VACCINATION POLITICS



The Comparative Politics and Policy of COVID-19 Vaccination

Edited by

Scott L. Greer, Elize Massard da Fonseca, Holly Jarman, and Elizabeth J. King

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1 | Introduction

Vaccination Politics During the COVID-19 Pandemic

Holly Jarman, Elize Massard da Fonseca, Elizabeth J. King, and Scott L. Greer

The global drive to vaccinate populations against SARS-CoV-2, the virus that causes COVID-19, is one of the most significant public health efforts of all time. Between December 2020, when vaccines against the virus became publicly available for the first time, and August 2024, over 13.7 billion doses were administered worldwide (Mathieu et al. 2025). By contrast, around 500 million doses of influenza vaccines are administered globally per year (Yau and Gastner 2021).

This book examines the politics that shaped COVID-19 vaccination campaigns from production, authorization, and acquisition through distribution, promotion, and uptake. The COVID-19 pandemic tasked governments with creating mass vaccination campaigns on an unprecedented scale, at extreme speed, amid considerable scientific uncertainty. It is hard to overstate how difficult this was for even the best-prepared and most well-resourced governments. The creation and execution of COVID-19 vaccination campaigns challenged every aspect of governments' capacity and capability, individually and collectively. Governments entered the pandemic with unequal capacities—ranging from financial resources, to institutional experience, to technical expertise—and operated within diverse social and political contexts that shaped both the challenges they faced and the tools they could deploy.

The analyses in this book reveal the results of this extreme stress test, which differ significantly from evaluations of global and national preparedness prior to the pandemic. They show both the astonishing successes of some actors in meeting this enormous challenge and the significant deficiencies in both national and global efforts to match vaccine availability with need. They also make clear the stakes for future debates—in some cases, COVID-19 vaccination campaigns have undermined the core ability of political systems to aggregate interests and produce stable consensus, with consequences for the future of democracies as well as the future health of populations.

Taken together, these examinations of vaccine acquisition and distribution make illuminating studies of politics. Because they are so ubiqui-

tous, vaccination campaigns against COVID-19 represent a unique opportunity for scholars of comparative politics to learn more about how states respond to crises in varied ways. What, if any, are the common political patterns that characterize COVID-19 vaccination and its explanation? How and why did governments make different choices about vaccination production, authorization, distribution, and eligibility, and what were the effects? What destabilizing effects might these politics have on future vaccination and other public health efforts, dynamics among states and in the global health system, or the fundamental relationships between people and governments?

Bringing together case studies of 26 countries, the European Union, the African Union, and global institutions, compiled by 52 authors, this book identifies and examines the political factors that have shaped COVID-19 vaccination in order to begin to answer these questions.

Vaccination Campaigns as Politics

The body of scientific and social scientific work addressing vaccination is enormous. Yet comparatively little of it directly addresses the *politics* of vaccination: the power structures and dynamics that play an important role in determining the what, when, how, and who of vaccine availability and uptake. In public health and medical studies of vaccination, politics is often presented as something to be lamented, with authors sometimes suggesting that "politics" should be detached from the supposedly apolitical scientific processes of vaccine development and delivery (Sharfstein et al. 2021). Or it is discussed in the context of critiquing a very unequal global economy and intellectual property rights regime (Fischer et al. 2024). In political science, research on vaccination tends to focus on individuals' willingness to be vaccinated, where their party identity and political views heavily influence their stance on vaccines (Carpiano et al. 2023; Stoeckel et al. 2022). While these studies are important, they only present part of the picture.

Furthermore, few studies examine vaccines and vaccination from a comparative perspective. We know very little in aggregate about how countries make vaccine and vaccination decisions in the context of the strategies of other states and nonstate actors with global reach (Fonseca et al. 2025), and what we do know concentrates on relatively few countries (Fonseca, chap. 3, this vol.; Nachlis and Thomson 2024). Much of the overall literature on any element of vaccination politics and policy is about the United States, or a handful of European countries, though historians have done some excellent work (Blume 2017; Holmberg et al. 2017; Blume and Baylac-Pauly 2022; Colgrove 2006). While this makes the task of understanding patterns of COVID-19 vaccination across countries more difficult, it also presents an opportunity to develop new explanatory frameworks.

Vaccines and Vaccinations: A Complex Process

In part, this lack of attention to the comparative politics of vaccines may be explained by the complexity of vaccines and vaccination. Vaccine campaigns are a form of extremely direct government intervention with very significant consequences for individual and collective human health. The process of moving from analyzing a biological agent such as a virus to injecting members of the public with a protective vaccine is a complicated one with many decision points, each of which can be the focus of political conflict. Governments are key actors in this process. The extent, effectiveness, and visibility of government interventions are key determinants in vaccines' existence, safety, accessibility, and public acceptance.

Before specific vaccines even exist, governments can choose to support the development of vaccination-relevant science and technology and production facilities, as well as the creation of vaccine formulations themselves. Governments can then promote commercialization of these technologies and products. They can grant authorization for products to be sold in their markets based on evaluation of scientific evidence that they solicit, choose to base their decision on evaluation that occurs in another country, or even forbid products from entering their market. These actions result in *vaccines*. Vaccine politics, then, are problems of political economy, or the relationship between states and markets, involving intellectual property, concentrated expertise, advanced industries, and vast sums of money (Jarman, Fonseca, and King 2024). They can often be characterized by challenges common to other forms of market regulation that derive from heavy engagement with capital, including a lack of transparency and sometimes a lack of accountability around decision-making and the investment of public funds, significant formal lobbying by concentrated interests, fear of capital flight, nationalism expressed as fear of failure to compete against other countries, and tensions (and potential conflicts of interest) between interpretation of scientific findings and economic outcomes.

After vaccines come to market, governments are responsible for *vaccination*. Vaccination politics might be best understood as problems of social policy, that is, government action with the stated goal of addressing human needs and improving well-being. In many countries, governments are responsible for protecting the public by regulating the quality and safety of vaccines. They contract with producers to purchase vaccines in bulk, negotiating prices on behalf of their populations and health systems to ensure vaccine availability. Governments can then play various roles in how purchased vaccines are distributed, as regulators and payers within health-care and public health systems and as recruiters and trainers of vaccinators. In consultation with groups of scientists and medical and public health professionals that they convene, governments set core policies around eligibility for and timing of vaccination and determine

whether vaccines will be mandatory in some settings or for some demographic groups (Cacace et al. 2024). Governments can play a vital role in shaping public messaging around these policies and investing in public health campaigns, as well as regulating misinformation and disinformation about vaccines. Governments also make important resource allocation decisions that affect how vaccines are distributed in practice, with consequences for equity of access to vaccines across populations. Whether and by how much governments succeed in any or all of their stated social goals, whether as a result of the lack of capacity or of deliberate intent, are also a matter of politics.

In addition to domestic actions, governments also make these decisions on behalf of people in other countries, in the context of policies on international development, global health, and industrial policy, impacting who can access vaccines on a global scale. Countries are unequal in size of market, wealth, and the scale and competence of their pharmaceutical industries, and the resulting inequality in vaccination access and costs shapes vaccine politics. During the pandemic, this inequality exposed challenges facing global health governance, the limitations of multilateral aid, the concentration of industry, and the prevalence of a relatively aggressive form of vaccine diplomacy in which vaccine supplies were deployed in service of geopolitical objectives.

Vaccine politics cannot be fully understood without placing questions of inequality at the center. The COVID-19 vaccination campaigns starkly revealed both long-standing and emergent forms of inequity—between countries, within countries, and across population groups. Globally, wealthy nations secured the vast majority of early vaccine supply through bilateral deals, while low- and middle-income countries were left to rely on limited local production capacity (Massard da Fonseca et al. 2021; Usher 2021) or imperfect multilateral mechanisms such as COVAX, a global, public-private partnership for distributing COVID-19 vaccines bought by rich countries among poorer nations. States reliant on these multilateral mechanisms often received doses later than their rich counterparts, and in insufficient quantities. Domestically, the pandemic exposed and deepened disparities in vaccine access and uptake along lines of race, class, and geography, among others (Wrigley-Field et al. 2021). These inequities were shaped not only by the structure of health systems but also by political choices—about eligibility and prioritization. In many countries, marginalized communities experienced lower rates of vaccination, even when formal access was guaranteed (dos Santos Costa et al. 2021; Jarman, chap. 12, this vol.; Moore-Petinak et al., chap. 14, this vol.). Understanding vaccine politics therefore requires us to examine how power, resources, and representation interact to shape who gets vaccinated and when.

Vaccine acquisition and vaccination, we argue, are shaped by both social and economic values as embodied within, and contested by, units of government and other actors at multiple levels. Because of this, we

need to look at vaccine politics through the lenses of political economy and social policy simultaneously if we want to answer questions such as how and why governments respond to viral threats through vaccine campaigns in the ways that they do.

By examining vaccines through the lens of political economy, we can derive insights about public investment in science and its effects on vaccine development, state approaches to vaccine purchasing and procurement, and research examining the regulation of vaccines in terms of market approval and post-market quality and safety. We can also examine the effects of state regulation or lack of regulation on media markets, the exchange of information, and the commercial drivers of false health claims.

By examining vaccination through the lens of social policy and its effects, we can derive insights about the impacts of vaccination eligibility policies on vaccine uptake, the effects of government communications on vaccine hesitancy, how patterns of government authority and finance shape vaccination capacity, and the ways that welfare state provision supports or hinders access to vaccines as a corollary of access to care.

It is then important to consider the extent to which political conflicts around vaccines and vaccination overlap in any particular case, which, we argue, has a lot to do with the politics of attention and agenda setting. Is the virus in question widely considered to be an urgent problem in need of policymakers' attention? Or is it a condition—a virus that while it is spreading among a population or some subgroup is not seen as a problem by elites or the wider public? Absent a perceived urgent need to fight an emerging disease threat, vaccine research, formulation, acquisition, and distribution can take time. There can be significant temporal gaps between the development of a vaccine technology (such as mRNA), development of a new vaccine, evaluation of the vaccine for safety and effectiveness, acquisition of the vaccine by governments, and distribution to members of the public. Should the presence or spread of a virus be framed as a big enough threat, however, there is huge pressure to compress the time between all of these steps.

The COVID-19 pandemic brought these dynamics to an extreme. Vaccine acquisition and distribution were global challenges, of high salience to most people and groups, and happened over a period of months, not years as part of historically large campaigns. Nevertheless, engagement of whole populations around the question of vaccination in the early pandemic, combined with rapid decision-making around the safety and efficacy of vaccines, an international race to acquire vaccines, and immense logistical and communications challenges, contributed to a certain kind of vaccination politics characterized by high conflict and deep international and subnational inequalities. This new vaccination politics is likely to persist over the coming years, with important consequences for human health and health systems.

A Wide Scope of Conflict and Limited Capacity to Incorporate It

The contributions in this book seek to bring together thoughts about both the political economy of vaccines and vaccination as social policy. In part, we do this out of necessity. Characterizing the politics of COVID-19, which engaged whole populations in high-stakes debates over compressed time periods, forces our analyses to grapple with the links between how governments acquired and approved vaccines and how they rationed and distributed them. But we can also draw theoretical lessons from this research.

One of the most significant characteristics of COVID-19 vaccination campaigns from a political perspective is that the scope of conflict around the issue became extremely wide. The "scope of conflict" is a core concept of politics. As the originator of the phrase, E. E. Schattschneider, wrote, the "outcome of all conflict is determined by the scope of its contagion. . . . At the nub of politics are, first, the way in which the public participates in the spread of the conflict, and, second, the processes by which the unstable relation of the public to the conflict is controlled. The second proposition is a consequence of the first. The most important strategy of politics is concerned with the scope of conflict" (Schattschneider 1960, 2–3). The COVID-19 pandemic, vaccine acquisition, and vaccination campaigns created an enormous scope of conflict, both within and between countries, affecting almost every living person. Many different types of actors at all levels of government and society, and most people, believed they had some stake in the outcome of this conflict.

As a global pandemic, COVID-19 affected almost everyone around the world, whether directly or indirectly. As of August 2023, 6,956,173 deaths from COVID-19 had been reported to the World Health Organization (WHO), with the actual death toll likely to be much higher. Large proportions of the global population have suffered negative health effects from contracting COVID-19, with some of those people impaired over months or even years as a result. Bereavement and disability ramified through families and societies. The economic impact of both the disease and the measures taken to prevent its spread has been felt by individuals (whether or not they themselves contracted the virus), communities, businesses and industry in every sector of the economy, charities and nonprofit organizations helping those in need, and public sector institutions including schools, transportation, and health systems. Most people and organizations, in one way or another, have been forced to form opinions about the pandemic and deal with its consequences over an extended period.

This broad conflict did not emerge all at once but rather unfolded over time as countries moved through successive phases of the pandemic (Massard da Fonseca et al. 2021; Wouters et al. 2021). In the pre-vaccine phase, decisions about research investment, procurement strategies, and preparedness planning were largely elite driven but shaped the conditions

for what followed. During the period of early vaccine authorization, politics turned to questions of regulatory capacity and scientific legitimacy—often highlighting global asymmetries in expertise and influence. As scarcity set in, competition for limited supplies intensified geopolitical tensions and exposed profound inequalities in access. Once rollout began, attention shifted to the challenges of distribution, prioritization, and communication—especially where trust was uneven and health infrastructure fragile. Understanding these temporal and structural layers is essential to explaining how vaccination politics evolved and why conflict intensified in some contexts more than others.

For vaccines specifically, the studies in this book document a global increase in political conflict around vaccination policies and the mobilization of vaccination opponents to a greater degree than observed in prior decades. This effect, while not observed to the same degree across countries, does exist even in some countries where vaccination decisions have been relatively uncontroversial in recent years.

Against this heightened salience and broad conflict, the government response in many countries was a concentration of authority, in terms of both concentrating authority at the national level of government and concentrating authority in the core executive within national bureaucracies (Greer et al. 2022). This was partly for functional reasons that relate to political economy and the central tendencies inherent in most national constitutions when it comes to shaping markets. Acquiring and approving vaccines involves the exercise of government functions that are primarily functions of national executives, and the success of COVID-19 vaccination campaigns was conditioned, in part, by these existing national bureaucratic structures. Lodging technical capacity at the center potentially creates more efficiency during a time-sensitive crisis, but it is also a political strategy. Across the countries examined in this book, states with lower capacity were often more centralized because lower-level units were not trusted by leaders to use discretion appropriately.

From a global perspective, centralization at the national level meant vaccine nationalism. This took two competitive forms. On the demand side, countries fought against other states to acquire vaccines. Governments frequently prioritized vaccination for their own populations over people living in other countries rather than taking a global approach to distribution based on need. On the supply side, large states with "homegrown" vaccines competed to distribute them in other countries, both selling them for economic profit and donating them for political influence and sometimes using their successes to reinforce their domestic legitimacy (Chester and Shih 2024). These supply- and demand-side tensions weakened regional and global cooperation through mechanisms such as COVAX, strengthened the global positions of some individual states such as Russia and China, and arguably damaged broader collaboration between poorer and richer countries in the long term.

Within national bureaucracies, routine decisions about vaccines are frequently made within narrow, not particularly transparent or participatory, institutions designed to manage the expectations of private actors and other interested elites rather than the wider public. In some cases, these institutions made decisions about COVID-19 vaccines much like they make decisions about other vaccines. Complicating this picture, however, was the very high salience and wide scope of conflict around COVID-19 vaccines. This high salience engaged core executives in most places, causing them to put extensive political pressure on health agencies to come up with certain answers on both vaccines and vaccination (Greer et al. 2024). Taking it further, leaders in some cases took direct control over decision-making to achieve the results they wanted to see. Heads of government sought credit for procuring and approving vaccines when these actions were viewed positively by the public; downplayed vaccines relative to other COVID-19 responses when vaccines were seen as a political liability; and in many cases sought to potentially deflect blame by exercising tight control over messaging, scientific advice, and the publication of data (Jarman et al. 2022; Jarman et al. 2024). Only when there was more blame than credit to go around did central governments decentralize responsibility to hapless governors, mayors, and scientific advisers. Shifts in blame contributed in some cases to a lack of transparency and accountability in decision-making and fed public confusion about how decisions were being made and the evidence on which they were based (Greer et al. 2022).

The combination of an enormous scope of conflict and centralized, crisis-driven authority produced a combustible political mixture. Samuel Huntington once located the source of political instability in the relationship between mobilization—the extent to which different actors were politically engaged and ready to make demands—and incorporation—the extent to which the political system could engage them in the process peacefully and satisfy them with some combination of recognition and reward such that they remained engaged in peaceful politics (1968). The capacity of a political system to absorb mobilized interests and respond to them was a necessary feature of stability and successful policymaking.

Viewed through this lens, COVID-19 saw a high level of mobilization and an enormous scope of conflict in the context of institutions with limited ability to incorporate those forces. Populations that had already been affected by disease, death, economic and educational disruption, lifestyle changes, and unusual mandates were now offered a vaccine—a vaccine that promised to some the restoration of normal life and to others a new threat to their freedom and bodily integrity. Conflicts over access and prioritization flared alongside anti-vaccination movements that undermined vaccination campaign goals and political comity in many countries. The integrity of information systems, including media outlets, data hubs, and government communications units, was strained by the rapid pace of events (McKee 2025). Public health and regulatory systems that were built

for very limited contestation were overwhelmed by conflict and, in many cases, lost political support.

Capacity and Trust

If the commonalities across these cases are a very broad scope of conflict on a high salience issue and a common response from executives of centralization of power and control, variation occurs in terms of two factors: capacity and trust. Capacity refers to the ability of actors, both state actors and those working with states, to stand up and carry out a vaccination campaign. We can ask, To what extent are states, or groups of states acting through common institutions like COVAX or the African Union, able to acquire, regulate, and distribute vaccines? What are their strengths and weaknesses in terms of available finance, workforce, infrastructure, practical experience, scientific expertise, or governance?

The second factor, which is harder to make concrete, is trust. As a large body of research in public health and medicine shows, trust influences outcomes at many points during vaccine campaigns (McKee et al. 2024). What our book underlines is the importance of not only understanding public trust in the vaccine itself, including the historical and contemporary reasons why trust varies among groups in the population, but also understanding trust in the political institutions that back the development, production, promotion, and administration of vaccines.

The case studies in this volume emphasize the ways that variation in capacity and public trust influenced COVID-19 vaccine availability and uptake. As the following chapters show, trust and capacity depend on a lot of diffuse things, including the institutional factors and resources listed above but also the determinants of public opinion, news media and information environments, and a state's prior experience with similar outbreaks. For example, some states such as South Korea, Hong Kong, and some African countries had specific infrastructure, expertise derived from prior experience with disease outbreaks, or cultures of masking that improved their performance relative to the expectations of public health evaluations of preparedness.

These national experiences also reflect broader regional patterns that shaped the politics of vaccination. In Latin America, a legacy of universal health systems coexisted with dependence on external suppliers and deep political polarization. African countries, though often constrained in resources, coordinated impressively through institutions like the African Union and Africa CDC, pushing back against long-standing assumptions of passive dependency. In some areas, prior epidemic experience and strong administrative capacity contributed to early and decisive action, though outcomes varied significantly depending on regime type and geopolitical alignments. Some of these factors were not well explored for

some or all countries in comparative assessments made prior to the pandemic and indicate potential directions for future research.

But while we point to capacity and trust as areas that need further development when comparing countries' pandemic outcomes, we do not attempt to provide definitive answers to these puzzles, preferring instead to let case studies stand on their own merits. This is in part because the explanations for differences between COVID-19 vaccination expectations and outcomes are complex and sometimes idiosyncratic; context and details are vital. It is also because we have to be careful not to accept any classification of "good" and "bad" performing states without sufficient critical reflection. Arguably, a country that vaccinated a significant portion of its population but failed to vaccinate marginalized groups should not be classified as a highly performing state. Some states that were successful at mounting vaccination campaigns were not sufficiently prioritizing minority groups for outreach despite evidence of significant risks to those groups from COVID-19. Some countries were running successful vaccination campaigns but simultaneously compromising their populations' human rights in some or several aspects of their pandemic response. Some "successful" states have long been classified as authoritarian or semi-authoritarian regimes, or were experiencing democratic backsliding, and we should be careful not to highlight their "success" without also highlighting this political context.

In aggregate, the cases in this book make clear that capacity and trust are interconnected in ways that vary across political systems and regime types. They should be measured with politics in mind: as exercises of, and reactions to, power; as interdependent; and as part of feedback loops within complex systems. Any assessment of the capacity to conduct a vaccination campaign needs to grapple with the specific challenges of measuring trust in charged political environments. Where evaluations and rankings of pandemic or public health preparedness conducted prior to the COVID-19 pandemic were found wanting, it is arguably in an overemphasis on the assessment of capacity in the form of institutions, people, and things and a comparative underemphasis on the importance of trust as an integrated, political component of capacity. Addressing this problem requires, as our cases make clear, far more than extrapolation from vaccine campaigns prior to the pandemic. Public trust in vaccines and the institutions doing the vaccinating measured during lower salience vaccine campaigns did not necessarily predict public trust during the much larger-scale political conflict that was the COVID-19 pandemic.

Outline of the Book

This book focuses on comparing the political processes through which governments acquired vaccines against COVID-19 and engaged in vaccina-

tion campaigns. It picks up with many of the same countries and authors as *Coronavirus Politics: The Comparative Politics and Policy of COVID-19* (2021), which focused on the non-pharmaceutical public health and social policy interventions taken in the first year of the pandemic.

To understand the global political environment governments found themselves in, the book starts with a discussion of international actions. The global political arena for COVID-19 vaccine debates was a crowded place filled with international and regional organizations, charities, and networks as diverse as pharmaceutical regulators and anti-vaccination activists. Globally, the tension between national interests and global goods was resolved in favor of national interests, with the WHO-led COVAX scheme largely serving as a form of charity used by better-off countries rather than the collective human solution that it might have been (Fox 2024; Park 2024; Perroud, chap. 4, this vol.). Regionally, our examinations of the African Union and the European Union show more effectiveness and integrative momentum from both polities than might have been expected given significant vaccine nationalism practiced by some individual states (Balogun and Amaya, chap. 26, this vol.; Greer, chap. 6, this vol.). This is followed by a comparative discussion of the regulation of vaccines, in a chapter that points out just how little scholars have written or know about how regulations vary across countries or how states reference one another.

The first part of the book also addresses what the WHO leadership called the "infodemic" of misinformation that characterized the pandemic experience almost everywhere and undermined responses (Vissapragada, chap. 5, this vol.; *The Lancet Infectious Diseases* 2020). The infodemic was not just a shared experience of multiple countries but an explicitly transnational phenomenon with purveyors of misinformation working across borders to sow doubt about vaccines, promote ineffective treatments, and encourage resistance to public health measures—in democracies, in particular (Boräng and Carlitz 2024).

After setting the global stage, the book turns to the countries, discussing selected countries that exemplify the different ways regime, wealth, and politics interacted. We sought diverse and emblematic experiences from around the world as well as coverage of the powerful countries that shaped global vaccine science, production, and markets. This allows chapters to contribute to understanding how countries not just approached the social policy challenges of vaccination but also managed their situation in a very unequal world economy where vaccine knowledge and profits are concentrated in the hands of a few powerful countries. Each country chapter addresses the acquisition of vaccines, discusses the vaccination campaign—including decisions around prioritization, communication, and outreach—and then proffers an explanation grounded in the authors' expertise. These accounts show how governments confronted logistical hurdles, political resistance, and tensions around equity, all while operat-

ing under extraordinary pressure to act swiftly. Some focused early on procurement and regulatory autonomy; others depended on multilateral initiatives or donations. Beneath these choices lie deeper political dynamics: trust in institutions, the strength and structure of public administration, the role of health professionals, and the impact of social movements and misinformation. The conclusion draws out in more detail the themes that ran through chapters, including trust, polarization, capacity, global economic inequality, and the work of transnational anti-vaccination activists—offering a comparative portrait of how politics shaped not just vaccination outcomes but the very terms on which public health could be pursued.

Conclusion

Vaccines might be the most magical, Promethean technology that humans have ever invented. They have all the stunning scientific achievement of controlling electricity or going to space, but without the disadvantages. The COVID-19 vaccines might be taken as an equivalent instance of scientific advance, with centuries of research and investment allowing a transnational collaborative community of scientists to almost instantly sequence the new virus and have vaccine trials completed *within a year of the virus's first discovery*. People who had lived in fear, or stayed home far too much, had a credible reason to resume their lives, their education, their travel, and their socialization without fear of death by a respiratory virus.

Much of the political contention surrounding the vaccines, therefore, focused on access. Internationally, this meant the efforts by different countries to secure vaccine supplies as well as efforts to reform international health governance to enable egalitarian access and arguments about whether deeper changes, such as waivers of intellectual property rights, would be necessary to achieve global vaccine equity (Fischer et al. 2024). Within countries, it meant arguments about prioritization—that of COVID-19 versus other health needs in some countries but also that of specific groups for the limited number of vaccinations.

The contributions to this book illuminate the commonalities, contrasts, and many surprises that the COVID-19 vaccination campaigns revealed about politics, political economy, and public health. Trust and state capacity were put to the test in the context of both a catastrophic disease and a scientific triumph. The vaccines saved lives and changed lives—and also changed and revealed political systems in new ways. This book's authors show how.

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Part I

The International Governance of Vaccines and Vaccinations

2 | The TRIPS Waiver Debate

Intellectual Property Rights, Technology Transfer, and Access to COVID-19 Vaccines and Therapeutics

Kenneth Shadlen and Henrique Zeferino de Menezes

The outbreak of COVID-19 in early 2020 produced an enormous global crisis that affected nearly all areas of the world and nearly all aspects of global politics and economics. By June 2024, more than 7 million people had died from COVID-19 worldwide. As shocking as such a figure is, it still hides the human impacts of the pandemic, when compared to the estimated excess mortality data.[1] Throughout the entire pandemic period, more than 27 million cumulative excess deaths are estimated.[2] In addition to the widespread health crisis, the pandemic generated profound social, economic, and humanitarian crises that disproportionately affected vulnerable populations and low-income countries (Silveira et al. 2024).

A key tool for mitigating the social and human toll resulting from the transmission of SARS-CoV-2 was the development of effective and safe therapeutics and vaccines. With this aim, numerous initiatives and mechanisms of international collaboration were announced and implemented. Governments worldwide allocated substantial resources toward research and development of COVID-19 countermeasures, with the US government's Operation Warp Speed being a prime example (Kim et al. 2021). Simultaneously, the World Health Organization (WHO) developed instruments to stimulate scientific research and promote the sharing of trial results and technologies, aiming to facilitate faster development of vaccines and identification of effective therapies, such as Solidarity Trial[3] and the COVID-19 Technology Access Pool (C-TAP).[4] Organizations like the Coalition for Epidemic Preparedness Innovations (CEPI), with the support of different international organizations and philanthropic entities, also played a pivotal role, intensifying its efforts to fund vaccine research and production (Sampat and Shadlen 2021).

The rapid development of new vaccines to control the pandemic was astonishing. Within months from when the virus was identified, multiple candidates entered into development, and by the end of 2020, less than a year after WHO declared COVID-19 a global health emergency, the first doses of vaccines were administered (Barrett et al. 2022).

Notwithstanding these achievements, the challenges facing a successful global vaccination campaign included not just development per se but also manufacturing, distribution, and affordable access (Wouters et al. 2021). Considering the long history of conflicts over access to essential medicines that have marked previous global health crises, it is not surprising that conflicts over access to COVID-19 countermeasures (current and anticipated) began to receive considerable attention early in the pandemic (Spinney 2020; 't Hoen 2020).

In October 2020, fearing unequal distribution of vaccines and other countermeasures, the governments of India and South Africa presented a proposal to the World Trade Organization (WTO) that, its sponsors argued, aimed to speed up the production of vaccine doses, therapeutics, and diagnostic kits by diversifying producers. The central element of the proposal was to suspend various obligations contained in the WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), exclusively for COVID-19 countermeasures, with the expectation that this would increase the global diffusion of critical technologies, knowledge, and data needed to produce pharmaceutical products essential for addressing the pandemic. In short, there was a concern that intellectual property rights (IPRs) would create "artificial scarcity" (as they are intended to do) that would result in poorer countries experiencing unequal access.

The proposed "TRIPS waiver" sparked intense global debate. In June 2022, after nearly two years of discussion, WTO members announced a Ministerial Decision on the TRIPS Agreement, an agreement that diverged significantly from the initial ambitions, limited to clarifications on compulsory licensing and restricted solely to vaccines.

This chapter discusses the TRIPS waiver negotiation process, including the arguments presented by its advocates and critics, and what was achieved in the negotiations. Advocates of the waiver viewed it as a crucial measure to accelerate vaccine production and thus avoid repeating tragedies experienced in previous global health crises. Indeed, proponents of the waiver often draw parallels with the HIV/AIDS crisis, citing lessons learned from that period in increasing production and access to critical medicines.[5] In contrast, opponents of the waiver, including high-income countries and their pharmaceutical companies,[6] argued that it was misguided, threatening to global innovation incentives, and based on an incorrect understanding of the challenges involved in scaling up vaccine manufacturing and a misleading invocation of the HIV/AIDS crisis. Underlying these conflicting perspectives are broader disagreements regarding the TRIPS Agreement itself, the role of IPRs in pharmaceutical innovation and access to medicines, and the historical global position of global pharmaceutical companies.

The chapter includes four sections. In the first section, we examine the context of vaccine inequality that informed the waiver proposal and pres-

ent the rationale advanced by its advocates for why this was critical for boosting production of pharmaceutical countermeasures and achieving more equitable global access. The second section presents reactions and counterarguments that the proposal elicited, particularly those emphasizing the importance of IPRs to foster pharmaceutical innovation and the role played by voluntary licensing and technology transfer agreements to expand vaccine manufacturing. In the third section, we review the negotiating history leading to the June 2022 decision and compare the outcome reached with the TRIPS waiver as it was originally proposed. Finally, in the fourth section, we offer some concluding reflections on the broader implications of this debate for global health and intellectual property governance. The specificities of this moment showed the urgency of cooperation between companies and the need to develop greater technological capabilities to respond to global health emergencies in the future.

Waiver Proposal: Context and Rationale

In October 2020, the governments of South Africa and India presented a proposal to temporarily suspend WTO members' obligations to apply and enforce sections 1, 4, 5, and 7 of part II of TRIPS, which pertain to the establishment of rights protecting information, knowledge, and know-how through the granting of copyrights, industrial designs, patents, and provisions for treating of confidential information.[7] Likewise, the obligations of part III, regarding the enforcement of IPRs, would be suspended in their entirety. The proposed waiver would apply to health products and technologies for the prevention, treatment, or containment of COVID-19, a definition that includes vaccines, therapeutics, and diagnostics (as well as materials or components and their methods and means of manufacture), and would be in force until widespread global vaccination had been achieved.[8]

The context in which the TRIPS waiver was proposed merits attention. Although the waiver would cover—and have implications for—all medical countermeasures, it was made at a time when vaccines were consuming the world's attention. In October 2020, vaccines were still in the development phase, with the world anxiously awaiting clinical trial results, and it was abundantly clear that access to these essential pharmaceutical products, when approved, would be highly unequal.

The principal instrument that had been introduced to avoid such an outcome, COVAX,[9] which aimed to procure vaccines on behalf of the world and distribute them globally on an equal basis, was floundering, a victim of "vaccine nationalism." High-income countries, which financed most vaccine development, bypassed COVAX, opting to procure doses directly from the producers; and in doing so they purchased quantities that would allow them to vaccinate their entire populations.[10] Moreover, with uncer-

tainty about which (if any) vaccines would succeed, countries made these advance purchase agreements with multiple developers, ultimately accumulating what in retrospect turned out to be excessive volumes.[11] Not surprisingly, this behavior inspired others to do the same: fearing being left out in the cold as scarce supplies were locked up, any country that could procure vaccines directly tried to do so as well, and as a result individual countries ended up tying down much of the output that was projected for 2020 and 2021 (Riaz et al. 2021; Santos Rutschman 2020). Countries less able to procure directly, however, remained dependent on COVAX, which was left undersupplied and thus unequipped to play the role it was designed to play (Borges et al. 2022; Mullard 2020; Usher 2021).[12]

Nor had originator companies (or their governments) supported multilateral efforts to share technology widely to enable more widespread global production. In May 2020, for example, WHO launched C-TAP, which created an opportunity for developers to share technology, data, and knowledge with other producers. The initiative was designed to boost vaccine technology transfer and increase production capacity by encouraging participation from both governments and the pharmaceutical sector. However, the initiative suffered due to a lack of commitment from participating countries and the reluctance of pharmaceutical companies to engage: By the end of 2021, countries with relevant technological capabilities, such as the United States and the European Union (EU), had not joined the initiative nor, importantly, had any vaccine-producing pharmaceutical firms.[13]

To be sure, vaccine developers were building production networks to meet the unprecedented demand, arrangements that included technology transfer (Bown and Bollyky 2022; Shadlen 2024). Yet they were doing so in ways that allowed them to retain greater control. Production networks for COVID-19 vaccines tended to be narrow, with a few selected partners—mostly in the United States and Europe—receiving technology transfer and participating in the manufacturing exercise either as licensees or contract manufacturers. Table 2.1 provides data on 12 important vaccines, as of mid-2022. The fourth column refers to the number of countries where the manufacture of the "drug substance," the key element of the vaccine (essentially the active pharmaceutical ingredient), occurred. The limited geographic extent of drug substance production is unmistakable, with the exception of the Oxford-AstraZeneca vaccine, which was produced by partners in 12 countries globally, including many developing countries.[14]

It was in this context of an emerging geographic concentration of production—raising fears about restricted vaccine supply and unequal access—that the governments of India and South Africa made their proposal to the TRIPS Council. While multiple factors were acknowledged as contributing to this situation, the proposal focused on IPRs as a significant barrier that was preventing potential producers from accessing relevant technologies and making production more geographically diversified. The waiver proposal was based on a diagnosis that IPRs threatened to impede the

TABLE 2.1. Production of the Key COVID-19 Vaccines: Global

Vaccine developer	Originator country	Output (billions)	Countries with drug substance production[a]
Pfizer-BioNTech	Germany-US	3.21	[2] Germany, US
Oxford-AstraZeneca	UK	2.9	[12] Argentina, Australia, Belgium, Brazil, China, India, Japan, Netherlands, South Korea, Thailand, UK, US
Sinovac	China	2.8	[1] China
Sinopharm	China	2.6	[1] China
Moderna	US	.90	[3] Spain, Switzerland, US
Janssen	US	.40	[2] Netherlands, US
Bharat	India	.35	[1] India
CanSino	China	.31	[1] China
Gamaleya	Russia	.28	[3] Russia, Belarus, Kazakhstan
CIGB	Cuba	.04	[1] Cuba
Novavax	US	.03	[2] India, South Korea
Finlay (Soberana)	Cuba	.02	[1] Cuba

Source: Data via Airfinity (2022).

[a]Note that number of countries is not the same as number of production sites, as some vaccine developers produced from multiple facilities (on their own or via partners in individual countries).

expansion of global capacity to produce and supply vaccines, therapeutics, and other technologies that were needed to respond to the pandemic and that reliance on voluntary agreements for the transfer of knowledge and the expansion of global production would be insufficient.

An important element of the waiver was that it would go beyond existing provisions in the TRIPS Agreement that allowed countries to override and circumvent IPRs to meet domestic needs, such as, most prominently, compulsory licensing.[15] Given the complexity of vaccine production, which relies on patented technologies but also data and know-how that are protected by other forms of IPRs (e.g., trade secrets), it was argued that a broad suspension of IPRs was in order. At the same time, it was also argued that compulsory licensing would not be sufficient, due to the multiplicity of patent applications covering single products, many of which would still be in the secretive phase and thus unknown to the public (patent applications are kept secret for 18 months after application). Thus, rather than enabling governments to identify the specific patents and patent applications on particular technologies and issue compulsory licenses, as allowed under TRIPS, the proposal instead suggested suspending relevant IPRs and thereby making them temporarily unenforceable. After all, some of the patent applications would have yet to be published, and the owners of granted patents can appeal compulsory licenses. The waiver sought to clear the field, giving local producers freedom to operate. This approach, it was argued, would be the simplest way to quickly enable diversified production (Bozorgmehr et al. 2021; Erfani et al. 2021; Kumar

and Bharti 2023; Ranjan and Gour 2023; Thambisetty et al. 2021, 2022; Thrasher 2024). The waiver proposal was also depicted by some of its supporters as a tool to pressure originator pharmaceutical companies to speed up and increase their voluntary licensing arrangements. That is, originators would be made to feel that if they did not expand their production networks voluntarily, they would face competition in the form of the new producers unleashed by the waiver.

Reactions and Counterarguments

Not surprisingly, the waiver proposal met substantial resistance, largely from Europe- and US-based originator companies and their governments—resistance that was ordinarily expressed in terms of concerns about the effects of suspending IPRs on the overall pharmaceutical innovation system. That is, on the same grounds that virtually all initiatives to reform TRIPS have been opposed since the WTO came into existence in the mid-1990s, critics of the waiver stressed the important role that IPRs play in stimulating private investment toward the development of useful biomedical technologies (Roffe et al. 2006; Sell 2003). By this logic, the waiver was a dangerous proposal that threatened pharmaceutical innovation and, more generally, jeopardized research and development in technological fields that rely on IPRs. These objections, which again are similar to those invoked whenever proposals to reform TRIPS are made, were often made without acknowledgment of the fact that public investment played such important roles in generating innovations during the pandemic.

Critics also maintained that the existing flexibilities in the TRIPS Agreement were sufficient to address any challenges that IPRs created. That is, to the extent that IPRs were limiting production or access, it was argued, countries could issue compulsory licenses and no additional changes to TRIPS were needed.

In addition to these off-the-shelf rebuttals of the case for a TRIPS waiver, skepticism about the proposal was also based on a different diagnosis of the root problem of concentrated supply, one that questioned the utility of relaxing IPRs as the solution. The basis of these reservations was the importance of technology transfer to enable non-originator pharmaceutical firms to produce vaccines quickly enough to confront the pandemic. Because of the important roles that tacit knowledge and know-how that is not disclosed either in patent documents or regulatory submissions play in learning to produce vaccines, it was suggested that additional manufacturers could only succeed with the support and engagement of the originator firms (Barnes-Weise et al. 2022; Garrison 2020; Mercurio and Upreti 2022; Santos Rutschman and Barnes-Weise 2021). Furthermore, the absence of a regulatory pathway for approval of imitation "generic" vaccines meant that producers acting independently of the originators—and

thus not included in the regulatory dossiers of approved vaccines—would have to conduct their own clinical trials. In such a context, it was argued, establishing "freedom to operate" for independent producers, as the waiver proposed, would be insufficient, as the non-originator firms, acting on their own, would struggle to produce enough vaccines or obtain regulatory approval quickly enough. Importantly, this perspective shares the concern with overly concentrated production but does not regard removing IPRs as helpful in addressing the problem.[16]

Indeed, from this vantage point, the waiver was regarded not only as insufficient but, potentially, counterproductive (Bacchus 2020; Mercurio 2021; Schultz 2024). That is, some observers pointed to the positive role that IPRs play in enabling increased production, by allowing originators to share technology without losing control and thus providing a secure environment for the realization and execution of licensing and technology transfer agreements. According to this logic, suspending IPRs might lead to less technology transfer and thus reduce global production.

From Proposal to Decision: The Long Pathway to "Decision"

The initial debate over the waiver reflected familiar cleavages in the international politics of IPRs and pharmaceuticals: the proposal to suspend IPRs was enthusiastically embraced by civil society organizations and many developing country governments and vehemently opposed by transnational pharmaceutical companies and high-income countries such as Japan, the United States, and the EU. In the context of an organization that relies on consensus decision-making, the waiver proposal stalled for the first months after India and South Africa submitted it.

Early 2021 witnessed the inauguration of a new president in the United States, with Joe Biden taking office in January, and a change in WTO leadership, as Ngozi Okonjo-Iweala became the new director general in March. These changes coincided with substantial inequality in access to vaccines, fulfilling the fears and predictions of 2020 that had motivated the waiver proposal. By May 2021, less than 1% of low-income countries' populations were vaccinated, and vaccination campaigns in many middle-income countries were stuttering due to unstable supplies.[17] The extreme levels of vaccine inequality that the world was experiencing at this time revived the debate over the TRIPS waiver.

In May 2021, the US expressed support, in principle, for the waiver. The announcement took many observers by surprise, as the US has consistently opposed initiatives to reform TRIPS in ways that would reduce the amount of protection enjoyed by intellectual property owners, but in this instance the Office of the US Trade Representative (USTR) called for negotiations to reach a consensus within the WTO on waiving IPRs for COVID-19 vaccines.[18] The US expression of support was limited, in that it referred

only to vaccines, and it did not constitute an actual proposal so much as a call to move discussions forward, but, nonetheless, the announcement served to trigger more discussion.[19]

Immediately following the US announcement, India and South Africa, now joined by more than 60 countries as cosponsors (and with the support of several nongovernmental organizations), presented a revised version of the waiver proposal.[20] The new proposal did not differ from the original in substantively profound ways, but it provided clearer definitions and sharper limits on the waiver's application and duration. The revised proposal narrowed down the waiver scope, for example, establishing the specific groups of technologies covered, in contrast to the original proposal that would have applied to any technology for prevention, containment, or treatment of COVID-19. The revised version also specified the duration for at least three years from the date of the decision, subjecting it to annual reviews, thus offering more precise language in this regard than the original proposal. Written in a world where vaccines existed and were being unequally distributed, rather than the world of late 2020 where such a scenario was merely feared, the revised version also warns about the risks of excessive delay in finding a solution to expanding global vaccination, given the continuous mutations and emergence of new variants.

In June 2021, the EU then presented its own proposal, which would serve as a counterpoint to the India/South Africa initiative.[21] As would be expected, the EU's proposal emphasized the importance of intellectual property and TRIPS for pharmaceutical innovation and pointed to the necessity of legal certainty on the flexibilities provided for health proposals in the TRIPS Agreement. It also emphasized the urgency of strengthening multilateral instruments such as the COVAX Facility and efforts for voluntary technology transfer. Substantively, the most important part of the EU's proposal was to shift the focus from suspending IPRs to using compulsory licensing. That is, the EU statement reaffirmed WTO members' rights to use compulsory licensing and, in the context of the pandemic, proposed a set of adjustments to existing WTO rules on compulsory licensing and compulsory licensing for export that could, according to the EU proposal, simplify the use of such measures.[22]

Suspending IPRs versus simplifying provisions within TRIPS, the two broad approaches set out by India, South Africa, and their cosponsors, on the one hand, and the EU, on the other hand, framed the debate going forward. With the persistence of stark inequalities in global vaccination rates, the more transformative waiver proposal gained momentum, and much of the analyses turned to whether its proponents would obtain the backing of three-quarters of WTO member countries to approve the waiver at the 12th Ministerial Conference (MC12), scheduled for late 2021 in Geneva.[23] Just days before MC12 was meant to begin, however, the WTO postponed the meeting on account of an upsurge in COVID-19 cases linked to the spread of the Omicron variant, events that were accompanied by

global travel restrictions.[24] While the initial postponement was indefinite, pending pandemic circumstances, in February of the following year the WTO announced that MC12 would occur in June 2022.

Although it is not clear if the three-quarters threshold would have been met in 2021, by the time MC12 occurred, six months later, the conditions of the pandemic had begun to change in ways that reduced the sense of urgency around the waiver. Importantly, in the latter months of 2021 and through 2022, the global vaccination campaign began to turn a corner, as scarcity of doses became relieved. By June 2022, the proportion of the global population receiving at least one vaccine dose had reached approximately 65%,[25] practically the same level as when the pandemic was declared over. To be sure, low-income countries continued to remain well below the global vaccination average (a condition that continues today), though by the middle of 2022 vaccine inequality could no longer be attributed to insufficient production—the problem that the waiver was intended to address.

With this shift in conditions, marked by the rise in vaccination rates and the end of the pandemic's most acute phase, and with the divergent positions on the table, representatives of the EU, India, South Africa, and the United States, supported by the WTO Secretariat, began a process of consultations in search of a compromise agreement. The document produced from these negotiations, the "Quad proposal," created a basis for the document that was subsequently adopted at MC12 in June 2022.[26] Although it included more details and addressed more provisions than what the EU had put forward a year earlier, the Quad proposal largely reflected the EU's vision to modify some provisions of TRIPS rather than suspend it, as well as the US's limitation on the scope to deal only with vaccines.

The June 2022 Ministerial Decision on the TRIPS Agreement[27] represented a solution of limited scope. In terms of substance, the Decision clarifies provisions contained in the TRIPS articles regarding compulsory licensing (art. 31) and protection of information disclosed to regulators (art. 39.3). Importantly, as we discuss below, the Decision applied only to COVID-19 vaccines, excluding all other technologies relevant to tackling the pandemic, such as therapeutics and diagnostics.

With regard to compulsory licensing, paragraph 2 of the June 2022 Decision states that "an eligible Member may authorize the use of the subject matter of a patent under Article 31 without the right holder's consent," reaffirming an existing flexibility in the original TRIPS Agreement, which the Doha Declaration on the TRIPS Agreement and Public Health had confirmed more than 20 years ago. The waiver offers a more substantive modification of TRIPS rules on compulsory licenses for export, which according to the original agreement were limited by a requirement that the output produced under a compulsory license be "predominantly" for the domestic market (art. 31(f)). These rules were modified with a reform

to the TRIPS Agreement, agreed upon in the wake of the 2001 Doha Declaration and formally introduced into the WTO rules in 2017, which simplifies the conditions for such compulsory licenses by waiving the "predominantly" requirement under specific conditions.[28] Paragraph 3(b) of the June 2022 Ministerial Decision simplifies the process further, stating that "an eligible Member may waive the requirement of Article 31(f) . . . and may allow any proportion of the products manufactured under the authorization in accordance with this Decision to be exported to eligible Members."

Regarding information disclosed to regulators, paragraph 4 of the Decision explains that article 39.3 of TRIPS should not impede the rapid approval for the marketing and use of COVID-19 vaccines approved under a compulsory license.[29] Here again, the Decision is confirming a flexibility that TRIPS already provides countries with regard to how they treat regulatory data disclosures—namely, that the protection against unfair use of data that originators are required to submit to national regulators to obtain marketing approval does not mean that originators enjoy exclusive rights and does not prohibit regulators from relying on said data for the assessment and approval of other products.[30]

Another way in which the Decision was limiting was its restriction on the range of eligible members. The flexibilities granted by the waiver apply only to developing countries, and it explicitly urges those with technological and productive capacities to produce vaccines not to use the waiver.[31] The exclusion of developed countries and the political pressure for the opt-out of larger developing countries with the technical capacity to produce vaccine doses significantly reduce the potential impacts of the waiver (Ranjan 2023).

What about other countermeasures, beyond vaccines? As indicated, the scope of the June 2022 Ministerial Decision was restricted to patents and regulatory data related to COVID-19 vaccines, consistent with the USTR's announcement from May of the previous year. The question of whether the Decision should be extended to diagnostics and therapeutics was to be decided within six months, according to paragraph 8 of the Decision, that is, by the end of 2022. As this deadline approached, however, the USTR requested that the United States International Trade Commission (USITC) undertake research to study the potential benefits of extending the TRIPS waiver to cover COVID-19 diagnostics and therapeutics, research that would guide the USTR's decision. Accordingly, the USITC held hearings in March 2023 followed by detailed investigations, culminating in the release of a report later that year.[32] However, despite these efforts, the USTR never announced a position on the issue, and by the eve of the WTO's 13th Ministerial Conference in February 2024, it became evident that the decision of whether to expand the waiver had been effectively dropped, leaving the topic off the agenda for further discussion.

The exclusion of therapeutics and diagnostics from the Ministerial

Decision, followed by the subsequent non-extension, merits discussion. Access to these non-vaccine countermeasures remains essential to the global strategy to tackle COVID-19 effectively. At the beginning of the pandemic, access to diagnostic kits and the identification of effective treatments were significant challenges for WHO, and this concern continues even with the pandemic formally declared over,[33] due to the persistence of social groups still excluded from vaccination, the existence of population groups where vaccines, even if available, are not recommended, and the durability of protection provided by vaccines. Even with the dramatic reduction in new confirmed cases of COVID-19 infection since the end of 2022, WHO recommends that countries make more significant efforts to improve access to COVID-19 diagnostics and therapeutics for their populations.[34] Yet inequalities in access to therapeutics are more acute than was the case for vaccines (Gleeson et al. 2023; Iacobucci 2022). As of mid-2024, even with the licensing of key antivirals such as molnupiravir and nirmatrelvir/ritonavir to the Medicines Patent Pool,[35] data from Airfinity shows that the use of these drugs has been overwhelmingly (69% for molnupiravir and 98% for nirmatrelvir/ritonavir) in high-income countries.

At first glance, the exclusion of therapeutics seems like a missed opportunity. After all, it is widely recognized that therapeutics—particularly antivirals—is where the waiver proposal could be effective. These are small-molecule pills, widely patented or with pending applications,[36] that non-originator pharmaceutical firms can imitate and obtain regulatory approval for without the need for technology transfer and assistance of the originators. Thus, reservations expressed about the effectiveness of the waiver are not applicable: for therapeutics (and, arguably, diagnostics), suspending IPRs to create freedom to operate could indeed be expected to stimulate independent production, which in turn could create competition, reduce prices, and expand access. To be sure, many actors continued to oppose any reform to TRIPS, in principle and with regard to innovation incentives, but the claim that suspending IPRs would not affect production and supply made much less sense in the context of therapeutics.

Yet once the original waiver proposal was limited to compulsory licenses and affirmations of TRIPS, however, then the case for extending the June 2022 Ministerial Decision to therapeutics became more difficult to sustain. To the extent that the Ministerial Decision represented only marginal changes from the status quo, the argument for extending it to therapeutics lost steam. That is, while the original proposal made sense for therapeutics (if not vaccines), the 2022 Ministerial Decision would have been close to trivial for therapeutics, making just marginal changes to pre-pandemic TRIPS rules. In its limited form, the extension to therapeutics and diagnostics would only facilitate the use of the compulsory license for export by developing countries with production capacity that have not opted out of the waiver.[37] To generate increased production, what would

be needed was not an extension of the June 2022 Ministerial Decision but something closer to the TRIPS waiver proposal itself—but that was no longer on the table. Thus, with opponents to an extension of the Ministerial Decision declaring "no more" and supporters of the original waiver proposal lamenting that extending the Decision was "not enough," the extension lost momentum and, not surprisingly, did not progress.

Conclusion

The year 2021 was marked by the circulation of mutating forms of the SARS-CoV-2 virus, yielding high daily death tolls, in the context of a profound crisis in global vaccine distribution. Vaccines existed, but for most of 2021 doses were in scarce supply, and their consumption was primarily in rich countries. The inequalities that the world experienced throughout much of 2021 validated the early concerns that motivated the proposal made by India and South Africa in October 2020 to waive TRIPS for COVID-19 countermeasures. In this chapter we have reviewed the context that led to this proposal, the reactions that the proposed TRIPS waiver triggered, the long process leading to the WTO's Ministerial Decision of June 2022, and the subsequent abandonment of the topic.

The June 2022 outcome was considerably less ambitious than the original proposal put forth by India and South Africa in October 2020. Two critical differences between the India/South Africa proposal and the WTO Decision were that the latter did not create freedom to operate by suspending COVID-related IPRs across the board but rather modified existing TRIPS provisions (largely around compulsory licensing) that allow countries flexibility in implementing the agreement, and the latter was restricted to vaccines only, excluding other technologies such as medicines and diagnostic tests. This trajectory was largely due to the lack of consensus on the proposal, as well as changes in the global pandemic landscape, such that by the time WTO members finally got around to deciding the issue, the worst period of vaccine inequality had passed. While it was never clear how much the TRIPS waiver as originally proposed would have affected the production and supply of vaccines, the absence of movement for COVID-19 treatments was a missed opportunity, as freedom to operate may have significantly expanded the production of medicines, which remain heavily concentrated in high-income countries.

The global response to the COVID-19 pandemic offers important lessons for addressing future health crises. One lesson regards mechanisms that affect the distribution of and access to essential health technologies. The pandemic exposed stark inequalities in access to countermeasures, including personal protective equipment and diagnostics from early in the pandemic, as well as vaccines and therapeutics as these became avail-

able. COVAX, designed to ensure equitable vaccine access, faced significant obstacles that prevented it from performing its mission. As we have discussed, direct purchases of vaccines from their developers by high-income (and many upper middle-income) countries left COVAX—and the countries that depended on COVAX—at the back of the queue. Even when COVAX began to focus on receiving donations of surplus vaccines, it faced the problem of receiving doses that were too close to their expiration dates to administer. These experiences point to the need for faster allocation and distribution mechanisms, to get vaccines to poorer countries more swiftly in future health crises. Allocating doses for global distribution could be a condition that governments and philanthropists attach to their funding of vaccine development.[38] Or advance purchases could be made not just for national but rather global use.[39]

Further lessons regard the critical role of licensing and technology transfer for scaling up vaccine production during the pandemic's peak and the geographic concentration or diversification of production. In the face of overwhelming global demand for vaccines, developers were not going to be able to produce enough doses on their own; licensing and technology transfer were indispensable. Indeed, developers established partnerships to build expanded vaccine production networks—but with the sole exception of the Oxford-AstraZeneca vaccine, these "global" production networks included few partners in the Global South outside of India. How to increase originators' interest in technology transfer and how to assure that more partners in the Global South are engaged are key challenges for global health governance. One proposal being debated in the drafting of WHO's Pandemic Treaty, for example, is to require recipients of public funding for vaccine development to share their technology more widely.[40] However, this proposition encounters resistance similar to that faced by the waiver proposal.

These observations regarding licensing and technology transfer offer an opportunity to reflect on another issue related to the waiver debate that has not been addressed directly so far. We have presented the waiver as being rooted in an assessment of originator-led partnerships as being insufficient. Yet another argument made by the waiver's advocates was that originator-led partnerships were problematic, in principle, because they reinforce technological dependence (Amin and Kesselheim 2022). By this logic, global pharmaceutical companies have too much control over how much would be produced and in which locations as well as to which countries and at what price the subsequent output would be directed. To address this problem, more transformative measures are needed, measures that do not reinforce but rather challenge and, it was hoped, counteract technological dependence on a handful of firms. Suspending IPRs, it was argued, could provide pharmaceutical companies in developing countries with easier access to scientific knowledge and could enable collaborations between companies and international organizations to learn

new processes and technical steps and to develop new production practices for future products.[41]

Although these two strands of argument often came from the same sources, they are different: The first presents the waiver as a solution to an immediate problem of insufficient technology transfer and vaccine output; the second presents the waiver as a deeper and longer-term problem of dominance by Big Pharma. According to the first line of argument, if there was enough technology transfer, the waiver would not be needed;[42] according to the second line of argument, independent of the amount of technology transfer, the waiver is needed to transform the global biomedical system. Some sceptics of the waiver also acknowledged that reliance on originator-led partnerships might reinforce technological dependence but regarded it as a price worth paying to achieve the immediate goal of increasing supply (Shadlen 2024).

In the long run, however, reduced technological dependence is an important goal. Had developing countries produced more of their own vaccines, for example, the failure of COVAX and the insufficient levels of technology transfer would have been much less problematic. Yet while many countries of the Global South aimed to develop their own vaccines, and some succeeded (e.g., Cuba and India), only China produced enough vaccines quickly enough to have substantial effects on the global pandemic response. Developing countries thus must work to build scientific, technological, and productive capacities to develop solutions for pressing health needs. Here we call attention to the many national and regional initiatives to increase productive capabilities that have proliferated in the wake of the COVID-19 pandemic, as well as collective efforts to develop and share technology, such as WHO's mRNA Technology Transfer Programme. Ultimately the two paths of partnership and technological development are not mutually exclusive, either, as capacities generated through these efforts can also help local actors absorb external knowledge, and more technologically advanced and productive local actors are also more likely to be regarded as potential partners by global pharmaceutical firms looking to expand their production networks.

NOTES

1. COVID-19 excess mortality is measured as the difference between the reported number of deaths in a given period and an estimate of the expected deaths for that period had the COVID-19 pandemic not occurred.

2. https://ourworldindata.org/grapher/excess-deaths-cumulative-economist-single-entity

3. WHO COVID-19 Solidarity Therapeutics Trial, https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov/solidarity-clinical-trial-for-covid-19-treatments, accessed November 4, 2024.

4. COVID-19 Technology Access Pool (C-TAP), https://www.who.int/initiatives/covid-19-technology-access-pool, accessed November 4, 2024.

5. The comparison between the COVID-19 pandemic and the HIV/AIDS crisis was often invoked. See, for example, the MSF Briefing Document "Compulsory Licenses, the TRIPS Waiver and Access to Covid-19 Medical Technologies," https://msfaccess.org/compulsory-licenses-trips-waiver-and-access-covid-19-medical-technologies, accessed September 11, 2024. See also, e.g., Correa (2024).

6. For a discussion of pharmaceutical industry lobbying in shaping the US position, see https://www.citizen.org/article/industry-lobbyists-work-to-influence-u-s-position-in-critical-global-health-negotiations/

7. Waiver from Certain Provisions of the TRIPS Agreement for the Prevention, Containment and Treatment of COVID-19: Communication from India and South Africa (IP/C/W/669), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/IP/C/W669.pdf&Open=True

8. On this specific point of duration, the October 2020 proposal was unspecific: "The waiver should continue until widespread vaccination is in place globally, and the majority of the world's population has developed immunity hence we propose an initial duration of [x] years from the date of the adoption of the waiver" (paragraph 13).

9. The basics of the plan for "fair" allocation, as originally designed, was that COVAX would purchase vaccines and distribute them (free or at discounted price, depending on countries' income levels) equally, in volumes proportional to countries' populations. See "COVAX Explained," https://www.gavi.org/vaccineswork/covax-explained, accessed September 11, 2024.

10. "WHO Chief Warns Against COVID-19 'Vaccine Nationalism,' Urges Support for Fair Access," https://news.un.org/en/story/2020/08/1070422, 2021, accessed May 6, 2024.

11. COVAX's focus eventually transitioned from distributing vaccines it purchased to distributing surplus doses that it received as donations.

12. This situation would worsen in April 2021 when the Indian government imposed an export ban, prohibiting the Serum Institute from supplying COVAX. In 2021, when global vaccination commenced, COVAX was almost entirely dependent on doses of the Oxford-AstraZeneca vaccine produced by the Serum Institute.

13. In March 2022 the US National Institutes of Health announced it would contribute the technology for a coronavirus antibody test to C-TAP. WHO, "US NIH Licenses to C-TAP," https://www.who.int/initiatives/covid-19-technology-access-pool/us-nih-licenses

14. The production networks of the originator firms in table 2.1 also included partners engaged in the final, "fill-and-finish" stage of vaccine production, and these activities were more geographically diverse. Yet companies engaging in fill-and-finish operations depend on the originators (and their upstream partners) for supply of the critical input, drug substance, so in terms of mapping the location of control, drug substance production is what matters.

15. Compulsory licensing is a legal mechanism that allows a government to permit a third party to produce or import a patented product without the consent of the patent holder.

16. In other words, the TRIPS waiver proposal was regarded as the wrong solution to the right problem.

17. https://ourworldindata.org/grapher/share-people-vaccinated-covid?time=2021-05-15&country=Low-income+countries~Lower-middle-income+countries~Upper-middle-income+countries

18. USTR, Statement from Ambassador Katherine Tai on the Covid-19 Trips Waiver, May 5, 2021, https://ustr.gov/about-us/policy-offices/press-office/press-releases/2021/may/statement-ambassador-katherine-tai-covid-19-trips-waiver

19. According to Pfizer's CEO, the USTR's announcement (which he abhorred and

claimed took him by surprise) prompted the company to accelerate and expand an initiative to earmark one billion doses that it would sell to the US government for distribution in low- and middle-income countries (124–31), what eventually became this program: https://www.bbc.co.uk/news/world-us-canada-58654350

20. Waiver from Certain Provisions of the TRIPS Agreement for the Prevention, Containment and Treatment of Covid-19, revised decision text (IP/C/W/669/Rev.1), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/IP/C/W669R1.pdf&Open=True

21. Draft General Council Declaration on the TRIPS Agreement and Public Health in the Circumstances of a Pandemic, Communication from the European Union to the Council for TRIPS (IP/C/W/681), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/IP/C/W681.pdf&Open=True

22. Specifically, the EU proposed three simplifications affecting countries' (1) requirements to obtain authorization from patent holders prior to issuing CLs; (2) determinations of rates of compensation for CLs; and (3) notifications of recipient countries in the case of patented products produced and exported under CLs.

23. The provision allowing for waiving aspects of WTO rules subject to three-quarters support is in article IX.3 of the Marrakesh Agreement, https://www.wto.org/english/res_e/publications_e/ai17_e/wto_agree_art9_jur.pdf

24. This was the second postponement of MC12, which was originally scheduled for June 2020 in Kazakhstan, https://www.wto.org/english/news_e/news22_e/mc12_23feb22_e.htm

25. https://ourworldindata.org/grapher/share-people-vaccinated-covid?time=2022-06-27&country=Low-income+countries~Lower-middle-income+countries~Upper-middle-income+countries~High-income+countries

26. Communication from the Chairperson (IP/C/W/688), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/IP/C/W688.pdf&Open=True, accessed September 11, 2024.

27. Ministerial Decision on the TRIPS Agreement: Adopted on 17 June 2022 (WT/MIN(22)/30), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/MIN22/30.pdf&Open=True

28. The amendment to TRIPS rules on compulsory licensing for export are article 31bis.

29. "Recognizing the importance of the timely availability of and access to COVID-19 vaccines, it is understood that Article 39.3 of the Agreement does not prevent an eligible Member from enabling the rapid approval for use of a COVID-19 vaccine produced under this Decision."

30. In other words, article 39.3 offers "data protection" but not "data exclusivity."

31. Footnote 1: "For the purpose of this Decision, all developing country Members are eligible Members. Developing country Members with existing capacity to manufacture COVID-19 vaccines are encouraged to make a binding commitment not to avail themselves of this Decision." This note, which is puzzling since, by definition, it's only countries with manufacturing capacities that could produce and export vaccines, was reportedly included to limit the export of vaccines from China. See https://www.devex.com/news/wto-finally-agrees-on-a-trips-deal-but-not-everyone-is-happy-103476, accessed September 11, 2024.

32. See "USITC to Report on COVID-19 Diagnostics and Therapeutics and Flexibilities Under the TRIPS Agreement" (https://www.usitc.gov/press_room/news_release/2023/er0201_63483.htm) and "USITC Releases Report on Covid-19 Diagnostics and Therapeutics and Flexibilities Under the TRIPS Agreement" (https://www.usitc.gov/press_room/news_release/2023/er1017_64434.htm).

33. https://www.un.org/en/delegate/who-chief-declares-end-covid-19-global-health-emergency

34. World Health Organization, "Strategic Preparedness, Readiness and Response Plan to End the Global COVID-19 Emergency in 2022," March 30, 2022, https://www.who.int/publications/i/item/WHO-WHE-SPP-2022.1

35. In October and November 2021, the Medicines Patent Pool signed two license agreements with Merck Sharp and Dohme (MSD) and Pfizer to facilitate affordable access to molnupiravir and nirmatrelvir/ritonavir in almost 100 countries, https://medicinespatentpool.org/licence-post/molnupiravir-mol and https://medicinespatentpool.org/licence-post/pf-07321332. It is interesting to note that some large developing countries, such as Brazil, Argentina, Colombia, Mexico, and China, were left out of these agreements.

36. MedsPal (https://www.medspal.org/) provides national-level data on patent landscapes (applications filed and patents granted) for the main drugs used in the treatment of COVID-19.

37. In fact, extending the waiver to therapeutics with the footnote excluding countries with manufacturing capacity not only would accomplish little in terms of affecting output but would be yielding a restriction beyond TRIPS.

38. CEPI funding includes such provisions. In the pandemic, however, some vaccine developers that received funding from CEPI also received more funding from governments, with the latter sources not including global access provisions. For a criticism of such an approach, see Sparke and Levy (2022).

39. An example of this would be the US purchase of Pfizer doses in late 2021 (discussed above). Were this to be expanded and replicated, done by more countries for more doses of more vaccines, we would essentially be recreating COVAX.

40. https://apps.who.int/gb/ebwha/pdf_files/WHA77/A77_10-en.pdf

41. How such a transformation would be generated by a *time-limited* waiver remains unclear.

42. Thambisetty et al. (2022) are explicit: the waiver could be used as a threat to induce more technology transfer on the part of originator vaccine developers.

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3 | Global Disparities in Vaccine Authorization

A Comparative Analysis of Regulatory Responses to COVID-19

Elize Massard da Fonseca

The COVID-19 pandemic exposed deep disparities in how countries respond to public health emergencies (Greer et al. 2021). One aspect of vaccine acquisition that is often overlooked in both the academic literature and broader public discourse, including in the media, is the process of market authorization for these novel technologies. During the pandemic, vaccine developers acted swiftly, redeploying research efforts to create innovative technologies, such as mRNA vaccines, or adapting well-known platforms to respond to the novel coronavirus (Lurie et al. 2020). In doing so, a series of regulatory decisions had to be made—from streamlining clinical trials to determining procedures for expediting market approval, including inspecting manufacturing facilities and assessing the safety and efficacy data provided by developers. This chapter examines the challenges of vaccine authorization during public health crises, focusing on the first COVID-19 vaccines approved, and compares strategies employed across countries of varying economic capacities, drawing on insights from the country chapters and additional relevant data where necessary.

Global Context and Regulatory Procedures During the COVID-19 Pandemic

Like other medical technologies, vaccines must be authorized for use in each country where the developer intends to market their product. The US Food and Drug Administration (FDA) and the European Medicines Agency (EMA) are regarded as two of the most advanced national regulatory authorities (NRAs) globally due to their expertise in regulatory science, extensive resources, and rigorous procedures for licensing medicines, vaccines, and devices (Halabi and O'Hara 2024). Moreover, they are widely trusted and serve as global standard setters for vaccine safety. Their regulatory systems are increasingly converging, a trend that Vogel (2012) attributed to scientific advancements, industry globalization, and

regulatory collaboration. Public health crises and advocacy for quicker access to medicines have further driven harmonization.

However, significant variation persists across LMICs (Halabi and O'Hara 2024; Pezzola and Sweet 2016). Differences in regulatory decisions would result in delays, fragmentation, and unequal access to life-saving technologies, as well as create trade challenges by complicating market entry, increasing compliance costs, and disrupting global supply chains (Molzon 2010; Pan American Health Organization 1997). Therefore, WHO and its regional offices have encouraged the use of harmonized guidelines and have called for countries to converge toward a common standard (Pombo et al. 2016).

Until the late 2010s, countries with limited regulatory capacity and donor organizations could rely on the WHO Prequalification Program to assess pharmaceuticals and devices, which ensured that these products met international standards (World Health Organization 2019). Originally established to guarantee the quality of vaccines bought by UNICEF, the Prequalification Program has helped donors have confidence in the products funded by their contributions and has provided countries with assurance regarding the quality of the products imported into their markets (World Health Organization 2019). However, Halabi and O'Hara (2024) criticized WHO for having limited capacity to streamline regulatory approvals during health emergencies, as it often depends on decisions of "stringent" regulatory authorities (SRAs) such as the FDA and EMA.[1]

Indeed, approval by SRAs was precisely the prerequisite for vaccines to be supplied through the COVAX Facility mechanism (see more about the COVAX initiative in Perroud [chap. 4, this vol.]). According to Halabi and O'Hara (2024), many LMICs had to rely on WHO's Emergency Use Listing, a procedure that assesses the suitability of novel health products during public health emergencies, and the Prequalification Program, which, in turn, depends heavily on approvals from SRAs. Specifically, most COVID-19 vaccines granted a WHO Emergency Use Listing before June 2021 were listed on the basis of EMA reviews (Halabi and O'Hara 2024). This was the case for the Pfizer, AstraZeneca, Janssen, and Moderna vaccines. For the remaining two, WHO relied on the manufacturers' home regulators as the NRAs of record: China for Sinopharm and India for Covishield (a version of AstraZeneca's vaccine produced by the Serum Institute of India).[2]

This reliance caused delays in COVID-19 vaccine access for these countries. However, it is worth noting that WHO is transitioning from a donor-funded procurement model to increased reliance on locally financed medical product supply (Macé et al. 2022; World Health Organization 2019). To support this shift, WHO has introduced new initiatives to strengthen national and regional regulatory systems while promoting greater ownership of regulatory processes at the local level (Broojerdi et al. 2024). The WHO Global Benchmarking Tool provided the first standardized framework for assessing regulatory systems across various countries

(Broojerdi et al. 2020). Among the 194 WHO member states, only 50 (26%) have been classified as having mature regulatory agencies, predominantly European countries and other HICs. In contrast, 45 countries (23%) have stable and well-functioning regulatory systems, while more than half, 99 countries (51%), remain at the lowest level of regulatory maturity, highlighting significant gaps in global regulatory capacities.

While countries had varying capacities to regulate pharmaceuticals, they needed to act swiftly to facilitate the entry of novel COVID-19 vaccines or, at the very least, avoid obstructing their approval and distribution. Regulatory agencies such as the FDA, the EMA, the Pharmaceuticals and Medical Devices Agency (PMDA) in Japan, and the WHO Expert Committees had already developed expertise and procedures to expedite the entry of innovative biomedical products through various emergency regulatory authorities (Simpson et al. 2020). One of these accelerated procedures was the rolling submission, where regulatory agencies continuously assessed data from ongoing clinical trials as it became available. The second was the rapid authorization of vaccines through emergency use authorizations (EUAs) or conditional marketing approvals (CMAs), allowing the temporary use of unregistered or unapproved vaccines during public health emergencies or products that address unmet medical needs based on early clinical data before complete data is available, respectively (Simpson et al. 2020).

However, numerous agencies in LMICs were unfamiliar with such emergency regulatory processes and standards (Halabi and O'Hara 2024; Nachlis and Thomson 2024), leaving them with two possible pathways (Fonseca et al. 2021, 2024). First, they could wholly rely on decisions made by other NRAs through direct recognition, where an NRA fully accepts the decisions of others without conducting additional assessments (National Academies of Sciences Engineering and Medicine 2019), as is the case with WHO's Prequalification Program and the Emergency Use Listing.

Second, they could use the regulatory reliance pathway, which allows an NRA to use the assessments or decisions of external authorities—such as more advanced NRA from other jurisdictions or international organizations—as part of its regulatory processes. This approach enables countries with less regulatory capacity to expedite the approval of critical health products by leveraging the expertise and decisions of more mature agencies (World Health Organization 2021). For countries with some regulatory capacity, procedural reliance is often favored over direct recognition, allowing regulators to draw on the expertise of more advanced NRAs while retaining the ability to adapt and respond to local needs (Fonseca et al. 2024). Unlike direct recognition, procedural reliance provides greater flexibility and does not limit regulators' decision-making autonomy.

Building on this background, we now compare the various strategies employed by countries across the economic spectrum in approving COVID-19 vaccines.

HICS: Regulatory Independence and Strategic Autonomy

This section traces the paths taken by Canada, the EU, Israel, the United States, and the UK, highlighting the choices that shaped their COVID-19 pandemic responses. These entities are grouped as they exhibited independence in their regulatory choices, using local capacities and experts when authorizing COVID-19 vaccines.

As discussed above, the FDA and EMA are usually regarded as the most capable and trusted NRAs, with the necessary capabilities to access novel technologies during a public health emergency. However, in December 2020, the UK stunned the world by becoming the first country to approve the Pfizer-BioNTech COVID-19 vaccine, just seven months after clinical trials began. Encouraged by public health demands and political pressure, the UK's Medicines and Healthcare Products Regulatory Agency (MHRA) moved unprecedentedly. It used an expedited process called "rolling submission," similar to what the FDA and EMA used, where data from ongoing clinical trials were continuously assessed. As Jarman (chap. 12, this vol.) demonstrates, some celebrated the rapid approval as a testament to UK innovation while European leaders and US officials criticized it for its perceived rush. While the UK government framed this as a Brexit victory, claiming that the separation from EU bureaucracy allowed quicker decision-making, the reality was more nuanced. The UK's regulatory framework remained tied to EU rules, Jarman (chap. 12, this vol.) explains, but its efficient bureaucratic processes and lower workload allowed it to act swiftly.

Canada followed suit, authorizing the Pfizer-BioNTech COVID-19 vaccine shortly after the UK on December 9, 2020, just after the tiny state of Bahrain in the Middle East (NPR 2020). Canada based its decision on a two-month assessment using the "Interim Order Respecting the Importation, Sale, and Advertising of Drugs for Use in Relation to COVID-19," which is similar to a rolling submission, allowing the NRA to assess the information submitted by the manufacturer as it became available during the product development process. However, it faced criticisms for delays compared to faster-moving counterparts like the UK (Trowbridge and Fafard, chap. 13, this vol.).

In contrast, despite the prominence of the FDA, the US took a more measured approach. The FDA's approval of the Pfizer-BioNTech COVID-19 vaccine on December 11, 2020, followed extensive scrutiny (Moore-Petinak et al., chap. 14, this vol.). The FDA's emphasis on evidence-based approval meant that the United States waited longer to authorize additional COVID-19 vaccines, with only three approved initially, compared to five in Canada. While slower than the UK and Canada, the United States used its massive pharmaceutical partnerships to quickly secure vaccine supplies, making it one of the first countries to begin large-scale COVID-19 vaccination.

Israel took a politically charged and unique strategy, as described by Sommer and Freund (chap. 30, this vol.). In an agreement with Pfizer, Israel secured early access to millions of COVID-19 vaccine doses by committing to share "real-world" epidemiological data. This agreement, personally negotiated by Prime Minister Benjamin Netanyahu, positioned Israel as a testing ground for the Pfizer-BioNTech COVID-19 vaccine. During negotiations with Pfizer, Israel leveraged its extensive digitized medical records as infrastructural capital. This strategy enabled it to obtain a substantial COVID-19 vaccine supply by providing Pfizer with real-time vaccine administration and efficacy data. These data offered crucial insights into the Pfizer-BioNTech COVID-19 vaccine's performance across an entire population in real-world conditions rather than in the controlled setting of clinical trials.

The foundation of this approach was Israel's ability to capitalize on its existing resources, particularly its robust health-care infrastructure and comprehensive digitized health data system (Tubi 2022). While this decision raised ethical questions about data privacy, it also positioned Israel as a global leader in vaccine deployment, achieving low mortality rates and high COVID-19 vaccination coverage by early 2021 (Sommer and Freund, chap. 30, this vol.).

EU countries had to wait for the EMA's centralized approval process, which took longer. As Greer explains (chap. 6, this vol.), the EMA's process for approving coronavirus vaccines, known as conditional market authorization, mirrors the standard licensing procedure for any new vaccine but operates on a faster timeline. While the EMA's thorough approach aimed to ensure safety and efficacy, it sparked public frustration and political backlash from EU member states, especially as the UK advanced rapidly with its COVID-19 vaccine rollout (Associated Press 2020). The EMA authorized the Pfizer-BioNTech COVID-19 vaccine on December 21, 2020.

Hungary was the only EU country to diverge from the EMA's approval process when it authorized the use of the Russian Sputnik V vaccine on January 21, 2021, due to frustrations over the slow pace of EU vaccine procurement and licensure (BBC 2021). This approval was made possible by Directive 2001/83/EC, which permits member states to temporarily authorize the distribution of unapproved medicinal products in response to threats such as pathogenic agents or other harmful agents during public health emergencies. The Hungarian National Institute of Pharmacy and Nutrition granted the COVID-19 vaccine a six-month EUA based on clinical trial data from Russia (Sputnik V 2021). The decision faced criticism from the EU, with concerns that it exemplified Prime Minister Viktor Orbán's tendency to act independently, further straining EU solidarity (BBC 2021).

Except for the Hungarian case, our review of approval reports from these NRAs showed no reliance on other regulatory authorities, affirming their high level of regulatory independence.[3] All these countries exhibited strong regulatory capacity, with minimal reliance on external data, each

adapting their strategies to their own capabilities and health infrastructure. The United States and the UK stood at opposite ends of the spectrum: the United States maintained its reputation for regulatory thoroughness, while the UK prioritized speed, setting the pace for much of Europe. Although slower, the EU and Canada aimed to balance scientific rigor with public safety. Finally, Israel's approach was notable for its unique, strategic use of real-world data.

LMICS: Balancing Risk, Reliance, and Regulatory Capabilities

We now turn to an analysis of countries that either had to rely on or chose to align with other regulatory authorities or international mechanisms when authorizing COVID-19 vaccines. These countries exhibited varying levels of regulatory maturity, indicating that LMICs possessed differing capacities to assess and authorize vaccines. Three broad patterns emerged among LMICs. Some NRAs accepted higher risk by authorizing vaccines before trials were complete, as in China, India, and Thailand. Others leveraged geopolitical relationships to secure early access, as in Pakistan and Thailand. Still others balanced regulatory reliance on SRAs with domestic autonomy, as in Brazil and Argentina. Several countries exhibited more than one of these patterns, and we discuss them in turn.

One notable observation from our comparative analysis of the LMIC chapters was the willingness of certain NRAs to take calculated risks by authorizing vaccines before the completion of initial clinical trials.[4] In the context of the COVID-19 pandemic, some NRAs authorized vaccines based on early data from phase 2 trials, prioritizing rapid access to potentially life-saving interventions over waiting for complete data. While faster, this approach also involved uncertainties due to incomplete information about long-term safety and efficacy.

Among those that accepted higher regulatory risk, the most prominent case was China's decision to authorize Sinopharm's Covilo on December 30, 2020, around the time that Western vaccines became available. As Seligsohn (chap. 18, this vol.) explains, China's National Medical Products Administration based its authorization primarily on phase 2 safety trials to grant EUA. Phase 2 trials can be conducted more quickly, as they do not rely on the prevalence of the disease in the environment to evaluate outcomes. Consequently, while the Chinese COVID-19 vaccines were deemed safe for use, it took additional time for comprehensive data on their efficacy to become available.

Similarly, the Central Drugs Standard Control Organization, India's NRA, approved the vaccines Covishield, developed by Oxford-AstraZeneca, and Covaxin, developed by Bharat Biotech, a local biotech firm, on January 3, 2021. As suggested by Dey, Raj, and Singer (chap. 22, this vol.), the Covaxin vaccine was authorized before the completion of phase 3 clinical

trials, contributing to fears surrounding COVID-19 vaccine safety and efficacy across the country. Notably, the Covishield vaccine was produced in India through a partnership between AstraZeneca and the Serum Institute of India, the world's largest vaccine manufacturer. The strategic importance of this partnership likely influenced the expedited authorization of the Covishield vaccine, as India positioned itself as a major supplier of COVID-19 vaccines globally.

Finally, Thailand authorized the Sinovac vaccine on February 22, 2021, before it had received approval from WHO and even before it had been approved by China's own Food and Drug Administration (Harris, chap. 24, this vol.). At the time, phase 3 trials of Sinovac showed disappointing results, with just 51% efficacy, barely meeting the global standard of 50% for emergency use. As Harris (chap. 24, this vol.) suggests, Thailand's decision to approve the Sinovac vaccine before broader international validation was influenced by its close political relationship with China. Under the government of General Prayut Chan-o-cha, Thailand had strengthened its ties with China. In October 2020, during a meeting with Prayut, China's foreign minister pledged to prioritize COVID-19 vaccine sales to countries in the region and to "friends" of China. Like India, Thailand also approved AstraZeneca's vaccine on January 23, 2021, which also had an agreement with the local pharmaceutical industry, Siam Bioscience. This agreement likely expedited AstraZeneca's approval, as local manufacturing would ensure a faster supply to meet Thailand's urgent vaccination needs. Similarly, according to Khalid, Aftab, and Fox (chap. 23, this vol.), Pakistan's ties with China facilitated the approval and local production of PakVac, a version of Sinopharm's COVID-19 vaccine. This relationship allowed these countries to secure vaccines early. Similarly, Pakistan's Drug Regulatory Authority approved Sputnik V (Russia) and CanSino (China) vaccines in early 2021.

A second pattern involved countries that combined regulatory capacity with strategic diversification of vaccine sources. Two other cases that stood out in our analysis were Argentina and Ghana. Argentina's National Administration of Medicines, Food, and Medical Technology (ANMAT) is a reference agency in Latin America, and Ghana's Food and Drugs Authority is classified as Maturity Level 3 by the WHO Global Benchmarking Tool (Owusu-Asante et al. 2023; Pan American Health Organization 2022). Despite global skepticism regarding its efficacy, Argentina approved the Sputnik V vaccine early in the COVID-19 pandemic. ANMAT's local and international recognition as a regulatory body allowed Argentina to be among the first to authorize COVID-19 vaccines developed in countries without global recognition. The approval process was shaped by a mix of pragmatism and nationalism, as ANMAT sought to diversify the country's COVID-19 vaccine sources while bolstering Argentina's role as a clinical trial hub. The government's decision to approve the Sputnik V vaccine early on was also influenced by public health needs and Argentina's desire

to assert its health sovereignty (Bortz et al., chap. 16, this vol.). Similarly, Ghana's decision to procure and authorize the Sputnik V vaccine was influenced by global supply shortages, particularly after India imposed a temporary export ban on AstraZeneca's COVID-19 vaccine, which was being produced at the Serum Institute of India (Quakyi 2021).

The third pattern, balancing regulatory reliance with domestic autonomy, is best illustrated by Brazil. Compared with the cases discussed so far, the Brazilian National Health Surveillance Agency (ANVISA) took a more conservative approach, closely aligned with Western NRAs (Fonseca and Rich, chap. 15, this vol.). As one of Latin America's most stringent health regulatory bodies, ANVISA also serves as a reference agency in the region, similar to ANMAT (Pan American Health Organization 2022). ANVISA adopted a balanced approach during the COVID-19 pandemic, combining autonomous decision-making with reliance on other SRAs. This mix allowed the Brazilian regulator to expedite vaccine authorizations by leveraging external expertise while maintaining its own stringent standards (Fonseca et al. 2024). By employing mechanisms like procedural reliance, ANVISA learned from advanced NRAs while adapting foreign decisions to fit local needs. According to Fonseca et al. (2024), this strategy also provided political protection, as relying on well-established external standards helped ANVISA resist domestic political pressures.

ANVISA adopted a stringent approach to the Sputnik V and Covaxin vaccines, delaying their authorization despite the political pressure from Brazil's governors and congress, who were eager to expedite COVID-19 vaccine rollouts. ANVISA raised concerns about the Sputnik V vaccine, as it contained viruses that could still reproduce, posing potential safety risks, and the Russian authorities were uncooperative in providing transparent data or allowing site inspections (Fonseca et al. 2024). Similarly, ANVISA scrutinized the Covaxin vaccine, requiring more robust clinical trial data before considering its authorization.

Finally, Malawi's regulatory framework did not demonstrate the same level of regulatory capability as discussed so far, illustrating the unacceptable challenges that LICs face. While middle-income countries (MICs) demonstrated greater regulatory autonomy, diversity in vaccine portfolios, and the ability to leverage political influence, LICs remained constrained by external dependencies (Ferree et al., chap. 28, this vol.). MICs could innovate within their regulatory systems, experimenting with nontraditional COVID-19 vaccines and engaging in local production, whereas LICs like Malawi were more bound by global frameworks and donations. Heavily reliant on international support, Malawi lacked the infrastructure to independently assess and approve vaccines. Instead, it depended on global mechanisms such as the COVAX initiative and the WHO Prequalification Program to guide its COVID-19 vaccine choices. Malawi's Pharmacy and Medicine Regulatory Authority established an expedited approval pathway that allowed for rapid authorization—within 15 days—of COVID-

19 vaccines already validated by the WHO or other SRAs (World Bank 2021). This reliance highlighted the constraints faced by LICs, where regulatory capacity is limited and decisions are often dictated by global governance systems.

Conclusions

In conclusion, the regulatory responses to COVID-19 across both HICs and LMICs illustrated diverse approaches that reflected their respective regulatory capacities, political contexts, and strategic priorities. While HICs like the United States, the UK, the EU, Israel, and Canada demonstrated regulatory autonomy, many LMICs moved beyond reliance on SRAs, displaying pragmatism and innovation (see table 3.1).

With robust regulatory agencies like the FDA, EMA, and MHRA, HICs exercised their capacities to autonomously approve COVID-19 vaccines. For example, the UK was the first to approve the Pfizer-BioNTech COVID-19 vaccine, driven by public health needs and political pressures post-Brexit. The FDA, known for its rigorous and evidence-based approval processes, prioritized safety and thorough review, approving COVID-19 vaccines only after careful assessment; however, it efficiently leveraged its existing partnerships with pharmaceutical companies to ensure early distribution. Israel took a unique path by negotiating access to the Pfizer-BioNTech COVID-19 vaccine in exchange for sharing real-world data, capitalizing on its digitized health-care infrastructure.

In contrast, LMICs like China, India, Pakistan, Thailand, Argentina, and Ghana responded to their regulatory challenges with local pragmatic decision-making, meaning that these countries prioritized practical and immediate responses to the urgent need for COVID-19 vaccines over adherence to stringent regulatory protocols. Such pragmatic decisions often involved authorizing vaccines based on limited or early-stage data, forming strategic geopolitical relationships to access vaccines, or making approvals rapidly to address public health demands, even if it meant bypassing certain standard regulatory procedures. China authorized Sinopharm based on limited phase 2 data, while India approved Covaxin before phase 3 trials concluded, driven by urgent domestic needs. Pakistan and Thailand leveraged geopolitical relationships to secure early access to vaccines like Sinovac and Sputnik V. Argentina's ANMAT, using its established reputation, approved Sputnik V to ensure vaccine diversity, while Ghana's FDA acted rapidly in response to supply shortages by approving Sputnik V as well.

Some LMICs demonstrated balanced approaches, as seen in the cases of Brazil and Argentina, where NRAs employed hybrid strategies of reliance and autonomy to adapt to local contexts while maintaining high safety standards. Finally, with limited regulatory capacity, Malawi relied

TABLE 3.1. Comparative Regulatory Responses to COVID-19

Category	HICs	LMICs
REGULATORY CAPACITY	Strong, autonomous regulatory agencies like USFDA, EMA, MHRA	Varies; countries often rely on external data and regulatory decisions (e.g., WHO)
APPROVAL SPEED	Fast approvals with stablished accelerated pathways, e.g., UK was first to approve Pfizer-BioNTech	Often slower or reliant on early trial data (e.g., India, China); some nations, like Argentina and Ghana, expedited approvals despite limited data due to urgent public health needs
AUTONOMY	Maintained high autonomy such as countries like the US	Reliance on other agencies or on geopolitical ties (e.g., China-Thai relations) or WHO for vaccine approval
NOTABLE APPROACHES	Israel shared real-world data with Pfizer; UK used rolling submission for quick approvals	Argentina and Ghana approved Sputnik V to ensure vaccine diversity; some nations authorized before phase 3 completion
CHALLENGES	Balancing political pressures, stringent requirements, and safety concerns	Regulatory delays due to dependence on SRAs; reliance on external expertise

Source: Authors' compilation.

heavily on external bodies like WHO for expedited COVID-19 vaccine approval, highlighting the stark disparities in regulatory infrastructure between LICs and MICs.

These cases underscore that both HICs and LMICs employed distinct strategies shaped by their regulatory maturity, political contexts, and global positioning. Strengthening regulatory capacities in LMICs is crucial for reducing dependence on SRAs and ensuring more equitable global vaccine access. Moving forward, global health governance must promote both regulatory autonomy and international cooperation to build a more resilient framework for future public health emergencies.

NOTES

1. The concept of SRAs emerged during the HIV/AIDS pandemic when donors needed a way to approve antiretroviral medicines for distribution in low-income countries (LICs). SRAs were then defined as member states of the International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use (ICH). The ICH is a global initiative that brings together regulatory authorities and the pharmaceutical industry to develop harmonized guidelines, ensuring that medicines meet consistent standards across different regions. A group of scholars

have called attention to the conflicts of interest within the ICH, as the network includes representatives of the pharmaceutical industry (Abraham 2002, 2010), and the effects of harmonized regulatory requirements created by the Global North on LMICs (Brhlikova et al. 2015).

2. "WHO EUL/PQ Status of COVID-19 Vaccines," https://extranet.who.int/prequal/sites/default/files/document_files/Summary%20Status%20of%20COVID-19%20Vaccines%20within%20WHO%20EUL-PQ%20evaluation%20process%20-%2021%20May%202024_0.pdf, accessed Oct. 25, 2024.

3. See authorization reports here: FDA, https://www.fda.gov/media/154869/download; Canada, https://covid-vaccine.canada.ca/info/regulatory-decision-summary-detailTwo.html?linkID=RDS00730; EMA, https://www.ema.europa.eu/en/documents/assessment-report/comirnaty-epar-public-assessment-report_en.pdf; MHRA, https://assets.publishing.service.gov.uk/media/615714bbe90e0719810813fe/Conditions_of_authorisation_for_Pfizer_BioNTech_vaccine__27_Sept.pdf, accessed Dec. 17, 2024.

4. In simple terms, pharmaceuticals undergo four phases of clinical trials, during which the product is tested on humans. In phase 1, the product is tested on a small group of people to evaluate its safety and dosage. In phase 2, a larger group is involved to further assess safety and begin to evaluate effectiveness. In phase 3, the trials expand to larger populations to confirm effectiveness, monitor side effects, and compare the product to existing treatments. Finally, phase 4 occurs after approval, focusing on post-market surveillance.

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4 | Global Governance of COVID-19 Vaccination

Janamarie Perroud

In the annals of the 21st century, the COVID-19 pandemic undeniably stands out for challenging geopolitics, health-care infrastructures, and economic frameworks alike. Amid these obstacles, the role of COVID-19 vaccines reached beyond a medical solution, becoming a nexus for discussions on global power dynamics, equity, and diplomacy. With COVID-19 vaccines at the center of pandemic response efforts, the global vaccination arena became the stage on which many of the dilemmas of our unbalanced geopolitical landscape were unveiled.

A spectrum of stakeholders came to the forefront, each exerting their particular influence, all aiming to shape the global response to the pandemic's vaccination challenge. Among these were a range of international organizations and UN agencies. The World Health Organization (WHO), an established institution in global health diplomacy, was positioned at the epicenter of the crisis. In the vaccination space, WHO's mandate covers normative guidance spanning vaccine policy, regulation, safety, and research and development (R&D) (WHO 2020a). The Coalition for Epidemic Preparedness Innovations (CEPI), a global coordinating mechanism for the development of vaccines against epidemic and pandemic threats, took on a coordinating role in supporting COVID-19 vaccine development efforts (CEPI 2021). Gavi, the Vaccine Alliance, serves as the global financing mechanism supporting vaccination in low- and middle-income countries (LMICs) and quickly became home to COVAX, the global COVID-19 vaccination effort (KFF 2021). UNICEF and the PAHO Revolving Fund act as the key procurement and delivery agents for vaccines among other health products across LMICs (UNICEF 2020). These organizations also provide technical assistance and guidance relating to vaccination policy and programs at local, regional, and global levels. Beyond these organizations, country governments and a number of regional organizations—notably the European Union (EU) and the African Union (AU)—played a prominent role in relation to the vaccination of their own constituencies and the degree of support provided to vaccinate others.

It is among these players that COVAX was born. The concept of COVAX was first introduced in a white paper authored by Richard Hatchet, CEO of CEPI (Hatchett 2020). The central idea was for all countries to collectively purchase vaccine doses through COVAX, ensuring equitable distri-

bution worldwide. By pooling their funds, countries would create an advanced market commitment to support vaccine development. Once these vaccines became available, they would be distributed through COVAX, ensuring that every nation received an equitable share based on set priority brackets (Hatchett 2020). However, COVAX's bold promise brought forth intricate dilemmas. The pooling mechanism, underscored by equitable distribution, would require nations to reevaluate entrenched tenets of sovereignty and national interest.

In the uncertain landscape of April 2020, WHO Director General Dr. Tedros Adhanom Ghebreyesus announced the launch of the Access to COVID-19 Tools-Accelerator (ACT-A) partnership, a global effort designed to address the impending and daunting challenge of developing and producing COVID-19 vaccines. The ACT-A was presented as a coordinated international effort to ensure access to the products needed to combat COVID-19 on a global scale and to guarantee that once a vaccine was developed, it would be available to all, irrespective of national borders or economic status (WHO 2020b). It was composed of multiple pillars, each with its distinct focus. Among these, the COVAX pillar addressed vaccines. Underpinning this ambitious venture were several key global health organizations, each bringing their expertise and experience to the table. COVAX was to be co-steered by CEPI, Gavi, and WHO. UNICEF and the PAHO revolving fund were also closely involved as delivery partners, and, of course, donations would be required from wealthier countries to make such an endeavor function (UNICEF 2020). COVAX was designed as a mechanism to pool resources for COVID-19 vaccine R&D, and eventually vaccine distribution, in order to expedite the creation and production of COVID-19 vaccines while ensuring equitable global access.

To uphold the COVAX vision, the COVAX Facility was established within the Gavi structure as the procurement arm, responsible for purchasing vaccines for 186 participating countries. Advance purchase agreements (APAs) for vaccines under development would be made for this full set of countries through COVAX, where wealthier self-financing countries would pay for their own vaccines and donor-funded doses would be made available to 92 LMICs through an advanced market commitment (Gavi 2020; Hatchett 2020).

The Evolution of the Global Vaccination Response

Like many idealistic ventures, the blueprint of COVAX was not without its vulnerabilities. For it to function as designed, the full and unwavering participation of wealthier nations was essential. This turned out to be a fundamental miscalculation. COVAX, in its optimism, perhaps expected too much of these affluent nations. It wasn't just about funding, though that was crucial. The initiative also banked on massive logistical support

and, perhaps most naively, a willingness from these countries to patiently await their turn.

In a world reeling from the impacts of this unprecedented pandemic, such patience was in short supply. The anticipation of a vaccine became intertwined with national interests, with many countries and regional international entities becoming increasingly protective of their resources. Unsurprisingly, these nations were resistant, if not outright opposed, to ceding their sovereignty to COVAX when it came to distributing vaccines (Pushkaran et al. 2023). The ethos of global cooperation, while admirable, clashed with the pragmatic concerns of national self-interest.

Nations of the Global North, with their economic and diplomatic influence, were in a position not just to impact the direction of vaccine distribution but also to ensure that their populations were among the first in line. Despite this challenge, COVAX continued its campaign of vaccines for all (Gavi 2020). However, the ethnocentric behavior of these countries posed significant challenges for the initiative aimed at democratizing vaccine access.

Soon after COVAX was established, its vulnerabilities became evident. Wealthy nations, with powerful economies and significant political influence, swiftly entered the COVID-19 vaccine market, eager to secure doses for their citizens. Engaging in bilateral APAs with vaccine developers, they staked their claims, reserving vaccine supplies that would cover their populations many times over. For instance, Canada, despite being a staunch advocate of COVAX, secured deals that would cover its citizens three times over (Forman et al. 2021). By August 2020, the United States and the UK had procured enough vaccines to cover more than 130% of their population (Usher 2021).

Paradoxically, these countries, even as they made individual deals, were the primary financiers of COVAX (Usher 2021; Forman et al. 2021), caught in a contradiction between securing vaccines for their own people first while funding an initiative aimed at ensuring fair vaccine distribution globally. This dichotomy put COVAX in direct competition with its benefactors in the market it aimed to equilibrate and devalued the contributions of COVAX donors.

As 2020 drew to a close, the first emergency use authorizations (EUAs) for COVID-19 vaccines were approved (WHO 2020c) and the concerns for COVID-19 vaccine equity became concrete. Wealthy nations, armed with their bilateral agreements, were quick off the mark, initiating mass vaccination campaigns. Meanwhile, COVAX faced a myriad of logistical and financial hurdles. Funds that had been pledged to COVAX were slow to reach the facility, delaying its opportunity to claim a share of vaccines. Higher-income countries effectively cornered the market on the COVID-19 vaccine supply for the foreseeable future (de Bengy Puyvallée and Storeng 2022), leaving COVAX, and much of the Global South, behind.

However, COVAX persisted in its mission to secure doses and by early

2021 had made significant headway with purchase agreements, albeit behind the Global North. The most notable of these agreements was with the Serum Institute of India, a deal that was intended to serve 91 LMICs (de Bengy Puyvallée and Storeng 2022). Unfortunately, COVAX met yet another impasse shortly after when India, home to the Serum Institute, was hit by the Delta variant of COVID-19. Its rapid spread and virulence took the nation, and the world, by surprise. In a response reminiscent of the wealthy economies of the Global North, India prioritized its own. Exports from the Serum Institute were halted, redirecting the vaccines to meet the domestic needs of its population of 1.38 billion (Srinivasan 2021).

Because of the limited vaccine supply from COVAX, the AU, which represents 55 member states—most of which had expected to get doses through COVAX—began to initiate its own vaccine procurement efforts through the establishment of the Africa Vaccine Acquisition Task Team (AVATT) (AU 2021). Unfortunately, their late entry into negotiations with manufacturers meant they were at the very end of the queue. Despite their successful fundraising, by the time the AU approached vaccine manufacturers, the entirety of anticipated vaccine stock for 2021 had already been preordered by others. This required the AU to once again count on the scant altruism of high-income countries to cede space to the AU in the market. Fortunately, by the end of the year, the AU and the United States agreed to a queue swap, enabling the AU to obtain some vaccines for their population (Health Policy Watch 2021).

Come mid-2021, global COVID-19 vaccination dynamics began to shift. In the affluent corners of the world, vaccination campaigns began to slow with critical masses having received their first series of vaccinations. With successful campaigns underway, it became evident to these wealthier nations that they had secured more doses than they could possibly administer. Recognizing this surplus, COVAX launched a diplomatic offensive, urging these countries to redirect their excess stock toward the facility (de Bengy Puyvallée and Storeng 2022).

Many nations heeded the call, and donated doses poured in, eventually accounting for over 60% of COVAX's vaccine distribution in 2021. But this pivot was not without its complications. The dose-sharing model came with significant logistical challenges. The Gavi and COVAX mechanisms were not built to absorb doses the way they did financial contributions. To make matters more complicated, vaccine manufacturers and donor countries, whether due to bureaucratic inertia or other factors, often faltered in delivering on their pledges in a timely and consistent manner. The ad hoc nature of these donations, sometimes accompanied by specific conditions or "earmarks," exacerbated the distribution chaos (de Bengy Puyvallée and Storeng 2022; Africa CDC 2021). It wasn't just about getting doses; it was about getting the right doses to the right places at the right time. The lack of foresight and coordination led to highly publicized failures: doses

expiring before they could be administered, shortages of vital ancillary supplies, and other related issues (Africa CDC 2021).

During this same period, The COVAX Facility was extended by the Gavi board for another year through 2023 with a view to progressively integrate the necessary COVAX functions into the Gavi secretariat. In a reflection of the steadily increasing coverage and waning sense of urgency in relation to COVID-19 vaccination around the globe, the lines between pandemic response and routine immunization efforts were blurring as COVID-19 vaccines started to be reabsorbed into the core programs of Gavi. Nonetheless, there remained an underlying acknowledgment: COVID-19, and the lessons learned from its global response, would shape the way global health entities functioned and strategized for years to come (Gavi 2023).

As the world ushered in 2023, reflecting on the previous year's monumental efforts to counteract the COVID-19 pandemic presented a nuanced landscape of triumph and persistent disparity. By the close of 2022, COVAX had delivered 1.88 billion vaccine doses to 148 nations worldwide (Gavi 2022), reflecting the persistence of the global vaccination community to overcome countless obstacles during an unprecedented global crisis in order to globally distribute COVID-19 vaccines.

By the end of 2022, only 3% of people in low-income countries were fully vaccinated against COVID-19 compared to 69% in high-income countries (UNDP 2022). The case of sub-Saharan Africa is particularly jarring, as the region trailed behind all others in COVID-19 vaccination rates, serving as a poignant reminder of persisting disparities (Turyasingura et al. 2023).

Amid these uneven distribution rates, high-income countries have ventured even further, rolling out booster shots and specialized vaccines designed for newly emergent strains of the virus (Shrestha et al. 2022). Such advancements, while crucial for enhancing immunity against the continually mutating pathogen, also widen the chasm between the Global North and Global South.

The financial ramifications of this global health crisis offer another layer of complexity. Pfizer, one of the pharmaceutical giants leading COVID-19 vaccine production, yielded $38 billion in sales from its COVID-19 vaccine alone in 2022 (Pfizer 2022). While the promise of such capital gains may have contributed to the unprecedented pace of vaccine development and distribution (Bloom et al. 2020), one must also consider the impact it had on the geopolitical decisions made within this framework, from the limited buy-in to the COVAX model, to the delay of the Trade-Related Aspects of Intellectual Property Rights (TRIPS) waiver, to the resulting social and economic costs exacerbated by global inequities in access to vaccines (Bloom et al. 2020; Pushkaran et al. 2023; Mizrahi et al. 2023).

Recent scholarship has offered detailed analyses of COVAX's development and the multifaceted challenges it faced. Key studies have critically examined COVAX's ambitious goal of ensuring equitable vaccine distribu-

tion, while highlighting the systemic issues that hindered its success. For instance, Pushkaran et al. (2023) point out that COVAX was designed with the best intentions but was fundamentally constrained by the structural limitations of global multilateralism. Wealthier nations, whose full participation was critical to the initiative's success, often prioritized bilateral agreements over global solidarity, which weakened COVAX's ability to secure sufficient vaccine doses early on. This failure to reconcile national self-interest with global health equity not only delayed vaccine availability for lower-income countries but also exacerbated global inequalities.

Forman et al. (2023) further emphasize the disparity in vaccine access, especially for low-income countries, noting that COVAX's promise of equitable distribution was hampered by monopolies on vaccine production and procurement. The study highlights how high-income countries, by securing vaccines directly from manufacturers, left COVAX with limited leverage in the global vaccine market. As a result, lower-income countries relying on COVAX faced delays in receiving doses, which were compounded by logistical challenges such as supply chain disruptions and vaccine delivery delays. This inequitable access underscores the difficulties of relying on a global mechanism that depends on voluntary contributions from wealthier nations.

In addition to the structural and market barriers, Jones (2024) explores the critical role of expertise in navigating the global health governance challenges during the pandemic. The study reveals how international organizations like WHO and Gavi had to adapt rapidly to a constantly evolving situation, often with limited political and financial backing. COVAX, in particular, struggled with the complexities of global health diplomacy, as it sought to balance the interests of diverse stakeholders—governments, international organizations, and the private sector—all while navigating geopolitical tensions and vaccine nationalism. These studies collectively underscore the inherent challenges COVAX faced, in terms of not just executing logistical issues but also navigating a global landscape where national interests frequently trumped collective action.

As we look back at the milestones and shortcomings of global vaccination efforts, it is evident that the journey to achieving equitable distribution is far from over. The juxtaposition of enormous profits against inequitable vaccine access underscores the need for recalibrating our strategies and policies to ensure that the principles of health and equity are not overshadowed by the political influence of the pharmaceutical industry in the geopolitical arena.

Addressing Intellectual Property in the Pandemic Response

A significant barrier to achieving global vaccine equity during the COVID-19 pandemic involved the complex issues of intellectual property (IP),

including patents, trade secrets, and technology transfer. Early in the pandemic, much of the global debate centered on patent rights, particularly around the TRIPS waiver proposal by South Africa and India in October 2020. This waiver sought to temporarily suspend IP rights on COVID-19 vaccines, enabling manufacturers in LMICs to produce vaccines without legal repercussions. Proponents of the waiver argued that suspending patents would democratize vaccine production and address monopolistic practices that restricted access to life-saving vaccines (Fischer et al. 2024; WHO 2021; PAHO 2021). However, critics pointed out that simply waiving patents would not solve the deeper problem of vaccine production barriers. Complex vaccine production, particularly for mRNA vaccines, requires more than just patents; it demands access to highly specialized manufacturing techniques, materials, and equipment—all of which are tightly controlled as trade secrets by pharmaceutical companies (Forman et al. 2023; Medicines Patent Pool 2022; PAHO 2021). Trade secrets include proprietary processes such as precise methodologies for lipid nanoparticle formulations and the stringent quality control measures needed to produce safe and effective vaccines. Unlike patents, trade secrets are not publicly disclosed and cannot be easily mandated for transfer through international agreements (Fischer et al. 2024; PAHO 2021). This lack of access to proprietary information ensured that vaccine production remained concentrated in a few high-income countries with the infrastructure and expertise to handle these sophisticated manufacturing requirements. LMICs that sought to produce vaccines faced insurmountable obstacles, prolonging the pandemic's devastating impact in these regions (Fischer et al. 2024; PAHO 2021).

In addition to the issue of trade secrets, technology transfer mechanisms, such as licensing agreements and collaborative R&D partnerships, were slow to materialize during the pandemic. Although the WHO launched its mRNA technology transfer hub in South Africa in 2021 to address some of these gaps, the initiative arrived too late to alleviate the critical shortages many countries faced at the height of the pandemic. The reluctance of pharmaceutical companies to engage in meaningful technology transfer agreements further delayed the ability of LMICs to ramp up local vaccine production (WHO 2021; Medicines Patent Pool 2022; WHO 2020a). The mRNA technology transfer hub, while a positive step, exposed the broader challenge: Without timely and robust collaboration from pharmaceutical firms, including sharing essential trade secrets, the promise of equitable global vaccine production remained out of reach (Forman et al. 2023; PAHO 2021). This reluctance to share technology perpetuated a system of dependency that left many LMICs unable to produce vaccines despite having secured IP waivers or licensing agreements.

To ensure equitable vaccine distribution in future pandemics, the global health community must prioritize both technology transfer and the sharing of trade secrets. Initiatives such as the WHO's technology transfer

hubs must be expanded and supported with legal frameworks that mandate the sharing of critical manufacturing knowledge, especially during global health emergencies. More collaborative R&D partnerships, transparent licensing practices, and frameworks that address both patents and trade secrets are essential to preventing the inequities seen during the COVID-19 pandemic (WHO 2021, 2020b).

Looking Forward: The Call for Vaccine Sovereignty in Africa

The pandemic renewed attention to the deep-rooted geographic inequities in access to medicines, particularly the lack of R&D capabilities in many African nations. Unlike countries such as Brazil and Argentina, which were seen as strategic partners for receiving vaccine technology (PAHO 2021), most of the African continent was not integrated into these critical collaborations. Without the ability to develop their own vaccines or attract significant technology transfers, African countries were left dependent on the goodwill of wealthier nations. Efforts to remedy these gaps, such as the mRNA technology transfer hub established in South Africa (WHO 2021), came too late to make a substantial impact during the height of the pandemic. As the challenges faced by COVAX revealed, however, this generosity was limited. Vaccine nationalism soon took hold, with wealthier countries stockpiling doses far beyond their immediate needs, pushing much of Africa to the back of the line. When vaccines eventually reached the continent, the delayed and poorly coordinated deliveries led to significant wastage and inefficient distribution (Africa CDC 2021).

These compiling logistical challenges underscored a larger issue. Pharmaceutical manufacturing in sub-Saharan Africa trails that of similar regions. The African continent as a whole imports over 80% of its pharmaceuticals and medical supplies (AUC-UNIDO 2012). This places it in a position of dependence on external assistance, a situation underscored by the COVID-19 crisis. Amid these disparities, a resonating idea began to gain traction: To circumvent such discrepancies in the future, Africa needed to be self-reliant in vaccine production. This was not just about responding to COVID-19 but about preparing the continent for future health crises. As it stands, Africa produces less than 1% of its vaccines. This results from the interplay of market forces. In terms of local capacity coming into the pandemic, there were few vaccine production sites in sub-Saharan Africa. The lack of capacity was reinforced by limited demand for such facilities. Gavi, which has served as the primary vehicle for vaccine procurement across the continent, sources just one of its 20 vaccine products—the yellow fever vaccine—from Africa, in Senegal (Gavi 2022).

The call for decentralized vaccine production isn't novel. It is an issue that has been raised in the wake of the H1N1 and Ebola epidemics, among other health crises (Gavi 2022). But in response to the COVID-19 pandemic,

the urgency became palpable. There was now a distinct shift in the global discourse, with increased buy-in from global stakeholders with the agreement that African capacity for vaccine manufacturing needed to be expanded (WHO 2023).

In 2021, the Partnerships for African Vaccine Manufacturing (PAVM) was established. Supported by the Africa CDC, the ambitious initiative aims to produce 1.5 billion vaccine doses by 2040 to meet 60% of Africa's vaccine need and is estimated to cost $30 billion over 20 years (Turyasingura et al. 2023; Africa CDC 2021). The project is comprehensive in scope, going beyond setting up manufacturing plants, with ambitions to facilitate technology transfers, ensure robust regulatory systems, and create sustainable demand (Africa CDC 2021). Currently, 12 vaccine production facilities are either in operation or nearing completion in 6 African countries: Algeria, Egypt, Morocco, Rwanda, Senegal, and South Africa. While only 3 of these countries host facilities that were considered capable of vaccine production (Africa CDC 2021), the PAVM has established a comprehensive framework outlining the necessary steps to scale up these efforts within and beyond the existing facilities (Africa CDC 2021).

Conclusion: Reflecting on the Global COVID-19 Vaccination Response

The global response to the COVID-19 vaccination effort provides a rich tapestry for discerning the intricacies of geopolitical interactions, state priorities, and the mechanics of global governance.

First, the disparities in vaccine distribution, though framed predominantly as issues of logistical capability and resource availability, offer deeper insights into the underlying structural asymmetries between nations. High-income countries, with robust infrastructures and established diplomatic networks, effectively maneuvered to secure vaccines, often in quantities exceeding their immediate needs. This nationalistic approach toward vaccine procurement of prioritizing national needs over collective global well-being subtly echoes the sentiments of realist paradigms in global politics. The timely discourse on health-care equity and vaccine nationalism has also rejuvenated debates on justice and ethics in the politics of global health. The moral imperatives of ensuring global health equity, contrasted with the practical challenges of doing so, illustrated the continuous struggle between supporting the collective good and serving national interest.

The COVAX initiative, while a commendable attempt at promoting equitable vaccine distribution, encountered a consistent stream of challenges throughout its operational journey. Tasked with the ambitious goal of coordinating vaccine distribution on a global scale, COVAX grappled with logistical intricacies, supply chain disruptions, and competing national interests. Furthermore, the discrepancies in financial and politi-

cal leverage among participating countries posed significant obstacles to its objective. Despite its foundational ethos rooted in multilateralism and shared responsibility, COVAX's endeavors highlight the complex and often contentious interplay of diverse national priorities in global health diplomacy. This examination of COVAX underscores the importance of understanding and addressing the multifaceted challenges that can arise in large-scale international collaborations.

The experience with vaccine procurement and distribution across the African continent reveals yet another layer of the global power dynamics. Africa's dependence on external benevolence, juxtaposed with the need for vaccine sovereignty, underscores the tension between dependency theory and the aspirations for self-reliance. The push for decentralized vaccine production in Africa, while rooted in health-care needs, can also be viewed as a broader quest for autonomy and agency in the global arena, seeking to reduce the continent's vulnerability to the whims and priorities of more powerful state actors.

Additionally, the role of multinational corporations, particularly pharmaceutical giants, and their interplay with states and international organizations during this crisis, invites a reexamination of the relationship and rules of engagement among these stakeholders. The unprecedented revenues and the consequent influence of these corporations in policy decisions underscore the nexus between economic might and geopolitical power.

This experience has led to calls for clearer global financing, cooperative agreements, and collective action for pandemic preparedness among the international community. In an effort to meet this need, the Financial Intermediary Fund for Pandemic Prevention, Preparedness, and Response (the Pandemic Fund) was launched by the G20 in November 2022 (World Bank 2022a). The Pandemic Fund, based out of the World Bank, has obtained pledges for approximately $1.9 billion and is intended as a dedicated stream of funding for pandemic preparedness and response through investments and technical support at national, regional, and global levels (World Bank 2022b).

While this initiative has been presented as a first step toward coordinating global efforts in pandemic preparedness, its success depends on factors ranging from the sustainability of funding for these efforts as the memory of the COVID-19 pandemic fades (KFF 2022) to the mechanisms by which these funds are disbursed to address pandemic preparedness and response in an increasingly vertical global health landscape dominated by organizations focused on specific health issues and interventions (CGD 2023). Time will tell if this mechanism succeeds in securing the funding, political buy-in, and operationality necessary to provide the much needed global support to systemic gaps in pandemic preparedness and resilience, such as local vaccine manufacturing capacity, especially on the African continent.

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5 | COVID-19 Vaccine Misinformation

Supply, Demand, and Context

Praneetha Vissapragada

After the global COVID-19 pandemic, the World Health Organization (WHO) identified another pandemic growing alongside COVID-19—an infodemic. They define an infodemic as "too much information including false or misleading information in digital and physical environments during a disease outbreak." Misinformation is harmful to health as it can "intensify or lengthen outbreaks when people are unsure about what they need to do to protect their health and the health of people around them" (WHO 2024). Misinformation was rampant during COVID-19. There was fear that the COVID-19 vaccine would cause autism (Caceres et al. 2022). There was a false link created between vaccines and 5G technology (Nyilasy 2024). This misinformation led to vaccine hesitancy, which lengthened the pandemic and led to avoidable mortality and complications due to COVID-19 (Lee et al. 2022).

The definition of "misinformation" has been widely debated in public health, political science, and other fields. The American Psychological Association defines the word "misinformation" as "false or inaccurate information—getting the facts wrong" and the word "disinformation" as "false information which is deliberately intended to mislead—intentionally misstating the facts" (APA 2024). These distinctions are difficult to parse through in public health. False information about COVID-19 vaccinations, for example, led to deaths from COVID-19 in many communities. Some of the false information leading to this result may not have been shared with "the intension of doing harm" but resulted in avoidable mortality.

One approach to understanding and addressing vaccine misinformation and disinformation during COVID-19 and more broadly is to understand the supply and demand of misinformation about vaccines and COVID-19 more broadly. The supply addresses who is spreading misinformation and why. The demand looks at why the public believes, continues to spread, and acts on misinformation. Beyond this, it is important to think about the context and environment that is facilitating the spread of health misinformation, which is spreading faster than ever before.

Supply: Where Does Misinformation Come From?

A survey conducted by the Centers for Disease Control and Prevention (CDC) showed that 49% of US respondents believe that COVID-19 vaccines contain a live strain of the virus and that 40% believe that vaccines can cause you to "get sick" with COVID-19. The CDC finds that belief in this COVID-19 misinformation led to a statistically significant decrease in the likelihood of getting the COVID-19 vaccine (Neely and Witkowski 2024). This was among the already vaccinated population. It can be assumed that the percentage of people who believe this misinformation is even higher in the population that did not get vaccinated for COVID-19. At the individual level, person-to-person spread of vaccine misinformation seems to be stemming from genuine mistrust and concern about vaccines. The questioning of the safety of vaccines in developed countries in recent times seems mostly to have been triggered by a retracted study by Wakefield et al. that showed a connection between the MMR vaccine and autism (1998).[1] The spread of misinformation about vaccines causing autism started with concerned parents sharing this study frequently on social media. Some online communities formed around the beliefs created by this study and added "evidence" of support from personal anecdotes and additional conspiracy theories espousing mistrust in government and pharmaceutical companies (Wang et al. 2019). A study by Krishna (2017) found that the most active propagators of vaccine misinformation on social media tended to be those who were already vaccine averse (Krishna 2017; Wang et al. 2019). It may be that these communities attract those already averse to vaccines and members then use misinformation to justify their beliefs. These forums may also include people who are unsure about vaccines and are convinced by misinformation to become vaccine hesitant. Studies show that those who share vaccine misinformation also tend to be less knowledgeable about vaccines (Krishna 2017). At this micro level, the intersection between knowledge about vaccines and vaccine hesitancy seems more clear—it offers an entry point for public health professionals to share correct information about vaccines to allay some of the fears in this misinformed group.

Within these communities, the spread of COVID-19 vaccine misinformation is incentivized by an online economic model. Herasimenka et al. (2023) find that 85% of websites that shared anti-vaccination misinformation had a monetization strategy. The most common was an appeal for donations. They also included the sale of information products—or misinformation products—and the sale of merchandise (Herasimenka et al. 2023). A 2020 report by the House of Commons on COVID-19 noted that financial gain was a key motivator for the spread of COVID-19 misinformation. The report quotes an expert noting that "[w]e are seeing a huge increase in scams and hoaxes and people motivated by financial gain" (House of Commons 2020).

In addition to economic incentives, some propagators of vaccine misinformation responded to political incentives—namely, the anti-vaccination activists who created the "anti-vax movement." Anti-vaccination movements are not new (College of Physicians of Philadelphia 2024). The difficulty of the modern anti-vax movement is that it has structured into organizations with high visibility and influence. The American-based National Vaccine Information Center, the Canadian-based Vaccination Risk Awareness Network, and the Australian Vaccination Network are vaccination "watchdog" organizations that spread misinformation about vaccines. SafeRescue and Generation Rescue are popular anti-vaccination websites that promote an activist attitude against vaccines (Kata 2012). Importantly, these organizations intentionally use disinformation tactics on social media to propagate these messages. Kata finds the use of four key tactics: skewing the science, shifting hypotheses, engaging in censorship, and attacking the opposition (2012). It is important to note that by spreading misinformation, these activists intentionally create mistrust against government and experts. We see this tactic repeated by other actors spreading vaccine misinformation—it has the dual effect of bolstering belief in the misinformation as well as supporting an environment of mistrust that allows for further spread of misinformation (explored later in the chapter).

A hazardous phenomenon in anti-vaccination misinformation is the influence that these anti-vax activists have had on politicians in power. In the United States, a Republican-controlled House Judiciary Committee used legal action to prevent misinformation research on COVID-19. Calling misinformation researchers "agents of the government," the committee accused the researchers of limiting freedom of speech (Lee Myers and Frenkel 2023a, 2023b). In fact, politicians themselves were a large source of COVID-19 misinformation. In the spring and summer of 2020, Donald Trump tweeted about the therapeutic effects of hydroxychloroquine for COVID-19 (Shabad 2020). The Modi government asked Twitter to remove tweets critical of his response to COVID-19 (Madhok and Suri 2021). In the UK, public concern that politicians were spreading misinformation about COVID-19 increased over the course of the first few months of the pandemic from 31% to 41% (Fletcher et al. 2020). Politicians' spread and support of misinformation about COVID-19 was motivated by two factors: policy agenda and political agenda.

In March 2020, UK Prime Minister Boris Johnson repeatedly underplayed the danger of the COVID-19 virus against the advice of WHO. On March 5, Johnson stated that "one of the theories is, that perhaps you could take it on the chin, take it all in one go and allow the disease, as it were, to move through the population without taking as many draconian measures" (Miller 2020). It is clear this misinformation shared by Johnson was in support of a Conservative Party policy agenda that was pro-business and anti-lockdown. This attitude was detrimental to the UK response,

which led to an unprepared National Health Service system and to many avoidable deaths (Horton 2020). In Brazil, Jair Bolsonaro's government urged a "return to normalcy" campaign with the slogan "Brazil cannot stop"; the aim of this campaign was to reopen Brazilian businesses while ignoring COVID-19 infection rates (Ricard and Medeiros 2020). We see a similar pattern in other countries: Jahn (2022) finds that the first wave of the COVID-19 response was significantly impacted by which party was in power, with left-wing governments passing more stringent lockdown policies than right-wing governments. Politicians largely responded to COVID-19 based on preexisting policy agendas—misinformation was support for these policy agendas.

Misinformation was used to achieve political agendas. In a televised speech about COVID-19 in April 2020, Modi stated that "much before the number of coronavirus patients reached 100, India had made 14-day isolation mandatory for all those coming in from abroad" (Penkar 2020). This was incorrect. Rather, this statement and other statements of misinformation shared in the speech were aimed at advancing a political agenda—to note how well the Modi government had been handling the pandemic. In contrast, at this time, COVID-19 rates were growing rapidly in India, though this was hidden by limited testing, with marginalized communities bearing the brunt of harsh policies (*The Lancet* 2020). Trump did the same in the United States, tweeting in July 2020 that the United States had "the lowest Mortality Rate in the World" (Trump 2020), which was false. Again, the purpose was political to ensure a positive association of the Trump administration response to COVID-19. In France, Les Patriotes politicians, an offshoot of Marine Le Pen's party, spread untested cures for COVID-19 under the hashtag "#antivax." This was to protest the Macron administration's national vaccine policy. The use of misinformation for political purposes was especially common among populist politicians. Misinformation is particularly well suited for populism, which aims to create mistrust of the "elites," which often include scientific experts (Mudde 2004). The intersection of anti-vax activism and populist politicians provides an interesting overlap in aims and methods of misinformation.

A final and significant supply of misinformation about COVID-19 and its vaccine was foreign actors. Disinformation campaigns as a source of foreign political influence have been a rising phenomena, not only in the health field but in many others. Russia's Internet Research Agency used bot forms to spread COVID-19 misinformation. Importantly, Russia's misinformation efforts did not create a new narrative but rather deepened existing divisions. In disinformation campaigns aimed at the United States, Russia targeted the right-leaning population by noting that COVID-19 is a tool for taking away freedom while at the same time targeting the left-leaning population by blaming Trump for the pandemic (Melewski 2020; Linvill and Warren 2020). The aim of these campaigns was to create

anxiety and panic in the population while sowing distrust of the US government. China, on the other hand, ran a narrative-based disinformation campaign to blame the origin of COVID-19 on the US military. In addition to this anti-US narrative, in Taiwan, the Chinese government spread misinformation to create "panic" among the public (Melewski 2020). An investigation by Reuters finds that the United States similarly ran a misinformation campaign in the Philippines against China's Sinovac vaccine. Using fake Twitter accounts, disinformation was spread using #Chinaangvirus—Tagalog for "China is the virus" (Bing and Schectman 2024). Started under the Trump administration, this campaign was created to undermine China's influence in the Philippines and to retaliate against China's anti-US narrative (Regilme 2024). COVID-19 misinformation as foreign policy was used all over the world. A study by Jones (2020) shows that in the Middle East and North Africa regions, COVID-19 disinformation was used by regional actors to "attack rivals or bolster the legitimacy of their own regimes." Disinformation as foreign policy is a strategy larger than COVID-19 and vaccinations, but the pandemic served as a microcosm where foreign policy and misinformation intersected to the detriment of public health.

Demand: Why Does the Public Believe and Continue to Spread Misinformation?

While there were many sources of COVID-19 misinformation, health experts and others advised the public about the risk and dangers of COVID-19 and vaccine misinformation. Despite these warnings, much of the public believed and shared misinformation about COVID-19 vaccines. While this is a newer area of study, researchers have some theories on the public belief and spread of misinformation.

One stream of research on epistemic belief and rumors may provide some insight. Epistemic belief is an individual's perception of the characteristics of knowledge; they develop this through socialization, and it is relatively stable over time (Rudloff and Appel 2023). Those who are epistemically naive believe that knowledge is rigid and easy to acquire; those who are epistemically robust consider knowledge fuzzy and difficult to require (Chua 2017). A study by Chua and Banerjee (2017) shows that epistemic belief is a strong predictor of the belief and sharing of misinformation: Those who are epistemically naive are significantly more likely to share rumors than those who are epistemically robust. Another way to think about epistemology is in the connection between knowledge and belief. To have knowledge about something, one must believe it is true (Audi 2011; Rose 2020). In the case of misinformation, those who already have belief systems that align with the information they are presented with are more likely to believe it (Rose 2020). Rudloff and Appel (2023)

identify three aspects of epistemic beliefs: (1) faith in intuition for facts, (2) need for evidence, and (3) truth as political. They find that individuals "who prefer to trust their intuitions, who put little emphasis on evidence and who think that facts are formed by those in power (post-truth epistemic beliefs) are particularly susceptible to fake news" (2023, 344).

A second theory is that belief in misinformation is augmented by political polarization. A study by Robeiro et al. (2017) on Twitter users finds that those who are more likely to share misinformation are also more likely to be politically polarized. On a larger scale, studies find that politically aligned media networks and channels are more likely to share misinformation (Teruel-Rodriguez 2023; Bauer et al. 2021; Stelter 2020). Jerit and Zhao (2020) show that preexisting attachments to a political party or ideology lead to biases in how people obtain and evaluate information about the political and broader world. Information that aligns with preexisting political ideology is more likely to be believed—even if it is false. They note the strong presence of confirmation and disconfirmation bias. Currently, the political environment in many countries in highly polarized. We have also seen that COVID-19 and vaccinations have been politicized by activists and politicians. Thus, in this charged environment, when misinformation about COVID-19 vaccines confirmed existing biases, it was more likely to be believed.

It is also important to note that political and ideological divisions do not just stay in the realm of politics but spill over into lifestyles. In their seminal paper "Why Do Liberals Drink Lattes?," DellaPosta et al. (2015) explore the "relational explanation" of ideological identity, or the role of peers and social organization in lifestyle and ideology. The authors define the relational explanation through two processes: social influence and homophily. Social influence is the method by which an individual's attributes are shaped by exposure to others. Homophily is the self-selection of ties to people who are similar to the individual. The result of the mutually reinforcing processes of social influence and homophily is network autocorrelation—the tendency for people to resemble their network neighbors. The authors find that social influence and homophily, paired with a demographic and political elite, create a significant effect. Related to COVID-19 misinformation, this could translate to the social pressure to hold the same beliefs as your peers. If you are in a community that is anti-vax, you are more likely to be anti-vax yourself and/or to share anti-vax misinformation to signal yourself as part of the community. The social influence on belief in vaccine and COVID-19 misinformation should not be ignored.

Finally, there is a theory that emotion may impact the circumstances under which people may be susceptible to misinformation. Sharma et al. (2023) conducted a systematic review of these studies and find mixed results. Overall, this literature finds that short-term stress can have a protective effect for misinformation, while a greater stress that triggers a cor-

tisol response may be associated with greater susceptibility to misinformation. Notably, information with a negative valance, or content that is undesirable, leads to greater incorporation of misinformation. Anger is also associated with increased susceptibility to misinformation. Though many avenues of this field of research are discussed in the article, none are conclusive. Much more evidence is needed in this area to better understand this relationship. That said, the COVID-19 pandemic elicited strong emotional reactions from the global population, including anger and stress. It is worth considering the role of emotions in the spread of anti-vaccination misinformation.

Context: How Does the Current Environment Facilitate the Spread of Misinformation?

Misinformation supply and demand in the health and vaccine arenas have existed since the start of public health. However, the world saw the first "infodemic" during COVID-19. This was partly due to the incentives for increased supply and appetite for this misinformation, as discussed above. Additionally, the specific information and political environment during COVID-19 facilitated the rate of misinformation sharing. This section addresses three of these contextual factors in more detail: social media, information overload and dearth, and trust.

Social Media

Much of the COVID-19 misinformation was spread on social media. According to a review by Caceres et al. (2022), 53% of the world is active on social media, including Facebook with 2.89 billion monthly active users and YouTube with 2 billion users. The reach and structure of information on social media have made it an optimal platform for the spread of misinformation. Lee et al. (2022) in a sample of working adults in the United States find that 57% of the sample had been exposed to conspiratorial misinformation about COVID-19. Even with the COVID-19 pandemic now under control, we continue to see the spread of misinformation in health. Recently, there has been misinformation about fluoride in water (Lotto et al. 2022; Edwards et al. 2024) and the spread of monkey pox (France 24, 2024).

The invention of new communication technologies has always resulted in an increased spread of misinformation. The spread of misinformation is not new—in 44 BC, there was a smear campaign against Marc Anthony (Posetti and Mattews 2018). This campaign was conducted through slogans etched on coins. The next great rise of misinformation occurred with the invention of the Gutenberg printing press, with false stories spreading more easily across Europe (Posetti and Mattews 2018). In 1938, the broad-

cast of the *War of the Worlds* drama caused panic in the public, with people unable to distinguish reality from fiction. The rise of 24-hour news cycles has led to partisan journalism and increased politically motivated misinformation (Bauer 2021).

Though this repeating pattern of rising misinformation with increasing technology has been seen in the past, social media may be an especially ripe forum for facilitating the spread of misinformation. Uniquely different from traditional media, social media platforms allow for direct communication to a large network of followers without benchmarks for fact or source checking. Though the lack of these benchmarks is thought to offer a more democratic sharing of data, incentive structures on these platforms highlight some posts over others. DiResta (2024) argues that social media encourages the spread of misinformation through financial and political incentives, as discussed in the previous section. She finds that media posts with misinformation tend to have more engagement than posts without (likes, shares, etc.). Thus, algorithms and influencers start sharing misinformation content over other types of content. The other unique feature of social media is its speed, which allows the spread of data before the content can be regulated (Muhammed and Mattew 2022). The ubiquitous online ecosystem of communication cannot be avoided and is a strikingly robust environment for the proliferation of misinformation.

Information Overload and Dearth

Misinformation and trust of rumors over expert sources of misinformation also occur in times of information overload or information dearth (Muhammed and Mattew 2022). Information overload occurs when a volume of dense information is difficult to understand because of the language or complexity of words used (Balan and Matthew 2020). Information dearth is the lack of localized or personalized information (Muhammed and Mattew 2022). During COVID-19, both phenomena were at play. Health organizations at global and national levels put out urgent studies and communications about the spread and prevention of COVID-19. Often, these communication materials used complex public health terminology not familiar to the average public. On March 11, 2020, Dr. Tedros Adhanom Ghebreyesus, the WHO director general, gave a speech to media to characterize COVID-19 as a pandemic. He ended the speech in this way: "Let me give you some other words that matter much more, and that are much more actionable. Prevention. Preparedness. Public health. Political leadership" (WHO 2020). On March 15, 2020, In the United States, Dr. Anthony Fauci, the director of the National Institute of Allergy and Infectious Diseases (NIAID) and chief medical advisor to the president during the COVID-19 pandemic, appeared on cable TV to discuss voluntary quarantine, transmission rates, ventilators, and other medical interventions for COVID-19 (Face the Nation 2020). While Dr. Tedros and Dr. Fauci were

correct in their assessments of COVID-19 and in the next steps to control this pandemic, these experts used densely scientific language to talk about COVID-19, which led many to seek simplified explanations on social media (Muhammed and Mattew 2022).

At the same time, there was a dearth of information. Most COVID-19 information in 2020 was focused on the spread of the disease at the global and national levels. The nature of viral pandemics meant that the first cases and most of the early spread happened in densely inhabited areas. As such, in the United States, most news channels and experts were focused on the spread of disease in large urban, metropolitan areas. Despite continuous news coverage on the pandemic and its effects, there was very little localized or tailored coverage of its spread, especially in rural or suburban areas. This phenomenon was worsened by decreased funding environments of local news, though a major trusted source for Americans during COVID-19 throughout the pandemic (Waldman and Sennot 2020). According to the Pew Research Center, one-third of Americans surveyed noted a lack of local area news about COVID-19. With friends and family as the third trusted news source after local news and local government, many turned to social media to understand the effects of the pandemic on their local communities, where misinformation was quickly spreading (Shearer 2020).

Trust

Lack of trust in experts and institutions facilitates the spread of misinformation. A study by Vinck et al. (2019) found that low institutional trust and belief in misinformation during the Ebola crisis were associated with less compliance with Ebola prevention protocols. Each one-point increase in government trust increased the adoption of prevention protocols and Ebola vaccine acceptance (Vinck et al. 2019). A similar pattern was observed during COVID-19. Studies have shown that a lack of trust in health experts can obstruct the implementation of public health policies, including vaccination campaigns (Mihelj et al. 2022; Larson and Heymann 2010; Stecula et al. 2020). Trust in science, along with trust in politics, was also a reliable predictor of the adoption of protective measures during the COVID-19 pandemic (Mihelj et al. 2022; Dohle et al. 2020). When this trust in science and experts is lacking, people turn to other sources of information such as social media.

Trust in scientific expertise during the COVID-19 pandemic had a large impact on the public's adoption of vaccination and other protocols. Mihelj et al. (2022) researched indicators of expert trustworthiness during the COVID-19 pandemic in the Czech Republic, Hungary, Poland, and Serbia. They found three markers that signal trustworthiness of experts to the public. The first is independence from political elites. In Hungary and Serbia, perceived ties between the appointed COVID-19 advisory council

and the political elites decreased the trustworthiness of the advice they provided. The second marker is consensus between experts. In the Czech Republic, disagreement among and between physicians and public health scientists created an environment of conflict, with some experts pushing for a lockdown strategy and some for herd immunity methods. This perceived misalignment led to a search for other sources of information for consensus, opening the door for misinformation. A third marker of expert trustworthiness is the choice of communication channels. In a polarized media environment, experts that appeared on preferred channels were seen as more trustworthy than experts that did not.

The relationship between trust and misinformation is especially problematic. The lack of trust in experts and science leads to an increase in the spread of health misinformation. At the same time, the spread of health misinformation erodes trust in experts and science. This cyclical relationship is quite dangerous, indicating that trust is a critical area of intervention for public health professionals.

Conclusion

The COVID-19 pandemic and COVID-19 vaccination efforts were a hotbed of misinformation around the world. This resulted in the extension of the pandemic and thousands—if not more—of avoidable deaths. It is key for the public health community to understand why this happened and how it can be avoided in the future. Unfortunately, many sources of misinformation with different incentive structures support its dissemination. This misinformation is believed by the public and shared with others through multiple routes. Our current information environment creates the perfect propagation ecosystem for misinformation. The interplay of this multitude of dynamics makes it difficult to address vaccine misinformation easily or through any single effort. This exploration of COVID-19 misinformation shows that it must be addressed through multiple avenues.

Often, the public health community addresses misinformation by countering it via press releases and memos. While this is an important first step, it does not go far enough. First, we as a public health community must be better at communicating dense information in a more simple and understandable way to avoid information dearth and overload. The dynamics of vaccine misinformation also show that some people may not change their perception of vaccines even after receiving correct information. Here, we must be more forward thinking by addressing some of the more systematic drivers of misinformation and vaccine hesitancy.

One crucial driver of vaccine hesitancy is lack of trust. Those who share health misinformation, intentionally or unintentionally, create an even greater environment of mistrust between the public and the scientific community. It is imperative that the public health community not allow

this to continue. Mihelj et al. (2022) find that personal connection between scientific experts and the public increases the experts' trustworthiness. Meeting the public where they are—whether through traditional media channels, via social media, or physically in their communities—would go a long way toward reestablishing this trust between public health experts and the public.

Another systematic driver of misinformation is the platform where it is shared. Without increased scrutiny by social media platforms to identify and remove misinformation, this will continue to be an issue. Scrutiny of social media can be achieved not only by increasing monitoring efforts by these platforms but also by shifting incentives that support the proliferation of misinformation. Reworking algorithms to consider misinformation when promoting material is one method of doing so. A second is by removing financial incentives (such as advertising) for accounts sharing misinformation. Recreating a social media environment that is information friendly more than misinformation friendly would make great strides toward combatting COVID-19 and vaccine misinformation.

Misinformation is one of the greatest challenges of our time. It has sown mistrust and division in all arenas of society—including democratic procedures, education, and environment, among others. COVID-19 exemplifies the damage that misinformation can cause. As such, there is an opportunity for health professionals to be the leaders in identifying methods to fight misinformation.

NOTE

1. While this is the case in mainstream discourse around vaccine hesitancy, the hesitation surrounding vaccines in minority, particularly Black, communities in the United States also stems from a history of racial bias within the medical system (Savoia et al. 2024).

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Part II
Vaccination Politics in Europe

6 | COVID-19 Vaccination in the European Union

Forging Union in Crisis

Scott L. Greer

COVID-19 changed European Union (EU) health policies, above all through the EU's changed role in vaccine acquisition, and the EU's role and policies shaped the policies of member states while affecting countries around the world. It was part of a decades-long story in which the EU's small but wealthy member states have repeatedly found that collective action is the only way to achieve their policy goals.

The EU is an unusual creature, somewhere between an incomplete federation (Greer 2020b; Greer and Jarman 2021) and an enormously effective regional international organization (Greer, Amaya et al. 2022). By the standards of a federation it is dangerously imbalanced, but by the standards of an international organization it is extraordinarily powerful, legitimate, and useful. The COVID-19 crisis made it less unbalanced and more like a federation in several ways, including in the expansion of its health policy responsibilities after a decade of decreasing EU interest in social policy.

The EU's 27 member states, all of them upper-income countries, have a total population of around 448 million and a gross domestic product (GDP) of 15.8 trillion purchasing power standard, making it the world's third largest economy, slightly smaller than that of the United States (Greer et al. 2023; Greer 2020b). Institutionally and politically, the EU is not comparable to its member states. Institutionally, it does a few things with enormous vigor—above all, law. It is best understood as a "law-state" whose legal system is the core of its being (Pavone and Kelemen 2019). This law is enforced by member state courts and bureaucracies, which makes the relatively small EU extremely powerful but makes it vulnerable to member state governments that lack respect for the rule of law. Its budget is trivial—about 1% of EU GDP, which is far below the nearly 10% that the Organization for Economic Cooperation and Development countries spend on health care alone, and most of its budget is spent on regional aid and agriculture.[1] It has no coercive powers, though on its borders it is starting to develop what looks like them, has a limited if growing military role, and its administration tends to run through member states.

Politically, the EU exists and develops because it can credibly solve problems that its member state governments want to solve. In crisis after

crisis, from financial meltdown to refugee arrivals to COVID-19 to the Russian invasion of Ukraine, EU member states have, however reluctantly, often found that working together is a better way to shape their fates than going it alone (my reading of Riddervold et al. 2021; Rhinard et al. 2023). Their policy decisions might not be advisable, but they are made together. The result is that every crisis that hits the EU seems to start with articles in the global English-language press about how *this* will be the crisis that shatters European unity, followed by policies that tangibly advance European unification. The crisis response might produce least-common denominator solutions filled with internal contradictions, but they advance European integration nonetheless.

There is nothing guaranteed about EU integration or policy success. The existence of powerful and self-interested reasons for member states to work together with each other and the EU institutions does not mean that they always choose to do so. The EU's approach to vaccine acquisition was a comparatively quick and seamless integrative choice, but in other EU crises, notably the response to the refugee "crisis" that started in 2015 or the financial crisis that started in 2008, there has been more dissention and more difficulty deciding on policies (Riddervold et al. 2021).

Nor are EU successes always as visible as they might be. One of the problems governments want to solve is that of avoiding blame for unpleasant outcomes and unpopular decisions, so blaming "Brussels" is a constant temptation in politics anywhere around the EU. Member state politicians, by contrast, have little reason to share credit with the EU. Even in the many countries where the EU is viewed more positively than member state institutions, that is not due to member state politicians being generous with credit for EU achievements. It is worth bearing this blame-shifting and credit-claiming dynamic in mind when considering how it is that the EU came to be a key actor in its member states' efforts to escape the pandemic.

Vaccines

The EU entered the pandemic with a very minimal formal health policy. While it had a long history of affecting health and health systems, most of its impact was through internal market law, related regulatory areas such as environmental or occupational health, or the application of internal market law to health care with results that can be politely described as mixed from the perspective of health or European integration (de Ruijter 2019). After an efflorescence of health policy engagement and creativity in the early 2000s, health, like EU social policy in general, had become a topic out of favor with the largely center-right, austerity-focused leaders of the EU and its member states after 2008 (Greer and Jarman 2021). While a new Commission (executive) and parliament were producing more

health policy energy in late 2019, it was from the very low base set by the preceding EU leadership, which publicly considered abandoning any effort to make health policy (Greer, Amaya et al. 2022). Of the issues that turned out to be relevant to the pandemic, drug pricing was an increasingly salient one on the policy agenda, with the Commission given a clear mandate to promote access for the first time, and one that did not portray pharmaceuticals companies in a positive light. Then COVID-19 came.

The SARS-CoV-2 virus was sequenced and the results made known on *10 January 2020:* an astonishing success and months before the pandemic started from the perspective of politicians and populations in Europe. Many of the vaccine and vaccination policy challenges were also immediately visible to experts (Wouters et al. 2021).

It was therefore clear to most interested policymakers by late spring that there would soon be vaccines, produced with a number of different approaches by a number of different companies. International political economy moved as quickly as the science. It became equally clear that intellectual property rights would remain in private hands and global collective action would be limited. Vaccines would be what pharmaceuticals generally are: private goods based on publicly funded academic research that governments negotiate to buy based on their budgets and market size. The World Health Organization's (WHO) COVAX scheme, which aspired to be a mechanism for global collective action in the interests of equity, rapidly turned into what the history of global health would lead us to expect—namely, an underfunded vehicle through which rich countries supplied some charity to poor countries (see Shadlen and de Menezes [chap. 2] and Perroud [chap. 4], this vol.). Also predictably, the EU would be one of the biggest contributors to COVAX, reflecting its large role in development aid and its preference for working with international organizations including WHO (Greer et al. 2024). It is not clear whether global collective action for equitable vaccine production and access was ever a plausible option, but it was obviously foreclosed by the summer of 2020.

Equitable international collective action being stillborn, countries' options diverged based on wealth but also size. For rich countries such as the EU member states, the challenges became those of acquisition: choosing the vaccines (without yet knowing which might have undesirable side effects, production problems, insufficient effectiveness, or safety hazards), negotiating prices and liability, and securing beneficial delivery schedules from the producers. All the EU member states are high-income countries by global standards, but a good number were nonetheless weak in important respects. They might lack a large market (some EU member states, including Cyprus, Estonia, Latvia, Malta, and Slovenia, have very small markets) or much of a relationship with the pharmaceutical industry. This weakness would mean that despite their money, they would risk being charged higher prices or being at the back of the queue to acquire vaccines.

A number of larger, richer countries had almost immediately set out to

work together as a voluntary intergovernmental coalition for purchasing vaccines. France, Germany, Italy, and the Netherlands formed the misnamed "Inclusive Vaccine Alliance" and on 13 June 2020 announced a deal to acquire AstraZeneca vaccines (IISS 2021). Four days later, on 17 June, European Commission President Ursula von der Leyen released the "European strategy to accelerate the development, manufacturing and deployment of vaccines against COVID-19," which came to be known as the Vaccines Strategy. For all that the details of the politics that week remain obscure, what is clear is that the Commission strategy won far more support and became the dominant approach, to the particular benefit of smaller countries that would have had trouble procuring vaccines at good prices or priority.

The context probably matters as well. The same summer, and in fact the same meeting of the European Council (heads of government), saw a dramatic expansion in EU public health capacity and leadership in what came to be called the European Health Union (Fischer et al. 2024; Ferrera et al. 2024). A policy area that EU leaders had consciously chosen to neglect (Graziano and Hartlapp 2018) became one that they saw as important for pandemic response. Policies agreed in the same period included a vaccine passport program, expanded funding and competences for the European Center for Disease Prevention and Control, a vast new health program called EU4Health, an enormous expansion of the civil protection stockpiling system RescEU, suspension of punitive fiscal governance mechanisms that constrained health and social expenditure, joint purchasing of scarce therapeutic goods (notably ventilators), and coordination of stances in global forums on topics such as WHO. It was, quantitatively and qualitatively, a transformation of EU health policy (Brooks et al. 2020, 2021, 2022; Greer, de Ruijter, and Brooks 2021; Deruelle 2022; Deruelle and Engeli 2021; Brooks 2025). While in many countries the striking thing about COVID-19 worldwide is how little it seems to have changed politics (Greer, Massard da Fonseca, and King 2021), the EU emerged with new responsibilities and public health politics. Because the EU works within a seven-year budget framework, the decisions made in 2020 were also substantially locked in through 2028, setting up a reckoning for EU health policy around 2027 when negotiations for the next framework begin (the framework does leave some discretion; one billion euros were diverted to Ukraine crisis response in 2022).

The Vaccines Strategy was at the center of this new role (European Commission 2020). The Commission would use funds from a fiscal vehicle called the Emergency Support Instrument to pay vaccine manufacturers upfront for a share of their costs, making essentially a down payment that would enable the manufacturers to move quickly toward trials and production while securing advantageous timing and prices for the EU. Member states would then order the vaccines they needed and pay the rest at the EU-negotiated prices. The EU might not have paid as much as some others, for example, the United States, but its spending clearly helped bring vaccines to market quickly (Sampat and Shadlen 2021).

The Commission was explicit that it would negotiate advance purchase agreements with multiple producers as an insurance policy against some vaccines failing in trials or production. This policy of betting on many horses was common among rich countries, and while most vaccines included in the Vaccines Strategy did come to production, they were not all equally useful in all circumstances. It also bears remembering just how many things had to go right to get from a sequenced gene to a safe and acceptable vaccine, with potential risks including side effects, the production of vaccines and related materials such as syringes, different effects (e.g., different length of immunity or response to new variants), the need for sophisticated cold chains, price, and reputation. The result was that Europe's insurance policy meant it was signed up to buy around two billion (thousand million) doses. The Vaccines Strategy ended up betting on a well-known list using different technologies: Pfizer-BioNTech, Moderna, AstraZeneca, Johnson & Johnson, Novavax, Valneva, Sanofi-GSK, HIPRA and CureVac (in one of the pandemic's many weird moments, Donald Trump apparently tried to buy the CureVac firm for the United States) (Gonzalez 2020). All but Valneva were approved by late summer 2023, although some came too late to be real contenders (e.g., Novavax), relied on problematic production technology (again, Novavax), or had undesirable reputations or effects (Johnson & Johnson, AstraZeneca). Member states could not conduct their own negotiations with these manufacturers, though Hungary opted to procure some Russian Sputnik and Chinese Sinovac vaccines, which were not on the Commission's list.

Negotiating these large and highly sensitive contracts, with huge companies, in a competitive market, was a new experience for the EU institutions. The EU has limited procurement experience in general, and its bigger procurement projects were usually managed by cofinancing member states (as with its RescEU stockpiles or Joint Actions) or autonomous organizations. The negotiations were therefore a high-stakes priority for the EU, and in particular the Commission, which could emerge with new capabilities and an enhanced reputation if it went well.

The EU, unlike most other acquiring countries, sought to negotiate on liability, obliging companies to take on legal liability for unexpected side effects. This appears to be a result of its leaders' nervousness, partly born of accusations that industry influence had led to overreaction and overpayments in the 2009 H1N1 influenza pandemic and partly because of the interaction between accusations of industry influence and preexisting vaccine hesitancy problems in Europe. Insistence that firms accept liability was unusual, given that it was hard to see the actual scenario in which that would matter, and it delayed the negotiation of the contracts. The contracts also, strangely, did not appear to include penalties for late delivery, which would turn out to be a problem.

The EU showed the benefits of its approach in the prices it paid. There is nothing like a transparent and searchable database of prices paid for COVID-19 vaccinations or anything else, and the EU's negotiations were,

like those of most countries, a closely held secret (Deutsch 2020). But a Belgian official accidentally tweeted out a list of the prices the EU was probably paying per dose, and the prices were strikingly low: Oxford-AstraZeneca, €1.78; Johnson & Johnson, $8.50; Sanofi/GSK, €7.5; Pfizer-BioNTech, €12; CureVac, €10; and Moderna, $18 (Deutsch and Gijs 2020). The Israeli government, whose rapid vaccination rollout would be envied by so many, was paying $30 or maybe even $47 a dose for Pfizer-BioNTech (Regev 2021; Rosen 2021). It seems that market size and tough negotiating worked for the EU in exactly the way one might expect. Commercial confidentiality in this case meant that the EU was left unable to advertise its success relative to the countries that got vaccines slightly more quickly but at a far higher price.

Before any vaccines could actually be produced and purchased, of course, they had to be approved. Medicines approval in the EU is a story of slow centralization around the European Medicines Agency (EMA) as member state–level agencies became increasingly integrated into its expert networks and industry discovered the virtues of access to the whole internal market without applications in every member state. Smaller states also saw the virtues of mutual recognition for speeding introduction of new medicines (Hauray 2006; Hauray 2013; Permanand and Mossialos 2005; Permanand 2006). The treaty bases for pharmaceutical regulation were very clearly those of the internal market, and the foundations of the system were laid as part of the 1992 program. Over time, pressure from health advocates and a reluctance to not be seen as too close to the industry have increased the salience of health goals in pharmaceuticals regulation.

Putting any new vaccine on the market involves balancing important regulatory goals (Fonseca et al. 2022). Notably, the widespread administration of new vaccines to healthy people means that the threshold for acceptable risks is extremely low. Against this, regulators must balance the costs of not introducing a vaccine as potentially important as the COVID-19 vaccines. Vaccines that caused negative side effects have damaged the credibility of vaccination campaigns, public health, and medicine more broadly (Neustadt and Fineberg 1983), and there is an entire industry of anti-vaccination campaigners ready to amplify any word of a problem with a vaccine (e.g., Deer 2020; Kirkland 2012). The result is that regulators do not just have to make a tradeoff between the risks of introducing a vaccine and not introducing it; they also run the risk of an introduction that comes to be seen as illegitimate (e.g., of a vaccine with severe or unexpected side effects) and therefore undermines vaccine uptake.

The EMA opted for a "rolling review" process in which manufacturers submitted data as trials continued and otherwise ran a process closer to its ordinary approach. The endpoint was a "conditional market approval" for a year. The EMA process is intrinsically slower than some other regulators due to its multinational structure, though its decisions should then

have support from across all 27 regulators. While the reasons are murky, the EMA also received the application a bit later than some other regulators, for example, in the United States and the UK. This delay might be because in preapplication consultations the EMA asked for more data. EMA's leader was explicit that the EMA, operating in an environment of substantial popular vaccine hesitancy, did not want to do anything that made the vaccine appear rushed or give the impression that corners had been cut (Deutsch and Furlong 2020). In this, the evidence bears her out. A review of studies found that safety concerns and concern that the vaccines were developed too quickly were major reasons given for vaccine hesitancy (Troiano and Nardi 2021). The relatively high levels of vaccine hesitancy in Europe, once again, influenced decision-making, and the EMA response of ostentatious rigor was in keeping with both the EU's tendency to rely on "throughput legitimacy" (Schmidt 2016) and scientists' use of "mechanical objectivity" (Porter 1995)—both terms referring to the justification of a decision through its process.

This relative slowness and rigor was not without a cost. Vaccines deemed good enough for regulators in Israel, the UK, the United States, and other countries slow to market in the EU, with consequences for morbidity and mortality. The EMA's process also became a subject of political contestation (von der Burchard 2021; Momtaz 2021). In particular, German politicians angling to succeed Chancellor Angela Merkel chose to make political points, asking why a vaccine developed in Germany was being given elsewhere while Germans continued to bear the economic and health consequences of the pandemic (Posner and von der Burchard 2021). This was, indeed, a good question, but it is not clear that it was one that a leadership competition within a single center-right political party was optimized to answer (the fact that the EU probably saved Germany a lot of money was, of course, a commercial secret). The political calendar made the issue of EMA's speed particularly salient in Germany, but it posed a problem for any incumbent government (e.g., the Dutch) that had to explain why Europeans weren't getting the vaccines being administered elsewhere.

Hungary, as noted above, broke ranks and bought vaccines from Russia (Sputnik V) and China (Sinovac). The Hungarian government granted them emergency authorization in 2021, which was in line with WHO but not the EMA (RFE/RL 2021). China and Russia were, of course, happy to oblige for geopolitical reasons, and Russia even offered technology transfer so Hungary could produce its own. The Hungarian government, meanwhile, was able to trumpet the fact that its citizens were getting additional vaccines ahead of the rest of the other member states that were waiting for their Vaccines Strategy deliveries. The fact that most other EU member states did not recognize the two vaccines as vaccines (e.g., for work or travel) reduced their usefulness and prestige.

The Commission, which has to sign off on all EMA determinations,

accepted the EMA's suggestion of a conditional use authorization for BioNTech's vaccine (produced with Pfizer) on 21 December 2020. By this time, manufacturers were already making large quantities and distributing them in preparation for vaccines. The official start date for the vaccinations was 27 December, though the always helpful Hungarian government started vaccinations on 26 December (Hernandez 2020b), and a care home director in Germany was quite public that he did not see why he should wait a day to start vaccinating his staff, wife, and patients, starting with a 101-year old (Hernandez 2020a). By and large, though, 27 December was the date, though some countries (e.g., the Netherlands) started later. Other vaccine approvals came over the next months. Vaccination was underway.

The UK, still formally part of the EU at the time, chose not to participate in EU vaccine acquisitions programs. There is no evidence that the UK got meaningfully faster vaccines than the EU as a result of Brexit; Jarman (chap. 12, this vol.) covers its procurement strategy, but it is enough to note here that the UK could have negotiated essentially the same deals as part of the EU. Its given reasons for not participating are that it did not want the Commission to negotiate on its behalf, preferring to directly negotiate with companies, and that it wanted to be able to conduct its own negotiations with companies that the Commission was also negotiating with (Deutsch et al. 2020). The UK regulator was the first to approve a vaccine, after starting review later than the EMA. It used a national emergency authorization procedure that allowed any member state to get ahead of EMA's conditional use evaluation. Note that this was allowable under EU law, which still applied to the UK at the time, and Hungary did it with Sputnik as well. The emergency authorization had no bearing on the UK's acquisition strategy (Kane 2020), though the EMA did, unusually, criticize the UK regulator's speed and use of less data (Guarascio 2020). It is interesting, though, to consider the impact of Brexit on EU strategy, which might have become more conservative about regulation and hesitant about working with industry as a result of declining British influence (Greer 2020a).

Once vaccines had been acquired, the problem was supposed to become more and more about vaccination, which is legally and practically an issue for member states. The EU was no more legally competent than it was practically competent to set up vaccination centers, build out cold supply chains, or hire nurses. This transfer from collective European purchasing and regulation to member state administration, however, faced problems in early 2021. At the time, vaccines were scarce everywhere, not all vaccines were yet approved, and demand was enormous (as the other chapters in this book show). This meant that when a Pfizer plant in Puurs, Belgium, had to slow down production of the Pfizer-BioNTech vaccine, it quickly became a salient issue, and the Commission had to explain why vaccines were still being shipped to other countries while deliveries to the EU were slowed (Deutsch 2021). BioNTech, which had created the vaccine,

had teamed up with the much larger Pfizer for production. This means that it is not just political rhetoric when European politicians took credit for BioNTech's science but fustigated Pfizer for production failures (it is a testament to Pfizer's marketing that so many people around the world refer to the vaccine as "Pfizer").

The contracts were largely secret, which irritated member states and members of the European Parliament, but at least the complexity of the situation allowed member state politicians to blame the EU and Pfizer for almost any frustration in their domestic supply and rollout. Equally, the delays were temporary. The EU was a powerful buyer representing powerful countries, buying a range of vaccines from very sophisticated producers, and in many cases not just buying products made on its own territory but also supporting expansion of production in the EU. It was clear that it would get what it wanted, in fairly short order, and it did. Nonetheless, it probably taught the Commission some lessons about writing contracts—the liability provisions were likely a waste of time, whereas contract provisions including penalties for failure to perform in a timely manner might have been useful.

Vaccination policy worldwide was hit by reports that AstraZeneca's vaccine, which otherwise had many virtues, was associated with increased risk of heart problems for, mostly, younger men. The EU, like many countries, had placed large orders for AstraZeneca, and both limitations on the administration of that vaccine to young men and the reputational damage to that company's vaccine meant that it created a mismatch between what was on offer and what people wanted. The Vaccines Strategy had always allowed member states to place bets on particular vaccines, and AstraZeneca's vaccine was a popular candidate. Not only did AstraZeneca's misfortunes reduce demand for that vaccine, but evidence started to emerge that the mRNA vaccines from Pfizer-BioNTech and Moderna were better at preventing sickness and death. The result was pressure on politicians to procure mRNA vaccines while thinking of something useful to do with the other vaccines before they expired.

Germany went ahead and bought more vaccines, causing accusations that it was ignoring the basic terms of the Strategy. Politico.eu reported that a "Commission official said . . . that Germany's deal with Pfizer-BioNTech did not violate the terms of the strategy 'in spirit' as the country's doses would come after orders from the Commission had been filled" (Deutsch and Sugrue 2021). Regardless of the merits of such an argument, nobody stopped Germany (who could have?). Arguably the interesting question is not whether Germany could or should have done that but rather why it was the only such defection in the scarcity-minded first year of the Vaccines Strategy (Denmark then followed suit); the answer is likely that the price for additional doses would have been very high and that the new orders might have been a long way down producers' queues. The fact that the Commission refused to criticize Germany's actions shows the

extent to which the EU policy was, indeed, voluntary collective action by member state governments.

By 2023, vaccination outcomes were firmly in the hands of the member states. As in other political systems, though, investigations, reviews, and inquiries had begun into the big procurement decisions of 2020 (notably, European Court of Auditors 2022; European Parliament 2023). The Commission found itself targeted for its opacity and accused of conflicts of interest, both by political opposition and by more nonpartisan bodies. The contracts with the pharmaceutical companies remained secret despite pressure from the European Parliament, as did a set of texts between Commission President von der Leyen and the chief executive of Pfizer, Albert Bourla (Martuscelli 2022; Dubois 2025). The European Court of Auditors complained about Commission opacity, and the European Ombudsman's Office suggested that the Commission should be more open about the putatively missing messages. The Commission rejected the ombudsman's suggestion, leading to a finding of maladministration against the Commission (European Ombudsman 2021). Meanwhile, the European Public Prosecutor's Office confirmed on 14 October 2022 that it had an ongoing investigation into EU vaccine acquisition and, understandably, declined to provide any more information (European Public Prosecutor's Office 2022).

At the time of writing it is impossible to say if there was any actual malfeasance, let alone anything that would lead to action. It is noticeable that policy evaluations, such as those of the European Court of Auditors, are broadly favorable, but allegations of favoritism to industry and corruption continue, as well as critique of the opacity of the contracts and processes. Whether the EU was unusually favorable to industry is unclear but also irrelevant to determining the standards that European leaders will be expected to follow by their voters. If anything, the criticisms of opacity and close ties to industry might be a sign of healthy skepticism and civil society in Brussels, given the way principles of normal procurement and purchasing were so often ignored by member states in the pandemic (Montás et al. 2022).

Vaccinations

For most EU member states, and many other countries, vaccination was the major policy challenge. The EU, by contrast, played a small role in vaccination policy. There was limited EU competency in the area, in either sense of the word: it lacks the legal competence to do much to a healthcare delivery problem such as vaccinations, and it is unclear what the EU could add to what was fundamentally a set of public health campaigns. The EU's role was largely over once the vaccines were acquired, with member states and their purchasers handling the logistics and administration.

Nevertheless, the linkage between vaccination and vaccines is not just a unidirectional one in which the EU role ends when a pallet of vaccines is shipped. One of the striking themes of EU decision-making was collective nervousness about the likelihood that vaccine hesitancy or resistance would stall EU vaccination policy.

Europe was, before the pandemic, the world's most vaccine-hesitant continent, and France was the country with the world's highest levels of vaccine hesitancy or resistance (Wellcome Trust 2018). While France stood out, most of this vaccine hesitancy was entrenched in areas of central and eastern Europe that had experienced communist government. In the actual context of COVID-19, the French government managed this skepticism, and the bigger European challenge was the distrustful populations of the post-communist countries. The impact of the communist legacy on trust in general is an important research topic that could be productively linked to vaccination politics and policies. It is also worth asking if the strength of the populist radical right in the years after the pandemic might be partly attributable to vaccine resistance activism that blended with those parties' suspicion of expertise and regulation.

Thus, some of the themes running through the story of the Vaccines Strategy, such as the EMA's distrust of emergency measures and the collective worries of governments that they would look too favorable to industry, probably reflect policymakers' sense that the EU would have (more) serious vaccine hesitancy problems unless it was seen to be financially and scientifically clean. Putting aside ongoing debates about its success at this, it shows how policymakers' theory of future vaccination behavior and political oversight influenced decisions, leading them in some cases, such as EMA approval, to make decisions that were painful at the time.

Why?

There was one key decision made by member states: to use the EU as their collective vehicle for vaccine acquisition. The specific politics of the decision will only be better known in decades when memoirs are written and archives opened, but the basic reason for EU collective action was clear in June 2020: The big EU countries might have done better on their own but at a higher cost, the smaller countries were almost certain to do worse on their own, and the tightly integrated internal market would suffer if, for example, the "Inclusive Alliance" countries were vaccinated and their neighbors were not (imagine the economic effects of France, Germany, and the Netherlands trying to enter a vaccinated new normal while Belgium remained unvaccinated). It is probably no surprise that the undemocratic Hungarian regime and the populist UK government were the only two governments that undermined collective action in any significant way.

In general, EU public health policy from 2020 onward was a rousing confirmation of neofunctionalist integration theory and the particular "failing forward" offshoot that emphasizes the way in which member states will support integration but in lowest common denominator ways that set up the next crisis—in this case, by confining the EU public health response mostly to funding for public health rather than oversight or support of health systems (Jones et al. 2015; Greer, de Ruijter, and Brooks 2021; Brooks et al. 2022; Cox and Kurzer 2022).

Europeans have a broadly positive view of the EU's role in vaccine and vaccinations, with 53% telling a February 2022 Eurobarometer survey that they were satisfied with the way the EU institutions handled the vaccine rollout (Eurobarometer 2022). In the same survey, 48% said they were satisfied or very satisfied with the way their member state government handled vaccines, while 22% were very dissatisfied with their member state and only 15% were very dissatisfied with the EU institutions' performance. These averages obscured quite a lot of heterogeneity between member states, with positive evaluations of the EU institutions' performance varying from 85% in Portugal to 39% in Czechia (Eurobarometer 2022).

As ever, it is unclear what voters' basis for judgment might have been. Vaccine procurement (where the EU had the biggest role) and vaccination campaigns are difficult to understand and evaluate. Broadly, the countries whose populations gave the EU's vaccines policy the most positive evaluations were the ones that give the EU the most positive evaluations in most respects; Portugal is a Europhile country in general, and Czechia is almost always one of the most Eurosceptic. It is worth noting that there is not much relationship between country size and wealth and the evaluations of the EU. Political elites might have known that the smaller countries benefited most, while Germany or France would clearly have been able to negotiate good access and reasonable, if higher, prices on their own. Near majorities in indisputably small countries such as Estonia, Latvia, and Slovakia did not seem to see it that way.

Conclusions

In a global context, the EU's challenges might look like the epitome of first world problems: recriminations about choices of vaccine, an extra month or two of waiting while regulators examine data, or debates about liability provisions that were unlikely to matter. These problems all might seem like luxuries to citizens of most countries in the world, namely, poorer and smaller countries that lack huge pharmaceutical industries. For some countries, after all, having a leader texting with the CEO of Pfizer might be an achievement rather than a governance problem. Even if we were to accept that vaccines strategy shows the many distasteful features of EU and European politics (e.g., Müller 2021), we should keep a comparative

perspective. Comparing COVID-19 procurement policy with peer, and often competitor, countries shows EU institutions rapidly learning and developing their practical competence in complex areas of purchasing while maintaining regulatory credibility. Even the accusation of overly close ties with industry, hardly unique to Europe, rings hollow given the evidence that the EU struck a very good deal on prices. If industry had spent much money trying to corrupt Brussels, it didn't get an obvious return on the investment.

It is also worth asking why the EU moved so quickly and decisively, in June 2020, to work together on vaccine acquisition. While the neofunctionalist logic of integration suggests that collaboration was always a plausible outcome, there are other crises that elicited weaker and less coherent EU responses. It might be that COVID-19 was different simply because it hit all member states more or less equally and at approximately the same time, and because collective action had an enormous upside and a limited downside for almost all players. There was no equivalent of the Troika (imposing austerity on indebted countries in the aftermath of the financial crisis) or polarized arguments about refugee settlement.

In a more European context, the vaccines strategy is probably the most important step forward in EU health policy, of many steps forward that were taken in 2020. The EU's 27 member states chose to work together in joint purchasing, engaging in collective action despite the ease with which a country the size of France or Germany could have defected. Likewise, only Hungary and the UK chose to ignore the EMA timeline with emergency approvals.

Whether the EU will take another such step, however, remains to be seen. Outside a crisis such as COVID-19, it is not clear how many problems exist that would likely be addressed by joint purchasing. It is also not clear that the Vaccines Strategy will be seen over time as the success that it should be. The 53% satisfaction score that Eurobarometer reported contains national heterogeneity already and seems to be substantially correlated with general trust in the EU institutions rather than evaluation of vaccine policy. More to the point, 53% is not an overwhelming majority and could decay over time. In particular, the combination of corruption investigations, critical reports, widespread willful forgetfulness with regard to the pandemic (Greer, Massard da Fonseca, and King 2021), and dynamic anti-vaccination movements might leave a bad taste that makes European elites less likely to work together again. The bad taste left behind from the 2009 swine flu response meant that institutional structures designed to speed and centralize vaccine approval and acquisition were left half-built (de Ruijter 2021). Now they exist and performed well but might be left to lapse. The EU might end up having demonstrated competence but not getting credit. That would be a pity. Europe's vaccine strategy would seem to be a policy success.

NOTE

1. Before 2020 the budget was capped at or just above 1% of EU Gross Domestic Income (GDI). In 2020, the EU's potential budget envelope was increased to 2% to underpin bonds being issued to finance its Next Generation EU program of investment (the increase is theoretically temporary but is not to expire until 2058, reflecting the durations of bonds). The actual budget's expenditures did not rise to 2% because the rationale for the increase was showing that the EU could pay its debt, not double its expenditures.

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All internet links were confirmed on 9 August 2023 unless otherwise specified.

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7 | COVID-19 Vaccination in Italy

The Challenges behind an Unprecedented Vaccination Campaign

Michelle Falkenbach and Stefano Guicciardi

With over 70,000 confirmed deaths and almost two million confirmed cases by the end of 2020, Italy was one of the most severely affected countries by the COVID-19 pandemic in terms of infections and fatalities. Thus, it was a great relief to the Italians when on 27 December 2020 Italy received its first COVID-19 vaccines. By September 2021, more than 60% of the total population was vaccinated with at least two doses, making Italy one of the first countries worldwide to fully vaccinate more than half of its population (Antonini et al. 2022). By the end of 2022, over 80% of the population would be fully vaccinated in Italy, making it the country with the most people fully vaccinated (Mathieu et al. 2020).

Many may wonder why Italy was so successful in its vaccination uptake. Some might attribute it to the fact that Italy was the first country in Europe crippled by the virus, thereby increasing political and citizen motivation to do anything to stop the spread and death counts. Others might point to the solid leadership of Giuseppe Conte, at first, and then Mario Draghi. Both prime ministers enjoyed exceptionally high approval ratings, translating into high levels of trust in their politics. A further reason points to the mandatory vaccination law. Italy was the first country in Europe to make the COVID-19 vaccination mandatory for health and care workers (Peruch et al. 2022). Other reasons for the success include the strategic purchasing and distribution of vaccines and favorable vaccine campaigns.

These successes, however, did not come without important challenges directly related to the Italian vaccine campaign: first, the initial irregular vaccine supply; second, an uncoordinated rollout due to confusion surrounding which group of people would be vaccinated first; and third, an acute lack of health and care capacity propelled by decades of cuts to the Italian health-care system.

This chapter begins by looking at the type of vaccines that were purchased. The next section will discuss how the Italian government approached the vaccination process and the challenges associated with this. The third section will analyze the decisions made by the government,

and the conclusion will summarize the most significant lessons coming from Italy.

Vaccines

Before the introduction of COVID-19 vaccines, Italy and other European Union (EU) countries could rely only on non-pharmaceutical public health interventions based on mitigation and containment strategies. These interventions were essential to overcome the first and second pandemic waves of 2020 (Berardi et al. 2020).

Procurement

By the end of April 2020, shortly after the genomic sequence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was identified, the first clinical trials for developing COVID-19 vaccines had already begun. In reaction to these developments, the EU Commission and the EU Council published a joint roadmap that indicated the need for common procurement and equal access for future actions on vaccination strategies (Publications Office of the European Union 2020).

Italy, together with Germany, France, and the Netherlands, formed the Inclusive Vaccine Alliance (IVA) at the beginning of May 2020 to negotiate the production of COVID-19 vaccines with potential developers (Government of the Netherlands 2020). As a result, AstraZeneca announced a deal with the IVA for up to 400 million doses in June 2020.

By 17 June, an EU collaborative approach emerged where all European member states adopted the EU Vaccine Strategy. The strategy sought to foster the development, manufacturing, and deployment of COVID-19 vaccines and to negotiate with pharmaceutical companies on behalf of all member states (European Commission n.d.; European Court of Auditors 2022). Italy was entitled to 13.46% of the vaccines purchased by the EU, equating to 202.573 million doses (RAI 2020).

On 2 December 2020, the Italian minister of health presented the Italian strategic plan for anti-SARS-CoV-2/COVID-19 vaccination, which was updated on December 12 (Ministero della Salute 2020, 2021a). This plan was a combined effort involving the Ministry of Health, the special commissioner for the COVID-19 emergency, the National Institute of Health (ISS), the Italian National Agency for Regional Healthcare Services (AGENAS), and the Italian Medicines Agency (AIFA). Although the national committee coordinated this plan, the management and planning of the administration of the vaccines was tasked to the regional and provincial governments.

The strategic plan contained eight axes, the first of which was related to centralization and gratuity, implying that the vaccine is a common good

and must be made available to everyone regardless of income or where they live or work. The second axis surrounded distribution, wherein it was decided that if the authorization processes succeeded, doses would be distributed to the states in proportion to their populations beginning in the first quarter of 2021, with additional doses made available in the second and the third ones.

The minister of health stated that the following doses were secured and could be counted on according to the agreements concluded:

- AstraZeneca, 40.38 million
- Johnson & Johnson, 53.84 million
- Sanofi, 40.38 million
- Pfizer-BioNTech, 26.92 million
- CureVac, 30.285 million
- Moderna, 10.768 million

What was approved and deployed, in 2021, was somewhat different (table 7.1).

The third axis related to the timing of the authorization of vaccines, the fourth identified the categories of people that were to be vaccinated with priority (health and care workforce), and the fifth focused on logistics, procurement, storage, and transport, all of which were seen as responsibilities of the extraordinary commissioner.

The sixth axis encompassed the governance and vaccination plan enforced by the Ministry of Health, the special commissioner for the COVID-19 health emergency, and the regions. The seventh axis highlighted the importance of a modern information system to manage the vaccination campaign, and the eighth and final axis dealt with drug and immunological surveillance.

All these strategic axes helped shape the overall vaccination campaign that was implemented shortly after the vaccination doses were available.

Financing

On 8 April 2021, the extraordinary commissioner in charge of vaccine purchasing launched four tenders to purchase vaccination doses, one for each vaccine type. The auction-based amounts relating to the four tenders came to 864 million euros. The financing policies for the COVID-19 vaccination in Italy between 2020 and 2021 involved national funding, regional support, and utilization of European financial resources (Openpolis 2021).

NATIONAL FUNDING: As the pandemic continued to unfold, the Italian government recognized the need to allocate substantial resources to manage the crisis; the budget law (Legge di Bilancio 2020) for 2021, approved

TABLE 7.1. Approved and Deployed Vaccines

Vaccine	Approval	Deployment
Pfizer-BioNTech	December 21, 2020	December 27, 2020
Moderna	January 6, 2021	January 12, 2021
AstraZeneca	January 29, 2021	February 6, 2021
Johnson & Johnson	March 11, 2021	April 21, 2021

Source: Adapted from ANSA (2021c, 2021d).

in December 2020, dedicated 4.7 billion euros to addressing the pandemic, including the procurement and distribution of COVID-19 vaccines (Gazzetta Ufficiale 2020).

EUROPEAN COLLABORATION: As previously mentioned, the European Commission negotiated advance purchase agreements (APAs) with vaccine manufacturers on behalf of EU member states, including Italy, securing vaccine doses for their populations. This collective approach enabled Italy to access vaccines more quickly and cost-effectively than if it had pursued contracts independently.

EUROPEAN STRUCTURAL AND INVESTMENT FUNDS: Italy made use of financial resources from the European Structural and Investment Funds, particularly the European Regional Development Fund (ERDF) and the European Social Fund, to support public health measures, including vaccination efforts (European Commission, n.d.). These funds provided crucial support for regional governments to strengthen health-care infrastructure and expand vaccination capacity.

NEXTGENERATIONEU AND RECOVERY AND RESILIENCE FACILITY: As part of the EU's recovery plan, NextGenerationEU, Italy was allocated 191.5 billion euros from the Recovery and Resilience Facility (European Commission 2021). This funding provided Italy with the resources needed to invest in health-care infrastructure, vaccination campaigns, and economic recovery initiatives.

REGIONAL SUPPORT: Italy's regional governments were essential in financing and implementing COVID-19 vaccination efforts. Each region allocated funds from its budgets and utilized the ERDF resources to support vaccination activities (European Commission 2020). This regional collaboration, when implemented, allowed for a more coordinated and effective response to the pandemic, ensuring that vaccination efforts reached every corner of Italy.

Vaccinations

A key aspect of the Italian vaccination campaign was a clear coordination plan between the national and regional health agencies with the strategic inclusion of all relevant stakeholders. The distribution and administration

of the vaccine supplies were built on a hub-and-spoke model, with one main central hub and a series of second-level territorial centers. The regions were in charge of setting up and coordinating the vaccination centers according to the specified guidelines (Governo Italiano 2020), which also defined how to equip and manage local vaccination points.

Operational guidelines for the distribution of the vaccines focused on a central level with a lean chain of command, accelerating the dissemination of vaccine capacity to reach 500,000 doses per day on a national basis, when fully operational (Governo Italiano 2020). Furthermore, the government set a vaccination target of 80% of the total population by September 2021. The vaccine campaign included three operational lines: procurement and distribution, needs monitoring, and widespread diffusion (Governo Italiano 2020).

Chronology

Following the presentation of the Italian strategic plan for COVID-19 vaccination, the vaccination campaign started on 27 December 2020. On 30 December, Prime Minister Giuseppe Conte announced the details of the vaccination strategy for Italy.[1] The Ministry of Health and Special Commissioner Domenico Arcuri managed the vaccination campaign until 1 March 2021. From that point forward, Army General Francesco Paolo Figliuolo took his place.

In the initial phase, a limited number of vaccines were available, and the first actions aimed to immunize critical individuals with a clear definition of priority populations. Health workers, residents, and staff of nursing facilities were the first group to receive the available doses, followed by people over age 80.

On 12 March 2021, the second phase of the campaign began when the Ministry of Health issued a decree adopting the new national strategic plan for the prevention of SARS-CoV-2 infections and the implementation of a national vaccination plan. The plan was developed by the ministry itself, the special commissioner for the COVID-19 health emergency, the Istituto Superiore di Sanità (ISS), the National Agency for Regional Healthcare Services (AGENAS), and AIFA (Ministero della Salute 2021b).

This plan built upon the original strategic plan issued in December 2020 and included the interim recommendations on the target groups of the COVID-19 vaccination program published on 10 March 2021, which redefined the population categories to be vaccinated and the priority groups (Gazzetta Ufficiale 2021d; Istituto Superiore di Sanita 2021).

As in other EU countries, Italy identified the following categories according to age, as a proxy of risk and comorbidity, for vaccination priority (see table 7.2). In addition, the following categories were also identified as priority groups, regardless of age and preexisting medical conditions:

TABLE 7.2. Vaccination Categories

CATEGORY 1	People with severe physical, sensory, intellectual, or mental disabilities or extremely vulnerable individuals with conditions that can become life-threatening with COVID-19
CATEGORY 2	People aged 70–79 years, for whom the COVID-19 case fatality rate is 10%
CATEGORY 3	People aged 60–69 years, for whom the COVID-19 case fatality rate is 3%
CATEGORY 4	People under 60 years of age with co-morbidities that are not of the same severity as those affecting people in category 1 (for a detailed list, see table 4, p. 44, of the document)
CATEGORY 5	Other people under 60 years of age

- school and university staff (teaching and nonteaching)
- armed forces, law enforcement agencies, and emergency services (e.g., state police, financial police, coast guard, fire department, local police, civil protection)
- prison services (prison police, prison staff, prisoners)
- other residential health and social care facilities (civil, religious, etc.)

The government progressively adopted strong laws and strategies to guarantee vaccine distribution and achieve full immunization for the Italian population. In April 2021, Italy became the first country in Europe to issue a compulsory vaccination mandate for all doctors, dentists, and health professionals (Gazzetta Ufficiale 2021a; Paterlini 2021a).

By the end of July 2021, the government imposed a health certificate, the "Green Pass," displaying one's COVID-19 vaccination status. This pass or a negative PCR test taken within 48 hours was required by all citizens to access public and private venues (Gazzetta Ufficiale 2021b). On 16 September 2021, the use of the Green Pass was extended and became mandatory to access all private and public workplaces starting on 15 October (Consiglio dei Ministri 2021). On 24 November, the Italian government issued a new decree to strengthen the Green Pass requirement by introducing an additional certificate, the "Green Pass rafforzato," defined by the media as a "Super Green Pass." This Super Green Pass could only be obtained by vaccinated individuals or by individuals who had recovered from COVID-19 in the previous six months, allowing them to access shows, sporting events, indoor bars and restaurants, parties, and discos (Gazzetta Ufficiale 2021c). Twelve months after the start of the vaccination campaign, over 108 million doses were administered, with 47,947,263 Italians receiving at least one of them (88.77% of the population over 12 years old) (ANSA 2021b).

Challenges

Despite high vaccination rates, there were three significant challenges to the Italian vaccine campaign: vaccine supply, an uncoordinated initial vaccine rollout, and an acute lack of health and care capacity.

Vaccine Supply

Since the beginning of the vaccine campaign, the biggest challenge for Italy was the supply of vaccines, which proved to be irregular. Vaccine rollout and administration were strictly related to the provisions supplied by the EU. The EU organized collective agreements with pharmaceutical companies, the latter of which had to reorganize their production in response to the global demand. This reorganization affected the responses in different phases of the Italian vaccine campaign.

Italy suffered a 29% loss in volume supply from 18 January 2021 to 1 February 2021, with some regions reaching up to a 60% loss of supply (BBC 2021). This resulted in international tensions, as Italy threatened to sue Pfizer and AstraZeneca for delivering fewer vaccines than anticipated (Rotondi 2021). With the approval of new vaccines between January and March 2021 (i.e., AstraZeneca and Johnson & Johnson), the limited supply was partially addressed, allowing regions to overcome vaccine shortages.

The effect of vaccine scarcity was amplified on 11 March 2021, when AIFA suspended the use of the AstraZeneca vaccine in Italy because of the death of two men. The deaths were caused by a rare adverse event called thrombosis with thrombocytopenia syndrome that occurred after administering the vaccine. Italy joined Sweden, Latvia, and several other European nations in temporarily pausing the use of this vaccine[2] (Amaro 2021).

What eventually calmed the supply challenge was the progression of the global vaccine production and distribution (Yang et al. 2022).

Uncoordinated Rollout

By the time vaccines were ready to be rolled out, Mario Draghi had replaced Prime Minister Conte. Conte's government, as can be seen in the previous section, included individuals working in education as priority recipients of the vaccine. When the regions were given the responsibility to ensure that priority individuals were vaccinated, disparities emerged as it became unclear who was actually considered a priority individual (Johnson 2021). This uncertainty led to abuse wherein certain groups and professional organizations claimed essential worker status, thereby taking away the limited vaccine doses from older adults. The result was that only 2 in 10 doses were being given to those over 70. Italy received just as many vaccines as Germany and France; however, Italy only managed to vacci-

nate 6% of people over the age of 80 by 20 February 2021. Germany and France vaccinated more than one-fifth of the individuals in this category at the same time.

Furthermore, because the rollout was initially decentralized, there was a difference in rollout rates between the regions (Reno et al. 2022). The region of Lombardy was, for example, exceptionally successful in administering 70 doses per 100 people, while Sicily was only able to administer 61 doses per 100 people during the same time (Oliani et al. 2022).

Two measures were undertaken to tackle this challenge. First, at the beginning of 2021, Draghi relaunched the vaccine campaign with the slogan "Wait your turn" (Il Sole 24 Ore 2021). This refocused vaccine rollout ensured that the limited vaccine supplies would first go to older adults and the most vulnerable. Second, a logistical strategy was implemented to centralize the coordination of the vaccine distribution, decreasing vaccine administration differences between the regions.

Health and Care Capacity

Italy's third challenge was the acute lack of health and care capacity. Due to national laws, mainly the Ministerial Decree 70 of 2015 (Gazzetta Ufficiale 2015), Italy has seen cuts to its health system for the past three decades, resulting in a drastic reduction of acute care hospitals and beds. The cuts to the health and care system have also resulted in a mass exodus of health-care professionals from the system. In the aftermath of the first two years of the COVID-19 pandemic, the newly elected general secretary of the largest union of public hospital physicians (Anaao-Assomed) confirmed that "seven doctors leave the national health service every day" (Anaao-Assomed 2022; Turone 2022).

In addition to this challenge, more than 50% of Italian doctors are over the age of 50 and 15% are over the age of 65, making them very susceptible to COVID-19 (Falkenbach and Caiani 2021). In fact, the proportion of health and care workers infected with the virus reached 12% of the total number of cases in the first year of the pandemic and settled to representing around 2.6% of the total population by March 2022 (Buresti et al. 2022; Istituto Superiore di Sanità 2020).

The short-term solution to alleviate the burden on the health and care workforce saw doctors and nurses recruited from retirement using economic incentives; however, many health-care workers volunteered (Harlan and Pitrelli 2020). In addition, the army and military forces provided trained professionals to fill the gaps.

As was pointed out by unions and professional associations, a first longer-term solution could be to keep on training more medical and care practitioners; however, since the European average is 15 doctors trained per year per 100,000 inhabitants, and Italy went from 11 doctors trained in 2013 to 17 in 2022, increasing the overall number of graduates alone is

not enough. It should be coupled with strategic planning to expand and promote the most critical specialties, making them more visible, attractive, and popular.[3]

Why?

Although there were some initial challenges during the primary phase of the vaccine campaign with problems surrounding the vaccine rollout, the coordination between the government and the regions was the main driver of the vaccination campaign. Aside from its setup, other aspects that made vaccination successful in Italy included affordability and ease of access, trust, the health and care systems and professions, and the impact of the opposition (D'Errigo et al. 2021).

Affordability and Ease of Access

Vaccination in Italy (as in most of Europe) was completely free of charge and, therefore, easily affordable. Health-care workers were among the first people to get vaccinated and thus were able to help coordinate the rest of the vaccination process. The general public could sign up for their vaccine online or by telephone through their regional health-care authority. This decreased the barrier for older adults less versed with the internet. Furthermore, the general practitioners were asked to identify people who should be given vaccine priority, ensuring that those with the greatest risk were vaccinated first.

Besides health-care structures, large facilities originally used for mass events, such as athletic arenas, music halls, and exhibition spaces, were converted as vaccination centers, allowing the administration of high-volume doses daily. The best example of this can be seen in the region of Lombardy, where the Fiera Milano City became the landmark for all mass vaccination territorial centers in Lombardy and became an organizational model for effective vaccination planning in Italy (Oliani et al. 2022).

A final element that eased access significantly was mobile vaccination units that were sent to people who could not leave their homes. A great example of this is the "at-home COVID-19 vaccination campaign" created by the local health unit in Rome that was dedicated to reaching "non-self-sufficient people" (Carini et al. 2021). The campaign was a great success, as it reached people who otherwise would not have been able to receive the vaccination.

Trust

Italy has one of the highest COVID-19 vaccine acceptance rates in the EU. An online survey study among 7,605 adult respondents from the general

population in December 2020 showed that 81.9% were inclined to get the COVID-19 vaccine (Neumann-Böhme et al. 2020). This acceptance might have several explanations. First, the government played a very important role in promoting the acceptance of vaccinations before the onset of the pandemic (Bucchi et al. 2022). While Italians were previously seen as vaccine hesitant or skeptical, the National Immunization Prevention Plan 2017–2019 issued by the government changed this mindset by addressing issues of equity and affordability (Engin and Vezzoni 2020; Signorelli et al. 2017).

Second, in January 2021, the Pope made a statement wherein he expressed that getting vaccinated was a moral obligation, as doing so impacted not only one's own life but also the lives of others. Shortly after that, the Vatican launched a vaccine campaign among its employees, and the Pope was vaccinated at the beginning of that campaign (Vatican News 2021). As Italy is a predominantly Catholic country and generally very devout, religious leaders, such as Pope Francis, might have played an important role in increasing the trust in getting vaccinated (Gaweł et al. 2021).

Finally, the Italian government realized that the frontline health and care workers played a fundamental role in vaccine decision-making (D'Errigo et al. 2021). Thus, the government decided to make health-care workers vaccine ambassadors. This added an additional layer of trust among the population. Not only did the government communicate the necessity of the vaccination but health and care workers, who are much more present in people's daily lives, were also tasked with convincing the population.

Role of the Health-Care System and Professions

The Italian Federation of the Order of Doctors, Surgeons and Orthodontists (FNOMCeO) supported several governmental decisions, helped the institutions with their communication strategies even in the most critical phases of the campaigns, and also advocated for stricter measures and stronger actions (Anelli et al. 2020). FNOMCeO led the call for measures to better protect health and care workers from infection and backed the government's decision to make the vaccination mandatory for all health and care professionals. In line with this approach, the Italian doctors' association warned of and applied strict sanctions to doctors who refused to get vaccinated or promoted any anti-vaccination propaganda (Day 2020). In addition, FNOMCeO advocated boosting community surveillance during the first wave in order to rapidly isolate potentially infectious workers (de Fiore and Addis 2021; Paterlini 2021a).

Protecting health and care workers in Italy was exceptionally important given the high mortality rates within the profession during COVID-19

(Modenese et al. 2022) and the low numbers of health and care workers within the profession to begin with. Moving forward post-COVID-19, new strategies to recruit and retain health and care workers will be needed to secure the health system in Italy (Richeux et al. 2023).

Opposition

Since the beginning of the COVID-19 pandemic, several social movements and political parties, most notably the populist radical right (PRR) Lega and Fratelli d'Italia (FDI), opposed and regularly criticized the institutional policies to contain and mitigate the virus. Especially during the first year of the pandemic, Matteo Salvini, head of the Lega party, denounced the scientific community for their recommendation to wear masks and criticized the government for its lockdown strategy. Salvini went so far as to stage a two-day occupation of the Italian Parliament in protest (Falkenbach 2021). In addition, both Salvini and Giorgia Meloni, head of the PRR FDI and current prime minister (see table 7.3), attacked the EU for its lack of solidarity (Falkenbach and Caiani 2021).

Despite the high COVID-19 vaccine acceptance rates, during the summer of 2021, new protest waves from the PRR were triggered by the start of the vaccination campaign, with the rise of the so-called NoVax groups opposing the mandatory vaccination adopted by the government. This was closely followed by a wave of protests aimed at the restrictions imposed by the vaccination certificates that resulted in the "NoGreenPass" movements (Paterlini 2021b). Both Salvini and Meloni joined these protests opposing the government's decision to make the COVID-19 certificate a requirement to enter public facilities (bars, fitness centers, etc.).

By mid-July 2021, however, both PRR leaders received their first vaccination against the virus, and therewith came the gradual disappearance of critique from the opposition (ANSA 2021a). While resistance toward the government and its policies surrounding COVID-19 was initially strong, it grew weaker over time, solidifying first Conte's and then Draghi's role as stable trustworthy leaders.

Conclusions

In the case of Italian vaccination politics, four concrete lessons can be learned.

The first is that leadership matters, especially during a crisis. With the change in government leadership from Conte to Draghi, it appeared that Italy's pandemic management improved, vaccine uptake increased, and contagion decreased.

Building on this first lesson, the second lesson points to the fact that

TABLE 7.3. Governments During COVID-19

Period	Prime minister	Coalition members	Opposition	Most significant contribution
2019–21	Giuseppe Conte II	5 Star Movement, Democratic Party, Italia Viva, Free and Equal/Article One, Italian Left, Independents, and other minor parties	Lega, Forza Italia, FDI	Stable leader, increased national trust during the first year of COVID-19 pandemic, first non-pharmacological intervention adopted (lockdown)
2021–22	Mario Draghi	Independents, 5 Star Movement, Lega, Democratic Party, Forza Italia, Italia Viva, Article One, +Europa, others	FDI, Italian Left, Alternative	Financial stability, international trust, improved vaccination coverage
2022–present	Giorgia Meloni	FDI, Lega, Forza Italia	5 Star Movement, Democratic Party, Azione-Italia Viva, Greens and Left alliance, others	Too early to assess

increased trust in the government helped propel the uptake and acceptance of vaccines. Given Italy's high infection and death rates, especially during the first year of the pandemic, the country needed to be convinced of the benefits of vaccination to increase uptake. Having a stable and credible leader (first Conte and then Draghi) in government helped offset oppositional protests from PRR parties and others and swayed an often vaccine-skeptical audience.

The third lesson points to logistics, namely, that a centralized coordination strategy for vaccine distribution is generally better than a regional approach. Given Italy's size and differentiating regional capacities and resources, opting for a centralized vaccine distribution strategy was critical to ensure an even and fair supply of vaccines throughout the country.

Finally, the mandatory vaccination law requiring all health and care personnel to vaccinate against COVID-19 can be considered an important decision. Health and care workers were the first group to be prioritized for vaccination in Italy because of their crucial role during the pandemic and the fact that they were at a much higher risk of contracting the disease. In summary, despite some struggles getting started, Italy conducted a very successful vaccination campaign.

NOTES

1. See "Piano strategico nazionale di vaccinazione COVID-19," Istituto Superiore di Sanità, at https://www.epicentro.iss.it/vaccini/covid-19-piano-vaccinazione

2. On 19 March 2021, after several investigations, the ban was revoked and vaccinations resumed, but the mediatic impact of this interruption caused fear and concerns among the population with several delays and cancellations of medical appointments.

3. Data provided by Eurostat, available at https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_grd2__custom_20644179/default/table; see also Openpolis 2022.

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8 | COVID-19 Vaccination in France

Navigating Vaccine Hesitancy, Logistics, and Politics in the Land of Pasteur

Sarah D. Rozenblum

The COVID-19 pandemic was a major test for the French government, particularly in swiftly developing and distributing vaccines amid widespread hesitancy among health-care professionals and the public. Why did France, the birthplace of Pasteur, face significant challenges in creating its own COVID-19 vaccine and promoting immunization? This chapter explores how France's robust public health institutions guided policymakers during the pandemic, considering the impact of the 2022 presidential elections and vaccine hesitancy on decision-making processes. It also examines how vaccines were allocated in a centralized country committed to universal principles, highlighting its early challenges and factors contributing to its eventual success.[1]

The vaccination campaign was shaped by institutional, political, and logistical factors. France's universal health system facilitated population-wide vaccine access, though disparities persisted among ethnic and socioeconomic groups (Ward et al. 2024, 24). The country's centralized governance framework affected decision-making and resource allocation processes (Antonini et al. 2022), while widespread skepticism toward vaccination posed communication challenges. High levels of vaccine hesitancy among certain population groups, health-care workers, and opposition parties prompted policymakers to adopt a cautious approach, resulting in a gradual rollout of the campaign to address public sentiment concerns. The 2022 presidential elections further complicated the vaccine rollout, as President Macron balanced public health priorities with his political agenda (Rozenblum 2023). Finally, logistical challenges, including the number of distribution centers, supply chain efficiency, availability of personnel, and real-time tracking of injections, were significant hurdles for the government, particularly in the early stages of the campaign (Antonini et al. 2022).

Despite these initial obstacles, the French vaccination campaign achieved remarkable success by the summer and fall of 2021. France primarily relied on mRNA vaccines, particularly those produced by Pfizer-BioNTech (80.27%) and Moderna (11.08%) (Cour des Comptes 2022, 19;

Antonini et al. 2022). By early September 2022, more than 149.3 million vaccine doses had been administered (Ward et al. 2024, 18). Although vaccines did not offer complete protection against the virus, they reduced severe infections, preventing thousands of deaths and easing hospital strain. The French Court of Accounts reported that mass vaccination efforts prevented nearly "38,700 deaths among individuals aged 60 and over in France" (Cour des Comptes 2022, 20) and approximately half a million deaths in Europe (Meslé et al. 2021).

Ultimately, to strengthen its vaccination capacity, France should prioritize empowering public health agencies with greater autonomy and resources, engaging communities to build trust, and maintaining transparency in vaccine communication. Additionally, investing in logistics infrastructure and domestic vaccine production will ensure a stable supply, while fostering public-private partnerships can further drive scientific innovation. Implementing these strategies will better prepare France to handle future pandemic risks.

Vaccines

Despite a sluggish start, the engagement of additional medical professionals, establishment of vaccination centers, utilization of advice from both new and preexisting expert bodies, and allocation of substantial financial resources gradually accelerated the French vaccination campaign.

European-level decisions influenced France's immunization strategy to a large degree. The EU Vaccine Strategy, launched on June 17, 2020, aimed to standardize pricing, prevent competition over vaccines within the EU, and ensure equitable access through joint procurement (European Commission 2020; McEvoy et al. 2020). Under the terms of this agreement, the European Commission negotiated directly with pharmaceutical companies through advance purchase agreements on behalf of member states. France and other participating countries retained full responsibility for procuring and distributing vaccine doses to their populations (Della Corte 2023).

Despite these coordination efforts, initial rollout challenges led to temporary supply disruptions in many member states, including France, causing delays and logistical hurdles (Antonini et al. 2022). To finance its vaccination campaign, France relied heavily on the National Health Insurance Fund (CNAM), which covered 4.6 billion of the 5 billion euros spent on vaccinations in 2021. The French state provided the remaining 0.4 billion euros (Cour des Comptes 2022, 90). Beyond its domestic efforts, France contributed approximately 400 million euros to the COVID-19 Vaccines Global Access (COVAX) fund in 2021. Through this initiative, France supported the equitable distribution of vaccines worldwide, facilitating the delivery of 47 million vaccine doses to low- and middle-income countries (Ward et al. 2024).

The campaign involved a wide array of both "traditional" and new actors, including health-care professionals, vaccine experts, public officials, and civil servants (Ward et al. 2024, 18). Initially, only doctors could prescribe and administer COVID-19 vaccines. In an opinion released in March 2021, the Haute Authorité de Santé (HAS), one of the country's leading public health agencies, recommended expanding authorization to include midwives and pharmacists (HAS 2021a). The government acted on this recommendation by expanding the pool of health-care professionals authorized to administer vaccines. As a result, a substantial portion of the 149.3 million doses were administered in pharmacies, which previously only provided flu shots (Ward et al. 2024, 19).

Additionally, it is worth noting that in the fall of 2020, a persistent minority of health-care professionals displayed reluctance to administer or even receive the COVID-19 vaccine, while another 25% indicated moderate acceptance (Ward et al. 2024, 72). This hesitancy was particularly concerning within nursing homes, where only 55% of the staff had received at least one vaccine dose between December 2020 and June 2021, despite their patients' heightened vulnerability to the virus (Santé Publique France 2021). Efforts to combat hesitancy included transparent communication of vaccine safety data and vaccine mandates for health-care professionals. Before the mandate took effect, COVID-19 vaccine uptake among medical professionals in hospitals reached 70.1% for full vaccination and 81.3% for at least one dose. By September 20, 2021, after sanctions were enforced, these rates increased to 86.6% and 92%, respectively (Maltezou et al. 2022).

Overcoming these initial challenges also required a large-scale, coordinated approach to vaccine delivery across the country. While vaccination centers were initially met with skepticism due to past mismanagement during the 2009 H1N1 flu campaign, they soon became central to France's COVID-19 immunization efforts, administering 99.6 million of a total of 149.3 million doses between December 2021 and September 2022 (Cour des Comptes 2022, 55). By January 2021, the government, in collaboration with local authorities, had set up over 500 vaccination centers linked to hospitals (Antonini et al. 2022). Supporting these efforts, hospital-based pharmacies were key in receiving, storing, and preparing vaccine orders for vaccination centers since they possessed the necessary storage capacity.

As noted earlier, the campaign also mobilized a substantial health-care workforce to meet the demand. In 2021, primary care physicians accounted for approximately 23% of vaccinations and the campaign mobilized 189,673 health-care professionals, including 67,068 reserve professionals such as retired doctors and medical students, 54,510 nurses, 43,663 general practitioners, and 19,385 pharmacists (Cour des Comptes 2022, 114).

Preexisting agencies were also crucial in developing and executing

TABLE 8.1. Preexisting Agencies Involved in National Immunization Campaigns

MINISTRY OF HEALTH	• Develops national immunization programs
HIGH AUTHORITY FOR HEALTH (HAS)	• Issues recommendations on vaccine policies via its Technical Commission on Vaccinations • Assesses authorized vaccines for their reimbursement by the National Fund for Health Insurance via its Transparency Commission
PUBLIC HEALTH FRANCE (SPF)	• Monitors diseases for which vaccines are available • Evaluates the successes and failures of vaccine policies using various metrics (monitoring of vaccination coverage, impact on the target disease, perception of vaccines by the public, adherence to vaccine recommendations, etc.) • Informs the public and health professionals about vaccinations
NATIONAL AGENCY FOR THE SAFETY OF MEDICINES AND HEALTH PRODUCTS (ANSM)	• Authorizes clinical trials • Issues market authorizations based on benefit/risk assessment Controls the quality of vaccines • Conducts market surveillance • Ensures the availability of vaccine doses • Controls the advertising of vaccines to the public and health-care professionals
NATIONAL HEALTH INSURANCE FUND (CNAM)	• Reimburses vaccines and their administration • Carries out campaigns to promote vaccines to patients and health-care professionals

Source: Information drawn from HAS 2023, table 2, p. 46.

France's COVID-19 vaccine strategy. Key institutional players included the National Agency for the Safety of Health Products, which was responsible for pharmacovigilance and post-market monitoring; the High Council for Public Health (HCSP), which provided public health guidance to national authorities; the Academy of Pharmacy; and the National Consultative Ethics Council, which addressed ethical questions raised by new medical products, including vaccines. The government, however, did not consult extensively with other expert bodies, such as the National Academy of Medicine and the Biomedicine Agency (HAS 2023, 193). The directorate general for health played a central role at the national level, while regional health agencies managed vaccine distribution and approved new vaccination sites at the regional level (Ward et al. 2024, 19). Table 8.1 summarizes the institutional actors involved in France's COVID-19 immunization campaign.

While existing agencies provided critical expertise and infrastructure, the government sought to complement their efforts by creating new advisory bodies to guide vaccine policy. Instead of relying solely on existing agencies for scientific advice, the Macron administration established no less than four new expert bodies for vaccine policy (Rozenblum 2023). As shown in table 8.2, this approach was consistent with previous organizational choices, such as creating the Scientific Council and the Committee

for Analysis, Research, and Expertise in March 2020. In late 2020 and early 2021, specialized advisory bodies, including the Conseil d'Orientation de la Stratégie Vaccinale (COSV) and the Conseil Scientifique pour les Vaccins COVID-19 (CSV), were formed. A third committee, the Collectif Citoyen sur la Vaccination, was established in the fall of 2021 but was quickly disbanded due to overlapping responsibilities with existing institutions such as HAS and HCSP and President Macron's hesitation to be tied to citizen's advice (Rozenblum 2023). Finally, a new vaccine taskforce under the Ministry of Health was set up in November 2020 to manage logistics and coordinate with relevant stakeholders on the ground (see table 8.2).

Both the COSV's and the CSV's responsibilities overlapped with those of HAS, the established public health agency. While the reasons behind these governance choices extend beyond the scope of this chapter, new research (Rozenblum 2023, 2026) examines why presidents facing reelection, like Emmanuel Macron in 2022, created new sources of advice during the pandemic. Policymakers assessed not only existing agencies' capacity to act swiftly but also their suitability for achieving their own political goals. Macron established these ad hoc bodies for three main reasons: to overcome the alleged capacity limitations of existing agencies, to bypass standard administrative rules and transparency requirements by relying on more flexible and less regulated sources of advice, and to facilitate credit claiming and blame avoidance during an election year (Rozenblum 2023).

Finally, private actors also shaped the national COVID-19 vaccine strategy, particularly in France, where the government signed 33 contracts with consulting firms for mask communication and vaccine distribution, totaling 17.5 million euros (Sénat 2022, Annexes 41, 48). This reliance on private consultants was not unique to France. The US federal government, along with numerous states, health agencies, and local authorities, also relied on private consultants during the pandemic. For example, the US Center for Disease Control and Prevention awarded a $4.9 million contract to the Boston Consulting Group in September 2020 to facilitate nationwide vaccine distribution (Stanley-Becker 2021).

While governments often seek advice from private consultants, the magnitude of their involvement during the pandemic was unprecedented (Rozenblum 2023). A comparative report by the Covid Crisis Group noted that several countries outsourced broad policy design to private consulting firms (Allen et al. 2023, 19). Further empirical research is needed to examine the role of consulting firms and the private sector in shaping the COVID-19 vaccine strategy of their respective nations and across borders. In particular, it would be worth exploring whether consulting firms operating in different countries (including the BCG, Deloitte, and McKenzie) have contributed to a degree of standardization in the COVID-19 vaccine strategy across national borders.

TABLE 8.2. Main ad hoc Scientific Committees Established During the COVID-19 Pandemic

Name	Creation	Mission	Chair	Dissolution
Scientific Council (CS)	**March 10, 2020**	**Issued opinions on the state of the crisis, compiled relevant scientific evidence, identified containment and mitigation measures**	**Prof. Jean-François Delfraissy**	**July 31, 2022**
Analysis, Research and Expertise Committee (CARE)	**March 24, 2020**	**· Relayed scientific proposals to the government · Synthesized relevant scientific data · Disbanded in July 2020 on its own initiative**	**Prof. Françoise Barré-Sinoussi**	**July 2020**
Advisory Council on the Vaccine Strategy (COSV)	*December 3, 2020*	*Advised the government on the scientific and medical aspects of the vaccine campaign, including its design, delivery, and communication*	*Prof. Alain Fischer*	*August 1, 2022*
Advisory Council on Vaccines (CSV)	*June 4, 2020*	*Advised the government on the scientific interest of candidate vaccines that were being evaluated by health regulators*	*Prof. Marie-Paule Kieny*	*July 2022*
Interministerial vaccine task force	*2020*	*· Focuses on logistical aspects of the COVID-19 strategy · Helped purchase vaccines and track vaccine shipment; institutionally hosted within the Ministry of Health*	*Louis-Charles Viossat, Laetitia Buffet*	
Citizens committee	*December 2020*	*Citizens participate in the drafting of COVID-19 vaccine strategy*		*Disbanded in July 2021*

Source: Office parlementaire d'évaluation des choix scientifiques et technologiques sur "La stratégie vaccinale contre la COVID-19," 15 December 2020, HAS (2023), table 2, p. 46.

Note: Generalist advisory bodies are in **bold**; vaccine committees are in *italics*.

Vaccinations

The French vaccination campaign officially began on December 27, 2020, with a primary focus on prioritizing vulnerable populations. Despite a slow start, the campaign gained momentum in the second half of 2021. France developed targeted initiatives to vaccinate vulnerable groups, despite facing high vaccine hesitancy and significant logistical challenges. However, the country's leading scientific authorities failed to develop their own COVID-19 vaccines.

From Slow Start to Rapid Rollout: The Evolution of the French Vaccination Campaign

Between March 2020 and March 2021, over 34,000 nursing home residents contracted COVID-19 and subsequently died from it (Cour des Comptes 2022, 37). As a result, the initial phase of the immunization campaign (January 2021–February 2021) focused heavily on nursing home residents and their caregivers due to their susceptibility to severe complications. Strict protocols required pre-vaccination consultations, medical prescriptions, and the presence of a family member if the resident was unable to provide consent. Nursing homes initially faced challenges such as limited dose availability and modest outreach efforts (Débarre et al. 2022).

From December 2020 to July 2022, France's vaccination strategy underwent three major shifts in response to evolving priorities (Cour des Comptes 2022, 35). Initially, the strategy was cautious, prioritizing vulnerable groups following HAS guidelines (HAS, Opinion of November 27, 2020). However, this cautious approach inadvertently fueled the anti-vaccine movement, as skeptics viewed it as evidence that the new vaccines were unsafe. This in part resulted in 55% of the population refusing vaccines in early 2021 (Bajos et al. 2022). In response, the campaign accelerated in mid-2021, administering over 14 million doses primarily of mRNA vaccines to health-care workers aged 50 and older and the elderly by late spring 2021 (Cour des Comptes 2022, 19).

In the late spring 2021, the government expanded eligibility to the entire population, following recommendations from advisory bodies like COSV and CSV. In July 2021, while France struggled with the spread of the highly contagious Delta variant, the government introduced the health pass (*passe sanitaire*), followed by the vaccination pass (*passe vaccinale*) in January 2022. These measures, which restricted access to venues like bars and theaters to vaccinated individuals or those with a recent negative COVID-19 test, significantly boosted vaccination rates. By September 2021, a vaccine mandate for health-care workers further increased coverage: in July 2021, 72% of the individuals surveyed by *Santé Publique France* reported being fully vaccinated (DREES 2022). Vaccination coverage con-

tinued to increase after the summer, reaching 91% among adults and 77% across the entire population by the end of 2021 (DREES 2022).

Seeking to bolster vaccination coverage further, France discontinued free COVID-19 testing for unvaccinated individuals in October 2021, increasing the financial cost of vaccine refusal. The vaccination pass, introduced in January 2022, eliminated the option of negative tests for access to public spaces but was suspended in March 2022 due to public backlash, with modest impacts on vaccination rates (Débarre et al. 2022). However, while these measures that were aimed to increase vaccination were implemented, children aged 5 to 11 were somewhat overlooked in the first year of the campaign. Vaccination eligibility for children, particularly those vulnerable to complications from the virus or living with at-risk individuals, was only expanded on December 15, 2021, with the inclusion of all children aged 5 to 11 occurring later in the same month (Ministère de la Santé 2021).

Reaching Vulnerable Populations via Targeted Initiatives

How did the government attempt to reach vulnerable populations, and who did they prioritize? Ad hoc and preexisting advisory bodies played a key role in advocating for the needs of at-risk individuals (Rozenblum 2023). COSV and HAS experts proactively put forth a series of recommendations to the government through self-referrals and various initiatives involving diverse stakeholders. They actively sought input from patient organizations and advocacy groups, fostering an inclusive approach. They conducted webinars to share their recommendations with families of patients affected by obesity, mental illnesses, or autism. HAS and CNAM implemented "outreach" strategies (*aller-vers*) to streamline the vaccination process for elderly individuals or those with disabilities directly within their homes.

This engagement with civil society groups played a crucial role in enhancing vaccine coverage and vaccine accessibility among vulnerable populations. For example, after engaging with obstetric professional societies, COSV members issued a recommendation emphasizing the importance of vaccine boosters for pregnant women.[2] In addition, they developed a vaccination strategy targeting children based on insights gathered from conversations with pediatricians.[3] Regular interactions with medical professionals and patient organizations allowed COSV to identify potential challenges in implementing recommendations, such as vaccine hesitancy, language barriers, or resource constraints.

Importantly, this ongoing dialogue facilitated the establishment of supportive coalitions with patient organizations and medical societies, thereby increasing the acceptability of their recommendations among both the public and the medical profession. The inclusion of two repre-

sentatives from patient organizations within COSV, Nicolas Brun and Yvanie Caillé, bridged the gap between patients and vaccine experts. Ultimately, COSV and HAS played a crucial role in alerting governmental authorities to pressing issues affecting vulnerable populations, including autistic individuals, pregnant women, poor households, severely immunocompromised patients, individuals with disabilities, and undocumented immigrants (Rozenblum 2023).

Despite these efforts, disparities in vaccine coverage persisted among socioeconomic groups. By July 2021, nearly three-quarters of adults had received at least one vaccine dose (DREES 2022). However, while nine out of ten individuals belonging to the top 10% income bracket had been vaccinated, only five out of ten among the bottom 10% income bracket had received the vaccine (DREES 2022). This disparity underscores significant differences in vaccine uptake between low-income individuals and those with higher income levels.

The government's outreach strategies also targeted groups whose age, socioeconomic status, isolation, or mobility restrictions limited vaccine access. These efforts involved collaboration among regional health agencies, prefectures, municipalities, the CNAM, the Primary Health Insurance Fund, and various nonprofit organizations, including the Red Cross. These *aller-vers* initiatives aimed to reach individuals who faced challenges accessing vaccination centers and give them the option of receiving vaccinations in their homes. For instance, as reported by the Court of Accounts and interviews I conducted with relevant stakeholders, the CNAM adopted three distinct approaches: nationwide or localized communication campaigns, which engaged nearly 20.7 million insured individuals over age 50 through channels such as text messages, emails, letters, and phones calls; medicalized home interventions targeting high-risk patients with underlying health conditions; and tailored interventions focusing on underserved populations, including individuals experiencing homelessness (Cour des Comptes 2022, 63). The CNAM thus reached out to millions of French people, particularly those most at risk, to incentivize them to get vaccinated (Ward et al. 2024, 96).

While these interventions underscore a commitment to ensuring equitable access to vaccination services for all individuals regardless of their circumstances, these efforts were still limited in scope and effectiveness (Débarre et al. 2022). According to findings from the Icovac initiative, most promotional campaigns contained "no reference of the use of non-French languages," which could have benefited hard-to-reach populations, including non-francophone migrants (Ward et al. 2024, 25). Other limitations included the absence of a cohesive strategy and a dedicated budget at the national level. More broadly, French authorities should develop a comprehensive strategy to promote universal access to vaccines in future public health crises, with a focus on addressing language barriers and reaching ethnically and socioeconomically marginalized populations.

To conclude, the French vaccination campaign underwent significant changes from December 2020 to the fall of 2021, primarily driven by the need to broaden access to vaccinations as vaccine availability increased and to safeguard vulnerable populations. The following section addresses organizational, political, and technical challenges foreseen by the government or uncovered as the vaccination campaign progressed.

Facing Obstacles: Logistical Hurdles and Vaccine Hesitancy

The initial phase of the campaign faced several challenges, including complexities in obtaining consent among nursing home residents, logistical issues in producing and distributing vaccines to nursing homes, and delays in establishing an effective pharmacovigilance system (Ward et al. 2024, 22). Transporting vaccines was particularly difficult until May 2021 for facilities lacking an internal pharmacy or hospital affiliation, such as nursing homes (Cour des Comptes 2022, 53). Additionally, the overcentralization of crisis management marginalized local stakeholders who could have expedited the vaccination process (Bergeron et al. 2020). At the national level, the proliferation of ad hoc expert bodies within the executive branch hampered coordination with local actors and occasionally caused confusion by issuing conflicting vaccine opinions (Rozenblum 2023). Ultimately, vaccine hesitancy among both the public and the medical community proved to be one of the most significant challenges.

The COVID-19 vaccine strategy was in part shaped by previous setbacks in immunization policy, particularly the mismanagement of the 2009 H1N1 pandemic. Despite a comprehensive H1N1 vaccination campaign, only 8% of the French population at the time opted for the vaccine due to lower than expected epidemic severity, leading to its characterization as a "resounding failure" (*Sénat* 2022). This "perceived hyping of the [H1N1] pandemic" (Larson et al. 2022) eroded public trust in France's public health infrastructure. A 2021 survey revealed that while 87% of respondents trusted science, only 48% trusted government agencies tasked with pandemic preparedness (Dubois 2021). These public sentiments, along with how they were perceived by public leaders, subsequently influenced the formulation of the COVID-19 vaccine strategy.

In the fall of 2020, the government thus identified vaccine hesitancy as a critical issue that could impede the COVID-19 immunization campaign. Vaccine hesitancy is defined as "negative attitudes towards vaccines that do not amount to a radical refusal of any form of vaccination" (Ward et al. 2020) and has been rising in France for three decades. Resistance to vaccines predates the COVID-19 pandemic and intensified in the late 1990s when concerns about a possible link between hepatitis B vaccines and multiple sclerosis eroded public confidence (Ward et al. 2019). Before 2018, only three vaccines—tetanus, diphtheria, and poliomyelitis—were

mandatory, but a new law enacted under Emmanuel Macron's first term added eight mandatory vaccines for children under the age of two (Law of 30 December 2017). This policy shift aimed to contain measles, which had affected over 24,000 individuals between 2008 and 2016 (Cour des Comptes 2018). This change faced resistance from vaccine-hesitant parents. By early 2020, around 20% of the population expressed hostility toward vaccines (Sénat 2020), a concern that caught the attention of both the government and the medical community.

In the winter of 2020, surveys revealed significant vaccine hesitancy among the French population, with 55% unwilling to receive the COVID-19 vaccine in December 2020 (Bajos et al. 2020). Concerns centered around the perceived "rushed" vaccine development process or the use of "novel" and "untested" vaccine technologies (Schwarzinger 2021). Despite COVID-19 vaccines not causing substantial side effects, events such as the temporary suspension of the AstraZeneca vaccine on March 15, 2021, due to thromboembolic incidents further fueled public concern (Cour des Comptes 2022, 22). Although the suspension was lifted for individuals over age 55 after a favorable opinion from HAS on March 19, 2021, public confidence remained shaken. Many physicians reported that patients refused the AstraZeneca vaccine, and some doctors chose not to administer it due to the increased distrust (OPECST 2022, 52).

Researchers have found that vaccine hesitancy in France was also linked to political partisanship and engagement with the political system (Ward et al. 2020). The closer respondents were to "anti-system" political parties on the far left or far right, the less likely they were to get vaccinated against COVID-19. Conversely, those identifying with governing parties tended to trust vaccines more (Ward et al. 2020). Other studies reported that vaccine hesitancy was associated with factors such as female gender, lower education level, poor compliance with recommended vaccines in the past, lower perceived severity of COVID-19, and the absence of chronic conditions (Schwarzinger 2021). First-generation African and Asian immigrants, as well as French Overseas Department residents, were also less willing to get vaccinated (Bajos et al. 2022). Finally, vaccine hesitancy reflected a broader distrust toward public health institutions, as highlighted by *Santé Publique France* (SPF 2023).

In summary, the French government faced political, organizational, and technical challenges at the outset of the vaccination campaign, causing initial delays. However, as these issues were resolved and vaccine access improved, uptake increased significantly. By late 2021, the vaccination rate for individuals aged 12 and above exceeded 90%, surpassing most EU member states (Cour des Comptes 2022, 99). Booster rates for adults also ranged between 90% and 94%. However, France's reliance on vaccines from its European and American partners highlighted its lack of domestic vaccine production capabilities.

The Reasons Behind France's Failure to Produce COVID-19 Vaccines

France faced challenges in developing a viable COVID-19 vaccine, despite its institutional advantages, such as a universal health-care system and reputable research facilities. The following section examines the reasons behind France's inability to produce a COVID-19 vaccine, highlighting key institutional and strategic issues that impacted its efforts.

While the Institut Pasteur was the first to sequence the coronavirus genome and share it with the global scientific community, it faced significant hurdles in developing a viable COVID-19 vaccine (Bertrand et al. 2021). Unlike countries like Germany, the UK, and the United States, which rapidly developed effective vaccines, France's inability to do so prompted investigations into the causes of this delay, particularly as the sole permanent member of the UN Security Council unable to produce its own vaccine (Rabesandratana 2021). This outcome is puzzling as France enjoys considerable institutional advantages, including a universal health-care system, extensive medical and administrative databases, and respected research facilities (CAE 2021). France's failure has been attributed to insufficient funding for vaccine research, institutional complexities, poor development phase decisions, and a preference for fundamental research over applied research.

First, the vaccine candidates developed by Institut Pasteur and Sanofi were marred by significant design flaws (Bertrand et al. 2021). The Pasteur vaccine used a vector derived from the measles virus, which, while highly immunogenic, was already recognized by 95% of the population. This triggered a rapid immune response that proved too weak to be protective against the SARS-CoV-2 protein. In contrast, successful vaccines used primate adenoviruses that the human immune system had not encountered previously and that elicited strong immune responses against both the vector and the viral protein (Bertrand et al. 2021). Aside from the challenges posed by vector selection, Sanofi's candidate suffered from dosing errors: The amount of protein injected into volunteers was significantly lower than anticipated, resulting in the immune system being insufficiently activated (Bertrand et al. 2021).

Apart from research challenges, the Institut Pasteur faced institutional and circumstantial challenges during the pandemic. In recent years, it has shifted focus from applied research to fundamental research, diverging from its original mission of combating infectious diseases (Rabesandratana 2021). Meanwhile, vaccine development expertise has shifted to the industrial sector, particularly Sanofi, reducing the role of public research institutions like Institut Pasteur in vaccine development (Rabesandratana 2021). Given these challenges, France ultimately failed to develop an effective COVID-19 vaccine. The following section examines the French government's decisions in implementing its COVID-19 vaccine strategy and how it addressed some of these challenges.

Why? How France Transitioned to a Successful Vaccine Rollout

France's transition to a successful COVID-19 vaccine rollout was marked by a series of strategic decisions and adaptations that addressed both operational challenges and public hesitancy. These decisions also generated specific incentives for the incumbent president.

Expanding the Role of Health-Care Professionals

Recognizing the limitations of its public health workforce, the government gradually expanded the pool of professionals authorized to administer vaccines, including pharmacists, midwives, retired physicians, and medical students. This shift marked a broader trend in France's public health model, moving away from relying solely on primary care physicians to distributing preventative care responsibilities across various health-care professions. While centralizing preventative missions within regional health agencies or general practitioner practices could have offered clearer oversight, this decentralized approach prioritized flexibility and broader coverage. Moving forward, it will be important to assess how these trends reshape health-care delivery and workforce dynamics, as well as their long-term impact on public health outcomes.

Enhancing Scientific Credibility Through Prominent Experts

In response to concerns about vaccine hesitancy, the government strategically appointed respected experts to handle communication efforts, enhancing the credibility of their vaccine campaign and reinforcing the scientific basis of their decisions. Jean-François Delfraissy, the inaugural chair of the Scientific Council, became a trusted figure among French citizens during the early months of the pandemic. In the fall of 2020, the Ministry of Health sought another prominent scientist to serve as an authoritative voice for the COVID-19 vaccine strategy. Dr. Alain Fischer was appointed to lead the COSV, assuming a role akin to a "vaccine czar" in the United States, where figures like Drs. Anthony Fauci and Moncef Slaoui led similar efforts. Dr. Fischer's unparalleled expertise in immunology and experience in health policy formulation added significant credibility to the campaign. This move, however, sidelined traditional public health communicators, such as *Santé Publique France*, while enabling the government to shape the narrative around COVID-19 vaccines (Rozenblum 2023).

Centralizing Communication Efforts and Decision-Making Processes Ahead of the 2022 Presidential Elections

As the 2022 presidential election approached, President Macron took on a more prominent role in France's communication strategy regarding

COVID-19 vaccines, with both himself and the prime minister becoming key figures in the campaign (Ward et al. 2024, 92). In contrast, the minister of health remained relatively silent during this period (93). President Macron occasionally used strong language to denounce anti-vaccine sentiments: "The unvaccinated, I really want to screw them [*emmerder*]. . . . So we're going to keep doing it, all the way, that's the strategy" (94). Reports suggested that the government strategically leaked information to the media to gauge public opinion and assess the political acceptability of proposed vaccine measures. With President Macron seeking reelection, it is likely that he aimed to avoid alienating the public and making controversial decisions that could generate blame (Rozenblum 2023).

As noted earlier, this centralization trend was also evident in the way public health agencies, traditionally tasked with communication missions, were relatively sidelined in favor of central administrations. According to the Icovac initiative, "While Santé Publique France is traditionally responsible for producing large-scale communication campaigns on health issues, these appear to have been steered directly from the Ministry of Health in the case of vaccination against COVID-19" (Ward et al. 2024, 95). This shift highlights a trend where central administrations and ad hoc expert committees take precedence over established public health agencies in shaping public health narratives in times of crisis (Rozenblum 2023).

Navigating Vaccine Communication and Distribution amid Political Pressures

Finally, in the lead-up to the 2022 presidential election, the issue of COVID-19 vaccines became a focal point of political debate, with various parties using it to blame the incumbent president. Notably, both the far-left *La France Insoumise* (LFI), led by Jean-Luc Mélenchon, and the far-right the *Rassemblement National* (RN), led by Marine Le Pen, expressed skepticism about vaccine safety. They both criticized multiple aspects of the campaign's organization, objectives, and target demographics (Faccin et al. 2022). LFI, for example, accused the government of neglecting economically disadvantaged populations, while RN blamed President Macron for the sluggish start of the campaign (Ward et al. 2024, 97).

Both party leaders opposed the implementation of the health pass and the mandate requiring health-care workers to be vaccinated, advocating for the reinstatement of unvaccinated health-care practitioners dismissed for refusing the vaccines (Ward et al. 2024, 97). Many of their supporters echoed their anti-vaccine sentiments, leading to repeated protests in Paris. Additionally, right-wing figures such as Florian Philippot and Nicolas Dupont-Aignan took firmer anti-COVID-19 vaccine stances (Faccin et al. 2022). These critical positions were particularly vocal before the presidential election, with parties softening their stances on vaccines after April 2022. This illustrates how political dynamics influenced public dis-

course on vaccination and underscores the strategic rationale behind the incumbent president's efforts to maintain control over vaccine communication and accelerate the campaign to preserve public trust and support.

Conclusions: Balancing Political and Institutional Challenges in France's Vaccination Efforts

The French vaccination campaign was shaped by a combination of political imperatives and institutional constraints. In the French context, vaccination remains highly polarizing, with over 55% of the population initially hesitant to receive COVID-19 vaccines in late 2020 (Bajos et al. 2022). The government's cautious approach toward vaccination in December 2020 stemmed from the president's reluctance to alienate his voter base ahead of the election and from the uncertainty surrounding vaccine efficacy and safety at the time of their release.

Additionally, the hyper centralization of crisis governance under President Macron marginalized *Santé Publique France*, relegating France's premier public health agency to a mere operational role. Ad hoc expert committees and the *Haute Autorité de Santé* largely shaped the vaccine campaign, but this led to unintended consequences. Recommendations from these expert bodies sometimes conflicted, resulting in confusion among the public and medical professionals (Rozenblum 2023). However, both types of institutions played a key advocacy role, alerting the government to pressing issues facing vulnerable communities and designing targeted interventions tailored to their needs.

Moreover, France's challenges in timely vaccine distribution and production stem in part from the mandate of the country's public health agencies and several policy decisions made in recent decades regarding public investment in bioscientific research. The primary focus of public health agencies on risk assessment rather than active risk management has hampered their ability to partner with private manufacturers, purchase doses in sufficient quantities, and ultimately execute a vaccine campaign under time constraints. However, despite these constraints, vaccination efforts ultimately proved successful, with 90% of the eligible population fully vaccinated by November 2021 (Ward et al. 2022).

The introduction of a health pass and, to a lesser extent, a vaccination pass contributed to this positive outcome. The involvement of various health-care professionals also accelerated the vaccination efforts (HAS 2021c). Although these measures were noncoercive, they provided strong incentives for individuals to get vaccinated in order to resume their daily social activities—so much so that Macron praised them as "screwing" the unvaccinated. Empirical observations suggest that a combination of strong incentives (such as the health or vaccination pass) and targeted

vaccine mandates, particularly focusing on health-care professionals or federal contractors as seen in the United States, while sometimes unpopular, can lead to favorable vaccination outcomes and ultimately save numerous lives.

To conclude, France should draw lessons from its management of the COVID-19 pandemic by implementing several key strategies to enhance its public health response, particularly in strengthening immunization capabilities:

- *Empower public health agencies:* France should consider granting more autonomy to agencies like *Santé Publique France* to lead vaccination efforts and communication campaigns. This can be achieved by increasing their funding and resources, expanding their workforce, and developing comprehensive training programs for pandemic preparedness.
- *Engage with communities:* France should enhance its efforts to engage with local and regional communities, especially those that are vaccine hesitant. By involving these groups in consultations and decision-making processes, France can build trust and address legitimate concerns about vaccinations in a peaceful environment.
- *Ensure transparency and accountability:* The French government should maintain transparency about vaccine efficacy, safety, and decision-making processes. This will help build public confidence in vaccination campaigns and foster supportive coalitions with medical groups actively involved in vaccination efforts on the ground.
- *Strengthen logistics and distribution:* Investing in logistics infrastructure is crucial to ensure timely and efficient vaccine distribution across the country, with a focus on rural and underserved urban areas.
- *Enhance domestic vaccine production:* Increasing investment in domestic vaccine production capabilities will reduce reliance on international suppliers and ensure a stable vaccine supply. Boosting funding for bioscientific research in the public sector and fostering public-private partnerships, like Germany and the United States, can enhance production capacity and innovation in vaccine development.
- *Promote evaluation and data tracking:* Finally, France should establish metrics to monitor the performance of vaccination campaigns, enabling national authorities to assess the real-time impact of incentive-based strategies such as health passes or mandates for specific sectors. This approach will foster a culture of evaluation and continuous improvement.

By implementing these recommendations, France can enhance its vaccination capacity, ensuring the country is better prepared to confront the next pandemic.

NOTES

1. One limitation of this chapter is that it primarily focuses on Metropolitan France. It would be useful to dedicate a separate chapter to the case of overseas departments and territories, given their unique situation and some of the specific challenges they faced, including persistent vaccine hesitancy, logistical hurdles in accessing vaccination centers and distributing doses, health-care deserts, misinformation, and health-care disparities. In French, the author would rather use the expression "*France hexagonale*" to refer to the mainland part of France, excluding overseas territories, as "*France métropolitaine*" implies a relationship of subordination with mainland France.

2. COSV, Note du 30 septembre 2021—intérêt du rappel de vaccination chez les femmes enceintes, mis à jour le 26 novembre 2021.

3. COSV, Note du 13 janvier 2022, Communication autour de la vaccination pédiatrique.

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9 | COVID-19 Vaccination in Germany

Challenges of Coordination and Consent

Margitta Mätzke

Germans have expressed numerous complaints about how their government handled the COVID-19 pandemic. Despite those domestic criticisms of inefficiency and inadequacy, Germany's COVID-19 policies were relatively effective when viewed through a comparative lens. The vaccination campaign, however, presents a paradox. What initially seemed to have all the preconditions of a successful effort quickly turned into a story of disorganization, poor political communication, wastefulness, and deep political polarization.

Germany was the first country in Europe to develop a national immunization plan as early as July 2020 (Cadeddu et al. 2022, 3), which, one would think, would put the country at the forefront of international immunization efforts. Furthermore, one would think, Germany's economic power and its highly developed health system and administrative capacity afforded it the resources to acquire vaccines early and organize a mass vaccination campaign. This position of strength was amplified by the fact that the first COVID-19 vaccine was developed by the German company BioNTech in partnership with Pfizer. This scientific achievement fostered a sense of national pride (Dyer 2020) and a strong preference for the "German vaccine" among citizens (Jensen et al. 2021). An early assessment before the distribution of vaccines suggested widespread trust in German institutions and health experts to provide a safe and effective vaccine (Fiske et al. 2022).

Yet, as the vaccination campaign began in December 2020, resources alone proved insufficient (Falkenbach and Willison 2022, 8), and vaccination quickly became a source of political conflict. The initial rollout was criticized for being too slow, which sparked widespread frustration (Chazan 2021). More significantly, as vaccines became more widely available in the summer of 2021, misinformation and concerns about vaccine safety spread rapidly, contributing to a growing reluctance within segments of the population to get vaccinated. By the fall and winter of 2021, Germany faced widespread public discontent, as many blamed the slow pace of vaccination for what was perceived as preventable infections and deaths. This discontent was fueled by differential restrictions for vaccinated and

non-vaccinated individuals designed to encourage vaccination uptake and reduce infections. It culminated in heated debates over compulsory vaccination, which became a bone of contention and paved the way toward increasing polarization over the necessity, ethics, and feasibility of such a mandate. Political debates became increasingly aimless, and the public health response appeared indecisive, leading to significant vaccine wastage and further eroding public trust.

This chapter analyzes the roots and consequences of the politicization and polarization of COVID-19 vaccination in Germany. It explains how vaccine hesitancy evolved into opposition and outright antagonism and examines the consequences for policymaking and the political system. By tracing the development of public policies in both the acquisition and the distribution of vaccines and societal responses, the chapter aims to provide an understanding of the co-evolution of the political struggle over the issue of vaccination and the government's public health strategy during this critical period.

Vaccines

Under normal conditions, vaccines such as those for the seasonal flu are authorized by the European Medicines Agency (EMA) and recommended by Germany's Standing Committee on Vaccination. The responsibility for procuring vaccines typically falls under the jurisdiction of the subnational governments in the *Bundesländer* but in close coordination with federal authorities. The Paul-Ehrlich-Institute, a federal agency under the Ministry of Health, oversees the authorization and quality control of vaccines, while the actual procurement and distribution processes are managed at the *Bundesländer* level, and the federal government merely provides guidance and facilitates coordination. Financing comes primarily through Germany's statutory health insurance, which covers the cost of vaccines for insured individuals, making them accessible at no direct cost to the public. The COVID-19 pandemic changed this typical approach, both in Germany and across the European Union (EU). While vaccines were still authorized through the EMA, the process was greatly accelerated due to the public health emergency. Conditional marketing authorizations allowed for the rapid approval of vaccines, which was critical to getting vaccines to the public quickly in the face of the global pandemic.

The European Commission implemented a joint procurement strategy, representing all EU member states in negotiations with the vaccine manufacturers, an approach that significantly departed from the usual (sub) national-level procurement process. It was based on solidaristic principles, unusual for the EU, and sought to ensure equitable access to vaccines across all EU member states. The European Commission's goal was to prevent competition among countries and guarantee that even smaller or less

affluent states would have the same opportunity to secure vaccine supplies as larger or wealthier ones. The EU's vaccine strategy was launched in June 2020, with advance purchase agreements with vaccine manufacturers. By August 2020, these agreements were already in place, ensuring member states would receive a set number of doses once vaccines became available (European Court of Auditors 2022). The first vaccine, Pfizer-BioNTech, was approved by the EMA in December 2020, and the German campaign began on December 27, 2020. The vaccines were financed through the EU budget, with the member states contributing to this pooled budget. At the national level, COVID-19 vaccines were financed primarily from federal funds, with Germany's statutory health insurance system and subnational governments covering the costs of administering the vaccines to the population. On top of the EU's joint procurement efforts, Germany decided to take unilateral action by securing additional doses of vaccines, notably from Pfizer-BioNTech, early in 2021 (Hafner et al. 2020, 8). This decision was criticized by other EU member states, as it violated the underlying principles of solidarity that guided the joint procurement strategy (Becker 2021; Deutsch, et al. 2021).

Germany ended up purchasing massive numbers of vaccine doses from various manufacturers. According to press reports, Germany had ordered around 672 million doses of COVID-19 vaccines by the beginning of 2023, worth 13.1 billion euros (Grill 2023). The vast majority of the doses came from Pfizer-BioNTech, followed by Moderna, reflecting Germany's strong preference for mRNA vaccines. However, with such a large stockpile and the citizens' demand for vaccines faltering, not all vaccines were used. No official data are published on this (Van Kessel et al. 2023), but press reports indicate that millions of doses were destroyed due to expiry dates (Martuscelli 2023), raising concerns about the efficiency of procurement and distribution processes during the later stages of the pandemic.

Notwithstanding its solo efforts in acquiring vaccines, Germany has been a vocal proponent of global vaccine equity, particularly through its involvement in the COVAX initiative. This global effort is coordinated by the World Health Organization and two global health organizations, the Coalition for Epidemic Preparedness Innovations and the Global Alliance for Vaccines and Immunization, to ensure the fair distribution of vaccines to low- and middle-income countries (Eccleston-Turner and Upton 2021). Germany contributed substantial financial resources to COVAX, becoming one of its largest donors, and pledged to donate millions of vaccine doses to countries in need (Federal Ministry for Economic Cooperation and Development 2021). However, Germany faced criticism over its stance on the issue of patent waivers for COVID-19 vaccines. The patent waiver debate centered on the question of whether intellectual property protections for COVID-19 vaccines should be temporarily lifted to allow more countries, especially in the Global South, to produce vaccines locally. While Germany did raise some concerns about worldwide vaccine produc-

tion and access, its stance was firmly against waivers (Zupruk 2022). The German government, like the EU as a bloc, contended that a patent waiver would not resolve shortages in supply right away since capacity bottlenecks and distribution problems were more pressing obstacles than intellectual property restrictions. Germany emphasized that sharing know-how, scaling up production capacities, and strengthening supply chains were more effective solutions. This opposition was motivated by a concern that weakening patent protections could undermine innovation and future investments in research and development, especially within Germany's strong pharmaceutical industry, including companies like BioNTech. Germany instead advocated for increased manufacturing support and the donation of doses through initiatives like COVAX while maintaining intellectual property protections.

Overall, therefore, Germany's COVID-19 vaccine strategy was characterized by both cooperation within the EU and independent actions that sometimes strained relationships with its partners. The joint procurement strategy highlighted the importance of solidarity within the EU, but Germany's decision to secure additional doses on its own reflected the challenges of balancing national priorities with international cooperation in a crisis. In retrospect, the country procured far more doses than it needed, resulting in significant wastage. Globally, Germany's financial support for COVAX showed its commitment to ensuring vaccine access for poorer countries, though its reluctance to support patent waivers points to significant elements of vaccination nationalism and protection of domestic interests.

Vaccination

In Germany, vaccinations are traditionally administered by general practitioners or pediatricians, who operate within the decentralized structure of the country's health-care system and provide routine immunizations. This decentralized approach relies on the established patient-physician relationship, fostering trust and facilitating individualized service and counsel. The COVID-19 vaccination campaign deviated from this model by adopting a more centralized, large-scale approach to expedite vaccine distribution (Danek et al. 2023; Siedler et al. 2022). With the help of their local public health offices, subnational governments established mass vaccination centers across the country, often repurposing large venues such as exhibition halls or sports arenas. Additionally, mobile vaccination teams were deployed to reach vulnerable populations in nursing homes and remote areas. The involvement of the Bundeswehr (German Armed Forces) and civil protection agencies underscored the campaign's scale and urgency (Roßmann et al. 2021). During the early months of the COVID-19 vaccination, the country's established primary care providers, general practitioners, were not part of the campaign. The decision to bypass the

existing primary care infrastructure was in part informed by the logistical challenges posed by the ultra-cold storage requirements of the new mRNA vaccine. In part, there was also the intention to maintain control and ensure that the national priorities schedule was adhered to (Danek et al. 2023). As vaccine supply stabilized, general practitioners were progressively integrated starting in April 2021, and they ended up vaccinating large numbers of people (Götz et al. 2021, 11–12) and became key actors in trying to reach out to hesitant populations and those in rural areas (Warren and Lofstedt 2022, 1101). Their involvement was encouraged but not mandated by the government.

Germany's vaccination campaign began in late December 2020, after the EMA had approved the Pfizer-BioNTech vaccine. Early stages followed a clear prioritization strategy from the Standing Committee on Vaccination, which focused on protecting the most vulnerable populations: the elderly, health-care workers, and those with preexisting conditions. This strategy aimed to reduce mortality and prevent overwhelming hospital capacities in the health-care system. While the guidelines on who should receive the first doses were widely followed, tensions arose over the allocation of limited supplies and the regional distribution of vaccines. Overall, the first six months of the campaign were marked by a slow start, primarily due to vaccine shortages and organizational difficulties of administering vaccines in a centralized manner where established structures of health-care delivery are decentralized and personalized (Tonti 2022; Weinheimer 2022). Although mass vaccination centers were operational by January 2021, vaccine distribution faced delays at the European level. Public frustration grew as the rollout proceeded more slowly than anticipated, especially compared to other countries like the UK, the United States, or Israel (Beck and Sheppard 2021, 275; Reinl, et al. 2024).

One setback involved the AstraZeneca vaccine. In January 2021, German authorities initially recommended that AstraZeneca be given only to individuals under age 65, citing insufficient data on its effectiveness for older populations. This decision complicated prioritization, as the elderly could not receive this vaccine. In March 2021, reports of rare blood clotting disorders led to temporary suspensions of AstraZeneca in several European countries, including Germany. A few weeks later, German regulators reversed their decision and recommended AstraZeneca for individuals over age 60, based on new data about clotting risks in younger populations. Frequent policy reversals led to confusion and fed into the tendency toward increased public skepticism (Agosti et al. 2022; Priebe et al. 2022). By summer 2021, Germany's campaign picked up pace, aided by increased vaccine supplies and a much broadened set of venues to deliver vaccines, including the country's large sector of general practitioners. Opening eligibility to all adults in June 2021 marked a turning point, and by July Germany had largely caught up with the European average in vaccination rates.

Challenges

The initial challenges slowing down the rollout consisted of logistical obstacles. Distributing vaccines was complex, and Germany's decentralized state traditions in public health added to the difficulties. Coordination between federal and subnational authorities hinged on cooperation (Kropp and Schnabel 2021), as the latter were responsible for organizing mass vaccination centers. Centralizing the campaign through mass centers created accessibility issues for rural populations and less mobile elderly individuals. It was also at odds with the way health-care services are delivered in the German health system. For some German citizens, especially older ones, it was disconcerting to receive their COVID-19 vaccinations not from their family doctor but in mass vaccination centers, organizationally supported by the armed forces of Germany and administered by masked health-care personnel of unclear identification (Jentzsch et al. 2022). As vaccines became more widely available and general practitioners began delivering the vaccines, these logistical challenges lessened. They were, however, significant in the crucial early months of the campaign, and citizens' evaluations of the state's performance in coping with the pandemic continued to decline even after the organizational problems were largely solved (Busemeyer 2022, 403).

As logistical challenges eased and the campaign expanded beyond high-priority groups, vaccine hesitancy became the most significant challenge to the progress of the vaccination campaign. By summer 2021, a significant part of the population was reluctant to get vaccinated (Priebe et al. 2022). Concerns about side effects of the new mRNA vaccines and mistrust in government and pharmaceutical companies contributed to this reluctance. Confusion over AstraZeneca's side effects and misinformation on social media increased doubts. The Querdenker ("lateral thinkers") movement, which had protested lockdowns in 2020, expanded its focus to include opposition to vaccines and the possibility of compulsory vaccination (Frei et al. 2021). By mid-2021, protests took place regularly, drawing thousands of participants. These protests emphasized civil liberties, with demonstrators rejecting what they saw as government overreach. The movement attracted a mix of far-right extremists and conspiracy theorists, but also individuals from mainstream political backgrounds. Polarization over the issue of vaccination deepened, with debates over personal freedom versus collective responsibility becoming central features in political mobilization and election campaigning (Hunger et al. 2023; Stern 2020). The federal election of September 2021 further politicized the vaccination campaign. Parties used the pandemic response to position themselves, with opposition parties criticizing the government for a slow start and mixed messaging around vaccination policies. Far-right parties, particularly the Alternative for Germany (AfD), capitalized on anti-vaccine sentiments (Donovan 2021; Rensmann and Zee 2022),

framing vaccination requirements as violations of individual liberties, that way gaining support from some of the vaccination skeptics. Other parties, particularly the Greens and Social Democrats, advocated for stricter measures, including vaccine mandates. These divisions mirrored broader societal tensions and influenced voter preferences, with the AfD performing strongly in (east German) regions with lower vaccination rates (Desson et al. 2022, 5–6; Jäckle and Timmis 2023). The election became a focal point for both pro- and anti-vaccination positions, reflecting societal divisions but also contributing to further polarization (Niedermayer 2021).

Policies

As one of the earliest public policies beyond masks and contact restrictions, a contact tracing app was introduced in Germany in June 2020. The Corona Warn App, as it was called, was the first attempt at using technology to contain the spread of the disease (Gstrein et al. 2021). Citizens could download the app onto their smartphones, which used Bluetooth technology to detect proximity to individuals who tested positive for COVID-19. Initially, the app was seen as a key tool for controlling the virus, but citizens' participation fell short of expectations due to privacy concerns and technical issues (Beierle et al. 2021). As COVID-19 containment policies evolved and became increasingly differentiated based on vaccination status, the app's functionality was expanded to include digital proof of vaccination; it became a digital Corona passport. This aligned with the EU's Digital COVID Certificate, which helped streamline travel across member states by providing a unified platform to verify vaccination status. The digital vaccination certificate allowed vaccinated individuals to travel within the EU and access public venues. The Corona passport system, which took effect in mid-2021, was vital in easing lockdowns and travel restrictions. Freedom of movement now depended on vaccination status, keeping the unvaccinated subject to stricter restrictions. Corona passport regulations, known in Germany as 3G, 2G, and 2G+, were introduced. Under the 3G model, access to public venues (such as shops or restaurants) was allowed for individuals who were vaccinated, had recently recovered, or had tested negative. The 2G model restricted access to vaccinated or recovered individuals, and 2G+ was even stricter and added the requirement of a recent negative test. These rules sought to incentivize vaccination by providing greater freedoms to those immunized. Critics argued that these measures created a two-tier society and infringed on personal freedoms. The "G-rules" have failed to bridge the gap between differing views on how to contain the disease and likely contributed to increasing polarization (Fayaz-Farkhad and Jung 2024, 668; Henkel et al. 2020). As infection rates surged again in late 2021, the German government introduced a vaccine mandate for health-care workers, effective

March 2022, following similar measures in other European countries. The mandate aimed to protect vulnerable patients and ensure that the healthcare system remained functional. The broader debate over a general vaccine mandate was more contentious. In April 2022, the German parliament debated mandatory vaccination for the general population, but the measure failed to pass the parliamentary vote.

By mid-2022, Germany saw a decline in severe COVID-19 cases, attributable to high immunity rates from vaccination or previous infections. The government gradually lifted restrictions, shifting toward managing COVID-19 as endemic. Booster campaigns continued, particularly for vulnerable populations. As of late 2023, approximately 76% of Germany's population was fully vaccinated—a rate comparable to the European average but lower than Europe's leaders, such as Denmark or Spain. Efforts to increase the vaccination rate now face insistent opposition; moreover, the perception of declining urgency among the public poses an additional challenge. In the aftermath, there has been significant debate over the transparency and efficacy of the vaccination campaign, as well as decision-making and political communication by political elites and health authorities (Siggelkow 2024). Critics call for a thorough evaluation of the pandemic response, including the rationale behind lockdowns, school closures, and vaccination policies, emphasizing the need for transparency to rebuild trust and improve future crisis preparedness.

Explaining Vaccination Against COVID-19 in Germany

Two related aspects of German vaccination policy during the COVID-19 pandemic need to be explained: first, the slow start of the vaccination campaign, which was characterized by serious organizational difficulties, and second, the considerable opposition to mass vaccination against COVID-19. Initial efforts to organize mass vaccination were marred by logistical inefficiencies, delays, and waste, with millions of vaccines expiring before being administered. Despite the country's overall financial and administrative capacity, Germany struggled to distribute vaccines in the campaign's early months. This mismatch between capacity and performance led to widespread disappointment and distrust, which in turn contributed to a more consequential development, namely, rising vaccination hesitancy and growing opposition. By the time the logistical challenges had been largely overcome, the vaccination campaign met with resistance. What initially began as skepticism, partly fueled by the perception of a state policy that had fallen into disarray, developed into outright opposition and antagonism (Jennings et al. 2021). This resistance was reinforced by a broad populist movement that used opposition to vaccinations as part of a broader critique of state overreach.

As for the organizational difficulties, the cost of disorganization and

delay in the early months of Germany's vaccination campaign was significant, even though these difficulties were largely resolved by early summer 2021. By the early fall of 2021, Europe was beginning to grapple with the Delta wave, and while some argued that the slow start of mass vaccination had contributed to rising infection rates, many citizens and political decision-makers believed that it was widespread vaccine opposition and irresponsible behavior during the summer of 2021 that significantly contributed to the high rates of infection and deaths in the autumn and winter of 2021. Led by federal Health Minister Jens Spahn, the catchphrase "the pandemic of the unvaccinated" circulated widely in public discussions (DW 2021). What had begun as an issue of administrative shortcomings thus evolved into politically divisive discontent (see Wüstner 2023, 31–36, for an analysis of the confrontational political rhetoric at the time). The policies regulating access to public space based on vaccination status, as well as the debate over mandatory vaccination, provided fertile grounds for public protests against such measures and, as a result, political polarization. This polarization left lasting scars on the German political landscape, as opposition to vaccination became a proxy for wider resentment against government authority. This outcome was not unique to Germany, but it was especially pronounced due to the intersection of party-system dynamics and the timing of a federal election in the fall of 2021. Political rifts over COVID-19 management increasingly compromised the political feasibility of effective policy responses to the pandemic.

To better understand the politics of German COVID-19 vaccination, one must grasp the interaction between vaccination policy and societal opposition: Some of the policies, and the perception of ineffectiveness, generated skepticism; skepticism evolved into polarization; and polarization, in turn, informed the policies adopted. The explanation of this two-pronged outcome of disorganization and resistance employs two broad frameworks. The first focuses on organizational dynamics, particularly the role of decentralization in Germany's political and health systems. The second framework seeks to understand vaccine hesitancy and antagonism as informed by broadening perceptions of inequity, undermining public trust and furthering anti-government mobilization.

Disorganization

Commentators are quick to identify Germany's decentralized administrative and political structures and the polity's high demands for cooperation when pointing out reasons for less than stellar administrative performance. Even with frequent criticism of federalism in political commentary and the mass media (as reported in Lanfer 2022, 147–48), and despite public controversies over divergent pandemic strategies among the *Bundesländer*, decentralized administrative systems with long-standing

traditions of cooperation among jurisdictions had allowed for a highly effective response to the pandemic's first wave (Kropp and Schnabel 2021; Mätzke 2021). In that early phase, regional health authorities successfully adapted their actions to local circumstances, demonstrating how decentralized decision-making could respond to the distinct needs of different regions and populations. To say that Germany's federal structure and decentralized systems of health-care governance played a role in the disjointed vaccination campaign is, therefore, not a generalized statement about decentralization or federalism and pandemic management in Germany. The argument about decentralization is more specific.

Disorganization emerged from a mismatch between COVID-19 crisis management, including the vaccination campaign, and the institutional structures governing Germany's health-care system and public administration (Weinheimer 2022). While the latter have strong decentralized traditions, a more coordinated and centralized approach was employed for mass vaccination in an attempt to ensure uniform standards, particularly regarding vaccination priority, logistics, and progress. This approach was sound in principle, especially given earlier critiques of inconsistent regional lockdown measures. It was not fully effective, however, because it led to friction with established governance structures and norms of health-care service delivery. It contrasted with the personalized approach familiar to citizens and health professionals and also resulted in regional discrepancies in prioritization and eligibility to receive the vaccine (Warren and Lofstedt 2022, 1106). Coordinating the activities in the 16 *Bundesländer* proved to be challenging, as there is no centralized administrative leadership tradition in Germany's health system and public administration. There is, for instance, no position comparable to that of the Swiss federal chancellor, who acts as the senior civil servant for the federal administration and plays a central coordinating role in the public service. Germany's central public health institute, the Robert Koch Institute, enjoys scientific prestige but did not, as it is not designed to, take a leading role in implementation (Kropp and Schnabel 2021, 89). This lack of centralized implementation capacity (Mätzke 2012) complicated the situation and left subnational governments to make their own decisions, resulting in inconsistencies, regional disparities, and sometimes delays and confusion (Götz et al. 2021).

Inequity Politicized

The initial months of the German vaccination campaign presented a picture of disorganization, yet they were also the time when a distinctive way of looking at problems and policies took hold. This characteristic perspective was *segmentalist*, viewing vaccination, the disease, and implementation challenges primarily through the lens of specific subgroups. It had

begun a year earlier, when COVID-19 had been presented as a threat to the sick and elderly, leading to non-pharmaceutical interventions focused on protecting these vulnerable groups (Narlikar 2020). Universalistic perspectives on the pandemic as a problem affecting everyone were notably scarce, and this in turn influenced vaccination strategies. Issues such as the prioritization of certain groups, uneven access to vaccines, regional disparities in the progress of the campaign, unequal treatment, and privileges for some and not for others were not merely facets of specific measures; they were central themes—inequity was a constant concern—from the very outset of the vaccination campaign.

While some forms of unequal treatment were justifiable from a public health standpoint, other forms of disparity were harder to defend. These included unintentional inequalities caused by disorganized logistics and occasional instances of corruption and privilege. Reports of younger, healthier individuals finding ways to get vaccinated early or accusations of privileged access for certain groups were widely discussed in the media. Regional differences in the speed of vaccine rollout, often due to local administrative capacities, also added to an impression of arbitrariness. Much of this unevenness was an unintended consequence of the chaotic early months when friction between attempts at centralized coordination and decentralized implementation became most apparent. It still had a profound impact on trust in government capacity.

As the vaccine rollout progressed, intentional forms of unequal treatment became more prominent, and with them, vaccination skepticism began to rise (Warren and Lofstedt 2022, 1109–10). While formal prioritization of vulnerable groups during the initial stages of the vaccination had been broadly accepted as necessary and fair, all later forms of deliberately treating people unequally were not. First and foremost was unequal treatment based on vaccination status. This started with the G-rules of September 2021, which required people to show proof of vaccination, recovery from COVID-19, or a recent negative test to access public venues such as restaurants, gyms, and cultural events. These measures, too, were justified on public health grounds, as they sought to reduce the risk of infection while allowing social and economic activities to continue. In December 2021, the same reasoning led to another, even more drastic measure when access restrictions were lifted only for the vaccinated. This so-called *lockdown for the unvaccinated* was highly controversial. Many citizens viewed it, and increasingly the G-rules as well, as coercive and discriminatory rather than protective and solidaristic, deepening their sense of alienation from public health policy. This perception of unequal treatment left an enduring imprint on public discourse about vaccination, turning what was once a collective endeavor into a divisive and polarizing issue.

Unequal treatment was consequential: Even though in part unintentional or often based on sound public health principles, it undermined a

sense of solidarity and generalized trust and, as a consequence, compliance (Busemeyer 2022; Eisnecker et al. 2022). During the first wave of the pandemic, Germany experienced that sense of national solidarity, with widespread compliance with lockdown measures. However, as the vaccination campaign introduced all kinds of status distinctions, particularly based on vaccination status, this collective spirit began to fracture. For many, the campaign shifted from a shared effort to a divisive force that pitted vaccinated against unvaccinated citizens, creating an atmosphere of antagonism conducive to populist appeals. This loss of collective purpose made it impossible to generate support for subsequent measures like a general vaccination mandate. Without a strong sense of shared responsibility and given the perception of unequal treatment by the state, a generalized vaccination mandate seemed heavy-handed to a significant segment of society (Fayaz-Farkhad and Jung 2024, 667), so that a legislative proposal to that effect failed to pass parliament.

Polarization and Distrust

Vaccine hesitancy was an outcome as much as it was a cause of indecisive policy decisions and poor implementation. While some skepticism can be explained by concerns over vaccine safety or efficacy (Sterl et al. 2023), the growing opposition to vaccination reflected a more general distrust of government policies. Vaccine skepticism was widespread among Germany's large ecofriendly and esoteric scene (Frei et al. 2021). This subculture, known for promoting alternative health practices and harboring distrust toward mainstream medicine, became a significant source of resistance to the COVID-19 vaccination campaign. Within these circles, concerns about bodily autonomy, holistic health, and skepticism toward government interventions fed into broader vaccine hesitancy and complicated public health efforts. Vaccine hesitancy was thus not only a matter of individual skepticism but also a community phenomenon, and as such in part the result of deliberate political mobilization (Hunger et al. 2023). The right-wing populist party Alternative for Germany framed vaccination policies as emblematic of government overreach and, capitalizing on public discontent, presented themselves as defenders of civil liberties (Lewandowsky et al. 2022). This narrative found resonance not only among vaccine skeptics but also among those alienated by what was seen as the government's heavy-handed approach to pandemic management. Vaccine hesitancy became a symbol of broader dissatisfaction with the political establishment. The broad protest movement that had initially represented all kinds of dissent, from esoteric alternative health supporters, libertarians, and populist political actors to extremist groups on the right, became distinctly narrower over time. By the end of 2021, it had turned into a

coalition of disaffected voters, sharing a common skepticism toward government authority and providing a fertile ground for right-wing populist political mobilization.

Conclusion

Assessments of Germany's pandemic management and vaccination campaign have ranged from lukewarm to critical in public discourse, both during and after the pandemic. To be sure, some of this criticism reflects the German penchant for negativity, but it can be better understood by considering two key elements. First, long-term political effects, in which vaccination policy has acted as a catalyst, reinforced existing trends toward deeper political divisions within German society. Resistance to government mandates aimed at encouraging responsible behavior grew, fueling the rise of both right-wing and, more recently, left-wing populist movements. This shift has redefined how many residents of Germany perceive and challenge government authority, resulting in a broader and deeper skepticism of government intervention. Second, evaluations of the vaccination campaign's success or failure are in the eye of the beholder to some extent and hinge on the standards by which they are measured. Negative assessments often result from a mismatch between expectations and results. For example, despite the substantial resources allocated to the vaccination effort, operational delays, a slow initial rollout, significant wastage of vaccines, and mediocre results created disillusionment. Moreover, although the campaign was designed to establish uniform standards for broad participation and compliance, its implementation was uneven across Germany's decentralized political and health systems. These contrasts help explain the public's frustration and the mixed response from experts and party supporters alike.

This mismatch between expectations and experience sheds light on the political and policy challenges surrounding the campaign. Discrepancies emerged between policy design and institutional prerequisites, as well as between universal normative ideals and inequities in practical implementation. It is sometimes difficult to explain lockdown restrictions for some citizens and not for others, just as explaining the increasingly dense web of behavioral rules is a challenge in the general normative environment of liberal democracy. Most important, compliance with universal vaccination requirements faltered when citizens experienced uneven access and unequal treatment. Calls for responsible and solidaristic behavior, which had an impressive impact during the first lockdown in 2020, gradually lost their appeal as the perception of inequity intensified. The state's calls for responsible behavior for the common good were made in the context of policies that treated citizens unequally—sometimes for legitimate reasons, sometimes through oversight or inconsistency, and

sometimes deliberately. Without clear explanations for these disparities, the tension between unequal treatment and calls for solidarity remains a challenge.

This problem, which also affects current climate policy and the political center's struggle against extremism, was particularly pronounced during the German vaccination campaign. The stubborn rejection of mainstream political decisions, institutions, and leaders by a growing segment of the population cannot be attributed solely to demographics, attitudes, or subcultural influences. It also stems from policy failures and political missteps such as opaque decision-making processes, inconsistent political communication, and logistical and organizational confusion. Above all, however, perceptions of injustice have been the main driver of widespread disillusionment with government-mandated responsible behavior and mainstream politics.

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10 | COVID-19 Vaccination in Austria

How to Polarize a Society

Thomas Czypionka, Maurice Kinner, and Miriam Reiss

Quick and decisive action marked the first wave of the pandemic in Austria. The country was one of the earliest to exit lockdown. It also rolled out testing as well as vaccinations quickly, making both widely available to the public. Alas, the overall management of subsequent pandemic waves was less successful, with "too little, too late" in terms of restrictions that led to the need for even more drastic measures like lockdowns every single time. The vaccine was seen as a way out of this unfortunate dynamic, but although it was widely known that health literacy was poor and vaccine hesitancy high in Austria, little was done to counter this until vaccinations stagnated. In this situation, politicians seem to have been desperate and therefore dead set to introduce a general vaccination mandate and ignored empirical evidence about the problems of such an approach. The mandate divided Austrian society, and many vaccinated opposed a general mandate as well. In the end, the law was never executed and the plans were abolished after it had become very clear that the measure was not only unpopular but also the last drop for many who had already lost trust in the government when it announced a "lockdown for the unvaccinated."

These proceedings make a strong case for not leaving weaknesses in public health like high vaccine hesitancy and low health literacy to fester. And even if they still exist when a pandemic hits, policymakers need to address them decisively (Reiss et al. 2024). Having such weaknesses *and* failing at good communication to outbalance them is at the heart of the story we are about to tell: The introduction of a general vaccination mandate achieved nothing in terms of vaccinations but led to a split in society that prevails to this day.

Vaccines

What Is and Was Available in Austria

In accordance with European Union (EU) market authorizations, 11 COVID-19 vaccines have been approved in Austria as of July 2023. These

include two mRNA vaccines (Comirnaty [Pfizer] and Spikevax [Moderna]); two vector vaccines (Vaxzevria [AstraZeneca] and Jcovden [Janssen]); three recombinant protein-based vaccines (Nuvaxovid [Novavax], VidPrevtyn Beta [Sanofi-GSK], and Bimervax [HIPRA]); and one inactivated virus vaccine (Valneva) (Austrian Federal Office for Safety and Health Care 2023). To fight the Omicron variant, the list also includes the three bivalent vaccines Comirnaty Original/Omicron BA.1, Comirnaty Original/Omicron BA.4–5, and Spikevax Original/Omicron BA.1. Of the approved vaccines, Bimervax and Vaxzevria are not currently in use (Federal Ministry of Austria—Social Affairs, Health, Care and Consumer Protection 2023).

The list of available vaccines in Austria changed continuously over the course of the pandemic. From the pandemic's inception until December 2021, Austria ordered 57 million vaccine doses (33.3 million doses of Comirnaty; 8 million doses of Spikevax; 5.9 million doses of Vaxzervria; 4.5 million doses of Jcovden; 3 million doses of VidPrevtyn Beta; 1.2 million doses of Valneva; and 1.1 million doses of Nuvaxovid) and received a total of 23.9 million, which up until then only consisted of Comirnaty, Spikevax, Jcovden, and Vaxzevria (*Salzburger Nachrichten* 2022). However, Austria stopped administering first shots with Vaxzevria in June 2021 and from then on only performed second jabs with it. Potential boosters in the form of a third jab were already planned with a different vaccine. According to the former Health Minister Wolfgang Mückstein (Green Party), the main reasons for phasing out Vaxzervria were "concerns among the population," "bad press," and "delivery problems" rather than poorer effectiveness (Puls 24, 2021).

Recombinant protein-based vaccines have been available since March 2022, when the first doses of Nuvaxovid arrived in Austria. It was the hope of the government that their availability would increase demand, because skeptics of the mRNA technology were expected to be more willing to get vaccinated with the more traditional vaccine. However, this turned out to be a misconception, as the demand for Nuvaxovid fell way short of expectations: 2.6 million doses of Nuvaxovid had been delivered by June 2022, of which fewer than 10,000 were actually administered (*Kleine Zeitung* 2022).

Frictions in the Ordering Process

In 2020, all 27 member states of the EU agreed to jointly procure COVID-19 vaccines, and the EU Commission was tasked to negotiate with manufacturers. Prices and delivery modalities were therefore predetermined, and vaccine doses were distributed by population share. However, actual orders placed by the member states could exceed or fall short of the allotted amount. This was particularly relevant for countries with financial constraints, so they could opt out of having to buy their share in order to spend less (Austrian Court of Audit 2023).

Nevertheless, in March 2021, former Chancellor Sebastian Kurz started to publicly accuse the EU of an unequal distribution in which Austria would not get its fair share of 2%. In total, until mid-2021, Austria did receive 700,000 doses less than the maximum that would have been possible for the country according to their population share (*Kurier* 2021a). On the EU level, nobody denied Austria's claims that it did not receive its share, but many diplomats were surprised, because the Austrian government itself had not ordered the full quantity it was entitled to receive. Thus, observers believed that this political move of accusing the EU was intended to distract from turmoil in domestic policy, which included the resignation of the labor minister due to allegations of plagiarism, corruption investigations against the finance minister, and a generally pessimistic sentiment due to a damaged economy (*Financial Times* 2021b, 2021c). Kurz's narrative of the distribution issue was questioned even within his own party, the conservative People's Party, for instance by Austria's EU Commissioner Johannes Hahn (*Kleine Zeitung* 2021b).

Even after the issue around the distribution of vaccine doses was settled, observers perceived a lasting loss of diplomatic credibility for Austria on the EU level as a result (*Financial Times* 2021a). Kurz then went on to claim that Clemens Martin Auer, an Austrian official on the European steering board responsible for the procurement of vaccines, had singlehandedly decided not to buy vaccines according to Austria's quota. Although this claim was never confirmed, it led to Auer's dismissal. Shortly after this discussion in March 2021, 10 million additional doses were distributed throughout the EU, from which Austria received 199,000 (in accordance with their population-based share of 2%) and donated 30,000 of them to Czechia, which at this point was even more heavily affected by the virus (ORF 2021).

In summary, Austria ordered 12% less than what would have been possible in accordance with its population share by June 2021 and started ordering vaccine doses above its 2% share in October 2021 (Austrian Court of Audit 2023).

Overshooting the Mark of Vaccine Availability

In a special audit by the Austrian Court of Audit (Österreichischer Rechnungshof), several critical aspects about the financing plan for the vaccines came up. First, Austria had failed to make detailed calculations to predict the costs arising from the procurement of vaccines in the beginning of the pandemic. Although the Ministry of Social Affairs, Health, Care and Consumer Protection was informed about possible price ranges for future vaccines already in 2020, no cost approximations were made. Second, demand was heavily overestimated. Official documents show that the Austrian government had planned for a vaccination rate of 100% of all

people over the age of 12. While safeguarding sufficient supply, this strategy resulted in higher costs than necessary.

Total costs for vaccine orders added up to 1.25 billion euros for the 70 million doses that were ordered up until February 2022. By then, 31.7 million of these had already been delivered to Austria and 3.5 million were donated (Austrian Court of Audit 2023). Donations were mainly made to COVAX, although bilateral donations gained importance over time. The latter were focused on countries that Austria has ties with in development politics, as well as countries from the Western Balkan region (Parliamentary Correspondence 2021). The high number of orders in relation to Austria's population of 9.1 million resulted in a considerable amount of doses in stock as of March 2023 (29.9 million) and a high number of expired vaccines, even surpassing the population number (ORF 2023). However, political turbulences—Austria had three different health ministers (all from the Green Party) and three different chancellors (all from the People's Party) during the pandemic—certainly made planning more difficult.

Thus, one can conclude that while market authorizations and procurement were handled at the EU level, the Austrian government made some questionable decisions with regards to ordering vaccines. Arguably, too few vaccines were ordered in the early phases, and too many as the pandemic progressed. Possible explanations for this imbalance, including political misjudgments and the problem of widespread vaccine hesitancy, are provided later in the chapter. Overall, these policies created diplomatic issues in the early stages and led to unnecessarily high expenditures and poor vaccination rates during most of the pandemic.

Vaccinations

Arrival of the Long-Awaited Vaccine

Accompanied by a media spectacle and press appearances of the government, the first vaccine doses were administered on 27 December 2020 to five elderly volunteers. The actual rollout of the vaccination program began in early January when the first large deliveries arrived in Austria. Initially, it was planned that vaccinations would be organized by the central government. However, state governors voiced criticism regarding the foreseen bureaucratic processes—they claimed that if the vaccine administration were to be organized centrally, this would slow down the vaccination campaign (*Kurier* 2021b). Finally, it was thus decided that the states would be responsible for organization and implementation of vaccinations while procurement remained with the central government. Vaccine doses were distributed to the states based on their population through a central retrieval system. In general, capacities were ramped up relatively fast and the available doses were administered without significant delay.

Prior to the pandemic, the data situation with regard to immunization coverage was relatively poor in Austria. While the establishment of an electronic vaccination registry had been planned for several years, the prospect of COVID-19 vaccination accelerated the development and implementation process. The electronic registry (e-Impfpass), which is maintained by the Ministry of Health, was implemented simultaneously with the administration of the first COVID-19 vaccines. In contrast to the general electronic health record (ELGA), it is not possible to opt out of the vaccination registry.

Getting the Population Vaccinated

Under considerable time pressure, the states each set up their individual vaccination systems. As a result, there was great variation in how vaccination administration was handled. Due to a lack of experience with mRNA vaccines, many states preferred to send teams to nursing homes and hospitals for vaccination. For the general population, most states therefore also opted for vaccination centers, partly using existing infrastructure that had been set up for testing. Nonprofit health organizations like the Red Cross or the Workers Samaritan Organization, as well as retired health professionals and medical students, played a major role in manning these vaccination centers. Some states relied to a greater extent on primary care physicians to administer vaccines. However, the latter often had problems in both managing high demand and handling sensitive mRNA vaccines. Over time, a mixed approach was established in most states, with a focus on centers that were more efficient to organize. In later phases when vaccines were more broadly available, a multitude of smaller campaigns were introduced around the country to provide low-threshold access, including pop-up containers, vaccination buses, events, or supermarket vaccinations.

In addition to using different settings, the states also implemented different registration platforms. They differed in terms of, for example, whether they allowed for self-declaration of risk-group status, whether they allowed for preregistration of nonprioritized groups, or whether they featured waiting lists. This caused considerable confusion and frustration among the public (*Der Standard* 2021a).

Considering the scarce availability of vaccines in the early phases of the rollout, a clear prioritization scheme was applied. This scheme was based on recommendations by the national vaccination committee, a commission of independent experts advising the minister of health. At first, access was restricted to high-risk groups like residents and staff of nursing homes or elderly homes, those over the age of 80, and health professionals. The scheme was largely adopted by the states for their respective prioritization systems, with only minor changes applied in some states. However, reports began to emerge of ineligible persons

"jumping the queue" to receive leftover doses. In particular, this pertained to cases of mayors overseeing vaccination campaigns (*Kleine Zeitung* 2021a). During a period when demand overwhelmingly exceeded supply, these incidents created a major public outcry and condemnation of the respective persons. This also created the impression that, in general, there was a high willingness to get vaccinated in the Austrian population.

With the exception of one opposition party, the right-wing Freedom Party, there was a broad political consensus in favor of vaccination. The conservative People's Party and the Green Party, who formed the government, unanimously promoted the vaccination campaign and were joined in their efforts by the Social Democrats, whose leader at the time was a physician specialized in infectious diseases, and the liberal NEOS party. The so-called 3G rule was introduced, which allowed entry into restaurants, bars, and other leisure facilities only to those who presented proof of either vaccination, virus recovery, or a recent negative test result (antigen or polymerase chain reaction [PCR]).

Dropping Vaccine Demand and Rising Infection Rates

When prioritization rules were relaxed and vaccinations gradually became available to the wider population by mid-2021, it became evident that the demand for vaccinations was beginning to wane. This was partly fueled by media coverage on potential adverse reactions, particularly with regard to the Vaxzevria vaccine, and critical illustrations regarding the effectiveness of the vaccines against new variants. In the fall of 2021, the Delta variant spread rapidly, causing more severe illness than the previous variants and raising daily case numbers to unprecedented levels. The government tightened the 3G rule to a 2.5G rule such that antigen tests were no longer accepted (only PCR), also aiming to thereby increase the incentive to get vaccinated.

Chancellor Sebastian Kurz referred to the Delta wave as a "pandemic of the unvaccinated" (Federal Chancellery 2021), as those who had not been vaccinated were disproportionately and more severely affected, but the government failed to find an effective communication strategy to win over those who were hesitant. The right-wing Freedom Party increasingly stirred up the public debate against vaccination, and a newly founded party whose political stance solely consisted in resistance against vaccination earned significant gains in regional elections. At the same time, the ruling People's Party was shaken by an internal crisis triggered by corruption investigations against Chancellor Kurz and his inner circle as well as other members of the party. In October, Kurz resigned, and the former Foreign Minister Alexander Schallenberg took over his office.

Meanwhile, case numbers continued to rise until Austria recorded one of the highest daily case rates worldwide in late November 2021 and hospitals were overwhelmed with severely ill COVID-19 patients. In the

severely hit Salzburg region, a committee was instated to decide which patients would qualify for intensive care and which would not (Politico 2021). Politicians on both state and federal levels who had previously ruled out the introduction of further restrictions saw themselves forced to tighten measures on a day-to-day basis. On 12 November, a "lockdown for the unvaccinated" was announced together with a vaccine mandate for health professionals. A further measure considered sending letters to unvaccinated individuals by the Ministry of Health offering them a concrete vaccination appointment. A lengthy legal debate on whether this was compliant with data privacy laws ensued. After months of discussion, it was decided that the ministry was not entitled to knowing who was unvaccinated and thus could not send such a letter, but a law was passed that tasked Social Health Insurance to send the letters on behalf of the minister of health. Fashioned after similar, successful campaigns in Spain and Portugal, this campaign after so much turmoil eventually achieved no significant effect in Austria (Profil 2022). In the meantime, some state governments had already taken matters into their own hands, sending such letters without awaiting federal regulations or coordinating with the federal government, which resulted in growing tensions between the states and the federal government.

A Drastic Step

Several months into the Delta wave, a number of European countries such as Austria, Germany, Greece, and Italy began to discuss a measure that had previously been essentially inconceivable: a vaccine mandate. Although the respective domestic discussions within Europe were marked by different ideas of a mandate (i.e., only for specific age groups [Greece] or only for specific health-care, law, military, and educational jobs [Italy]), the Austrian debate was dominated by the idea of a mandate for the general (adult) population (Burki 2022). Austria still faced surging case numbers while lagging behind many other European countries in vaccination coverage. On 19 November, the Austrian government eventually resorted to announcing a general vaccine mandate, making it the first Western country to take this drastic step (*New York Times* 2021). The mandate was designed to take effect via three phases. In the first phase, starting in February 2022, the mandate legally came into force but was not enforced by the executive. The second phase was planned to start in mid-March 2022 and consisted of random police controls and fines of up to 3,600 euros for unvaccinated individuals. In the third phase, unvaccinated individuals would have been identified through the vaccination registry and fined if they continued to refuse vaccination. Exemptions would have applied to those who cannot get vaccinated for medical reasons.

While Germany was also fairly close to passing a vaccine mandate, political pressure there pushed the government to backpedal (Politico

2022). It soon became clear that no other Western country would follow the Austrian example. Furthermore, the People's Party continued to grapple with corruption allegations and internal frictions, and former Interior Minister Karl Nehammer succeeded Alexander Schallenberg as chancellor—only two months after the latter had taken office. The political right heavily campaigned against the vaccine mandate, and thousands of people protested in weekly demonstrations.

A Mandate That Never Was

With the highly transmissible but milder Omicron variant the dominant variant in early 2022, the situation in hospitals gradually relaxed. Doubts increasingly arose—also among vaccination proponents—regarding whether the vaccine mandate was still an appropriate measure (Tóth 2022). The government began to ease some restrictions and cautiously signaled that the mandate may not be fully implemented after all. When the symbolic first phase had already come into force, Chancellor Nehammer said in an interview that the mandate was not "set in stone" (*Der Standard* 2022a). An expert advisory panel was established and tasked with reviewing the mandate—which conveniently also relieved the government from political responsibility.

In the midst of this discussion, Health Minister Wolfgang Mückstein from the Green Party announced his resignation in early March, citing threats from radical anti-vaccination activists and fears for his and his family's safety as reasons. Observers, however, suspected that another reason was Mückstein's frustration regarding his lack of political leverage. While in theory, the bulk of competences in a pandemic lies with the health minister, political realities were in stark contrast: The state governments hold all the cards. Mückstein—a former physician with little political experience—is said to have mostly failed to withstand pressure from state governors and his party's senior partner in government, the People's Party (*Der Standard* 2022b).

On 8 March, the expert commission published its report (Bundeskanzleramt 2022). The experts concluded that the current epidemiological situation did not warrant the immediate implementation of a vaccine mandate whose declared purpose was to prevent the health system from collapsing. Furthermore, they argued that requiring people to get vaccinated in the spring may discourage some from getting a booster in the fall in case of a new wave. The government thus announced that the vaccine mandate would be suspended until further notice—only six days before it would have been enforced. A mandate for health professionals only, which had been announced prior to the general mandate, was not implemented either. In June 2022, the law governing the vaccine mandate was revoked completely.

Why? What Explains the Decisions Governments Made?

Infertile Ground for Vaccination Efforts

Public health—in particular, prevention and health promotion—has traditionally not been a major priority of health policy in Austria, which tends to be more focused on curative care (OECD and European Observatory on Health Systems and Policies 2021). Austria thus could not rely on a strong public health infrastructure when the pandemic began. Instead, competences and responsibilities were scattered across several entities and administrative levels (Reiss and Czypionka 2022; Czypionka and Reiss 2021).

Furthermore, the Austrian population compares relatively poorly to other European countries in terms of health literacy (Pelikan et al. 2014). According to the Austrian Health Literacy Survey 2019 (HLS_{19}-AT), over 30% of the population exhibit a problematic or inadequate level of health literacy. Particularly challenging areas are navigational competence, that is, orientation in the health system, and digital health literacy, and certain groups like those with low formal education and those in financially precarious situations struggle disproportionately (Griebler, Straßmayr, Mikšová et al. 2021). While a slight improvement could be observed compared to the previous wave of the survey in 2012, it remains clear that the issue of poor health literacy needs to be addressed by health policy.

These factors most probably contribute to the fact that vaccine hesitancy has been traditionally widespread in Austria. In 2017, for example, only 81% of 2- to 5-year-olds and 70% of 15- to 30-year-olds were fully vaccinated against measles, which is well below many Western European countries (Popper et al. 2018). Even before the pandemic, surveys indicated that a significant share of around one-fifth of the population had a skeptical or negative attitude toward vaccines, mostly driven by fear of side effects, lack of knowledge, doubt of effectiveness, or distrust toward the pharmaceutical industry (Bauer et al. 2021; Sandhofer et al. 2017). Paired with political misjudgments and unfavorable media coverage, this widespread phenomenon, which had long been widely neglected by health policy, negatively impacted efforts to get the Austrian population vaccinated against COVID-19.

A False Sense of Optimism

When COVID-19 vaccines arrived in Austria in late 2020/early 2021, media coverage was focused on the "run" on vaccines. In hindsight, however, there were indications that public trust was already beginning to crumble. While the government had made swift and decisive decisions to cope with the first wave in 2020, overconfidence and resistance, for example, from the tourism industry, had led to a pattern that was often repeated: The government was

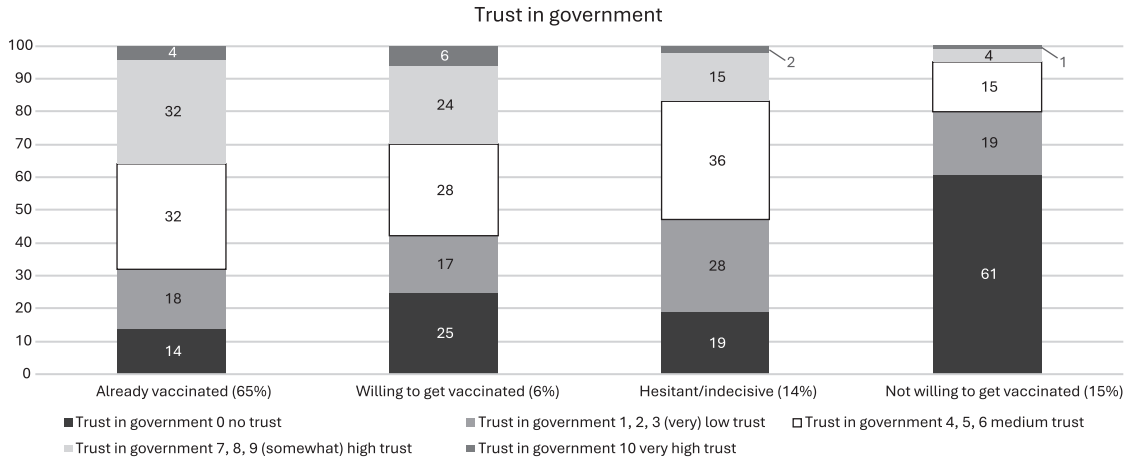

Fig. 10.1. Willingness to get vaccinated in Austria over time, 2020–22 (n = 1,500, population aged 14 or over)

reluctant to impose strict measures to curb epidemic growth in the beginning and was then overwhelmed, forcing them to resort to general lockdowns. When the vaccines became available, a four-month de facto lockdown had ended, and large parts of the population had become reluctant to continuously observe restrictions—that is, pandemic fatigue had spread. Reluctance to get vaccinated was in fact most pronounced among the population at this point in time, as illustrated in figure 10.1.

Over the course of 2021, the share of the population willing to get vaccinated—and actually getting vaccinated—gradually increased. However, while the seemingly great demand for the vaccine led to spreading optimism, survey data indicated that a certain fraction was still hesitant or fully reluctant to get vaccinated. By the end of 2022, 71% of the population had received two doses of the vaccine and 56% had received three doses (Federation of Austrian Social Security Institutions 2023).

Who Were the Hesitant Ones?

An important research effort in the context of the COVID-19 pandemic in Austria was the Austrian Corona Panel Project (ACPP) conducted by the University of Vienna, which investigated attitudes toward vaccination and other topics related to COVID-19 in a longitudinal study. Looking at attitudes toward vaccination in Austria from a socioeconomic perspective, the researchers found that increasing age was associated with increasing willingness to get vaccinated. At the same time, income was more strongly correlated with vaccination status than education, as illustrated in figure 10.2 (Partheymüller et al. 2021).

According to a survey of unvaccinated individuals (Stamm et al. 2022; n = 1,543), the main motivations to not get vaccinated were concern about

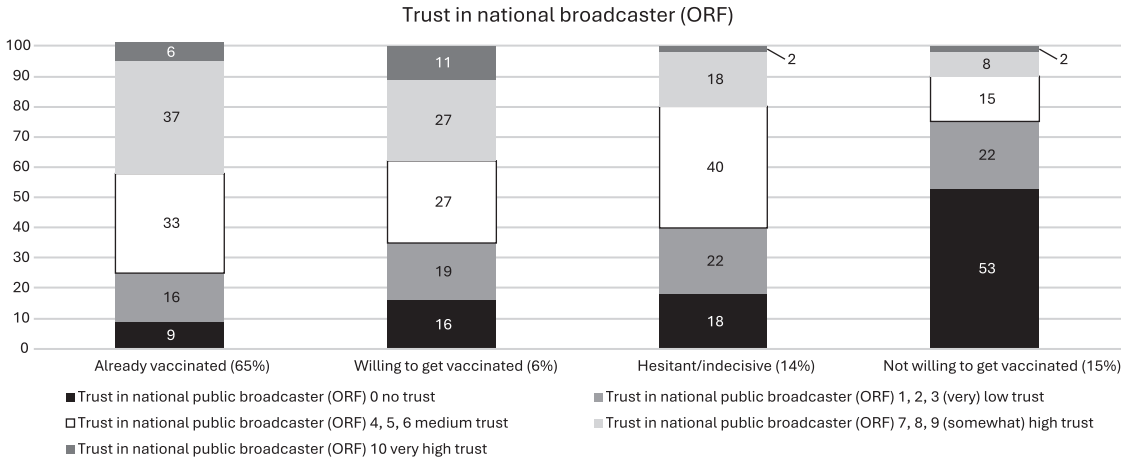

Fig. 10.2. Willingness to get vaccinated by education and household income, June–July 2021 (n = 1,500, population aged 14 or over)

unforeseen side effects (80%) and reliance on one's immune system (70%). Respondents reported a lack of knowledge regarding how the vaccines work and how they could help protect themselves and others. Further motivations of vaccine refusal included beliefs that comorbidities or the desire to have children would not allow vaccination, lack of trust in the development and authorization of vaccines, or conspiratorial thinking (e.g., the refusal to participate in a "large genetic experiment"). Moreover, the survey indicated that spiritual beliefs were disproportionately prevalent among the unvaccinated, while trust in societal institutions was low. In a further representative survey, it was found that vaccine hesitancy toward a COVID-19 vaccine was correlated with having voted for opposition parties or not voted at all, as well as with distrust in authorities (Schernhammer et al. 2022).

Thus, trust appears to have been a major determinant for the Austrian population of whether to get vaccinated. Figure 10.3 draws on data from the ACPP and illustrates the association between willingness to get vaccinated and trust in three different institutions: the government, the national public broadcaster (ORF) as a proxy for public media, and the health system. Among these three, trust is lowest for the government and highest for the health system. One-fourth of vaccinated individuals do not or barely trust the government. Among those who are not willing to get vaccinated, the share with no or very low trust in the government is 75%. A similar tendency can be observed with regard to trust in public media and trust in the health-care system. For the former, 18% of vaccinated people and 70% of vaccination opponents indicate no or very low trust. Regarding the health-care system, the respective numbers decrease to 5% among the vaccinated and 39% among anti-vaccine individuals (Partheymüller et al. 2021b).

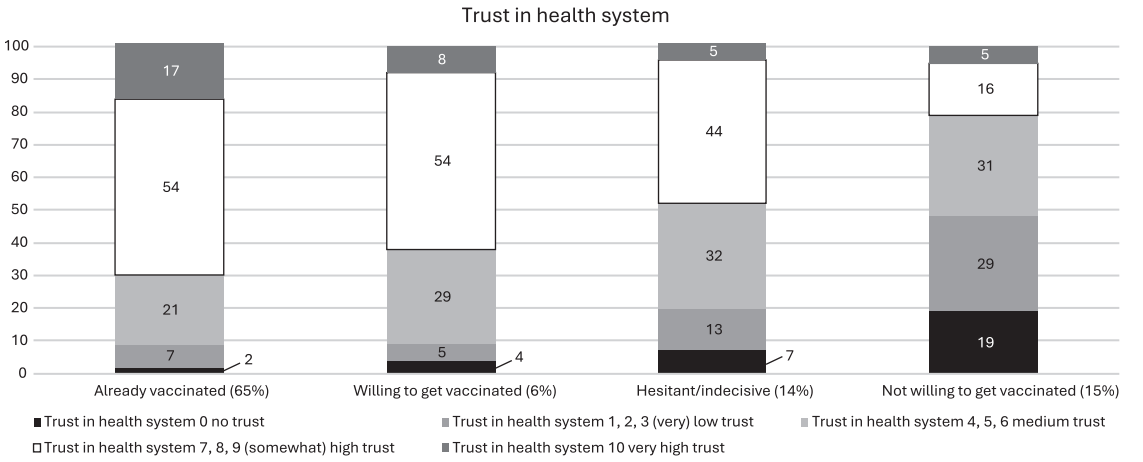

Fig. 10.3. Willingness to get vaccinated and trust in different institutions, June–July 2021 (n = 1,500, population aged 14 or over)

Communication: Room for Improvement

The widespread vaccine hesitancy not only was not factored into the government's deliberations but remained unaddressed for a long time. Over time, the situation essentially amounted to a vicious circle: A significant share of the population did not trust the government enough to comply with their calls to get vaccinated, but at the same time, the government failed to come up with effective communication strategies, which resulted in a further deterioration of trust.

The evaluation of communication strategies differs over time, but overall, they were not particularly well designed, which is in line with Austria's general difficulties in effectively providing health-related information to the public. For instance, one-fourth perceived it to be difficult or very difficult to understand which vaccinations they needed themselves or for their family (Griebler, Straßmayr, Dietscher et al. 2021). Regarding the government's communication during the COVID-19 pandemic, a survey on behalf of the Ministry of the Interior found that 41% of the population believed that relevant information was withheld (Heinz and Glantschnigg 2023).

While in other countries, communication toward the public was mostly led by experts like epidemiologists, virologists, or public health experts, in Austria, the government and its representatives were clearly the central figures in communication (Czypionka and Reiss 2021; Flaschberger et al. 2021). In the beginning of the pandemic, the main channel of communication consisted of daily press conferences by the government, complemented by information efforts like the "Look after you, look after me" campaign developed by the Red Cross on behalf of the government. In their evaluation report, Flaschberger et al. (2021) list several points of criticism in regard to the government's communication approach. These

include that early communication efforts were geared too much toward fear and that many measures were announced at short notice and had to be adapted later on, which caused confusion and distrust among the population. Furthermore, although some information campaigns were translated to reach migrant populations, approaches to reach diverse groups were developed relatively late and were limited to classical methods like advertisements or posters. An earlier and more target group–oriented communication would have been reasonable (Flaschberger et al. 2021).

The Politics of Vaccine Hesitancy

Communication from authorities was far from optimal, but skepticism was also fueled by other factors. The right-wing populist Freedom Party is the only mainstream party supporting anti-vaccine positions but was highly successful in mobilizing vaccine-critical population groups. The party's head, Herbert Kickl, famously propagated the use of the pharmaceutical Ivermectin rather than vaccinations, even though the former had been shown to be ineffective or even hazardous (*Kleine Zeitung* 2021c). He also filed a suit against a journalist who claimed that Kickl had gotten vaccinated (*Der Standard* 2023). In addition, the Freedom Party organized and representatives spoke at anti-vaccination rallies. In the state elections of Salzburg in April 2023, the Freedom Party gained disproportionately more votes in municipalities with lower vaccination rates, which were also the more rural ones. While gaining 6.7 percentage points on the state level, they won the election in the eight municipalities with the lowest vaccination rates (which all have fewer than 7,000 inhabitants) and gained up to 21.2 percentage points in these municipalities (*Kurier* 2023).

Resonating with the anti-vaccination sentiment in significant parts of the population, new parties were also founded during the pandemic period in order to represent vaccine-opposing positions. The MFG party (Party for the People, Freedom, and Fundamental Rights) entered the political stage in 2021 and solely focused on topics related to COVID-19 measures and vaccinations while ignoring any other political positions. Applying this approach, they reached 6.2% in the state elections in Upper Austria and are now represented in its state parliament (*Tiroler Tageszeitung Online* 2021).

However, vaccine-critical positions were not something that could be exclusively observed on the political right. Participants of demonstrations were in fact politically diverse, including groups that can be considered closer to the left-wing spectrum. In particular, attitudes based on esoterism and spiritualism were driving factors for such groups. What the protesting groups tend to have in common is a strong sense of individualism and promotion of individual freedom of choice, whereby anti-authoritarian feelings also play a role, although more so on the right politi-

cal spectrum (*Der Standard* 2021b). The anti-vaccine movement could thus rely on a relatively broad societal base.

Further Drivers of Hesitancy

In addition to the promotion of anti-vaccine positions by political parties and movements, traditional media as well as social media also played a critical role. As in many other countries, anti-vaccine campaigning swept through the Austrian public via social media like Telegram, Facebook, and Twitter. One major TV station, ServusTV, increasingly aired news programs and discussion formats where misinformation was spread and extreme anti-vaccine positions were framed as equivalent to expert opinions. Survey data from the ACPP indicated that while 80% of regular watchers of the national public broadcaster ORF were vaccinated or willing to get vaccinated in 2021, the corresponding share for regular watchers of ServusTV was only 60% (Eberl and Lebernegg 2021). Furthermore, some fringe media also often took a critical stance.

Another blow to vaccination was dealt with an open letter in December 2021 by approximately 200 health-care professionals opposing vaccination. This group represented only 0.4% of Austria's physicians but received considerable media coverage. Within this letter, these health-care professionals used drastic language to gain more attention as they referred to "the biggest medical scandal of all time," claiming that "vaccines have failed" (*Der Standard* 2021c). An analysis of small rural municipalities where general practitioners had signed the letter found that vaccination rates were 5.6 percentage points below, implying that vaccine-skeptic general practitioners discouraged almost 8% of the vaccinable population (Steinmayr and Rossi 2022). Considering that health professionals tend to be one of the most trusted sources of health information for the public, such developments are particularly concerning.

Last Resort: Vaccine Mandate

As mentioned above, the problem of vaccine hesitancy was not strategically addressed in an effective way by policymakers in Austria, which contributed to a drastic increase in (severe) infections during the Delta wave. In a sudden and not entirely expected political move, the government decided to respond with the general vaccine mandate described above. The mandate was allegedly demanded by a small number of powerful state governors in a nighttime crisis meeting in November 2021, as a condition for their consent to a new lockdown (Druml and Czech 2022). The measure was also seen as a signal to those who had been compliant with previous measures and gotten vaccinated but nevertheless now had to

bear the burden of another lockdown (Tóth 2022). The decision was taken against the explicit advice of experts (including the ones writing this chapter) pointing to the obstacles faced by other countries when introducing vaccination mandates, to the questionable effect on vaccinations as well as to the implications for society (see, e.g., European Observatory on Health Systems and Policies 2018). However, the decision to take such a drastic step that necessarily drew large media interest may also have been motivated by political turbulence in Austria. Since the ruling People's Party was troubled by corruption allegations, the vaccine mandate came at a convenient time to redirect public attention.

The vaccine mandate did draw massive attention—but increasingly of a critical nature. Unsurprisingly, anti-vaccine movements instigated large protests. A number of more radical activist groups emerged from these movements, some of which were feared to pose a danger for domestic security. This was also highlighted by the resignation of Health Minister Wolfgang Mückstein due to threats to his person and family.

These protests alone—considering that they also lost traction over time—would probably not have sufficed to move the government to back down from the mandate. However, concerns were also increasingly raised by experts. They argued that a measure as drastic as a vaccine mandate should not be rushed but carefully weighed against the epidemiological situation (Tóth 2022). The Omicron variant was shown to evade vaccine immunity to some extent, making the available vaccines less effective. The executive feared that vaccination checks would aggravate the already tense atmosphere in the country, while lawyers warned against overburdening the administration (Druml and Czech 2022; Tóth 2022). Last but not least, it can be expected that a mandate would have led to acts of defiance and deteriorating willingness to get vaccinated against other diseases.

Thus, in early 2022, the government found itself in a dilemma of facing crumbling support for their mandate while risking lost credibility in case of backpedaling. Leaving the decision to an independent expert advisory panel appeared to be a reasonable way out of this conundrum. Revoking the mandate probably had a conciliatory effect on some parts of the population. Nevertheless, the mandate, which was the culmination of a multitude of controversial policies during the pandemic, is likely to have left some deep divides in Austrian society that will take a long time to bridge. As of August 2024, the imminent general elections were indeed expected to result in a landslide victory of the Freedom Party.

Conclusions

Austrian society remains polarized to this day, and right-wing parties were successful in mobilizing the widespread distrust in government that resulted from imposing the "lockdown for the unvaccinated" and the gen-

eral vaccination mandate. Some important lessons can be drawn from the Austrian experience for the management of the pandemic and for pandemic preparedness.

With respect to pandemic management, Austria is the prime example of a "too little, too late" policy. With the exception of the first wave, every subsequent wave followed the same pattern: When a wave loomed, implemented policies were predictably too weak to curb pandemic growth, usually with regard to some industry like tourism or sentiments in the general population. With too few restrictions, pandemic growth got out of hand, and to avoid overwhelmed hospitals, drastic measures like lockdowns had to follow only weeks later. Thus, policymakers found themselves repeatedly between a rock and a hard place and saw widespread vaccination as a silver bullet that never materialized: At some point, vaccinations stagnated. This may help explain why they were so adamant about introducing a general vaccine mandate, hoping it would finally end this cycle, and also why every reference to empirical data showing the myriad of problems and poor outcomes of general vaccination mandates fell on deaf ears.

A second lesson for pandemic management is that if there are weaknesses in your health system during a pandemic, address them immediately. Poor health literacy and high vaccine hesitancy were obvious weak points for any vaccination strategy in Austria. Notwithstanding, policymakers were more concerned about vaccine logistics and did not engage in any meaningful communication strategy to win over skeptics until vaccinations leveled.

This situation could have been avoided or at least ameliorated with better pandemic preparedness. The main lesson therefore is to do your public health homework now! Public health experts in Austria had known for decades that health literacy was poor and that vaccine hesitancy was high. Nevertheless, efforts to improve this situation seemed half-hearted and mostly remained at the stage of announcing goals.

As with the "too little, too late" policy, where hesitant political decisions to avoid economic and social harm eventually resulted in the need for decisive and even more harmful policies, the spared efforts to increase health literacy and to fight vaccine hesitancy came back to bite policymakers during the pandemic.

Not all was bad with COVID-19 politics in Austria though. The first wave was handled well, and Austria was one of the first European countries to end the lockdown. Widespread testing was implemented in record time, and, similarly, vaccination centers were quickly ramped up. But what may remain as a legacy is the general vaccine mandate, a policy that eventually achieved nothing but inflicted a deep gash in society that will take a long time to heal.

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11 | COVID-19 Vaccination in Belgium and the Netherlands

Paulette Kurzer and Janet Laible

This chapter looks at the vaccine politics of Belgium and the Netherlands, two countries with a shared history and more or less of equal size. In health policy studies, they are usually categorized together (with Germany) as social insurance–based health systems. The Dutch health-care system consists of managed competition because it combines nonstate provision of health care with elements that promote equity and insurance providers compete for clients, while the government sets the basic benefit package and maximum premium (Anderson and van Druenen 2021). In Belgium a half dozen large nonprofit insurance companies manage health insurance. Public spending is high and insurance coverage is extensive; there has been less commitment to market-based reforms in Belgium than in the Netherlands (Laible 2013). In both countries, governance is shared among government actors, professional organizations and boards, and health insurers.

But beyond this, the comparative narrative breaks down with two major differences. First, Belgium is an asymmetric federal system complicated by a language divide, and the health-care system is regionalized and decentralized; the Netherlands also introduced a degree of decentralization, but it is a unitary state with one ministry of health and a single infection disease control agency. Second, there are cultural-political differences in that trust in government is or was much lower in Belgium than in the Netherlands. As many studies have pointed out, trust in government predicts COVID-19 vaccine uptake, and high trust in political leaders, experts, and science reduces vaccine hesitancy (Wynen et al. 2022).

Therefore, several variables lead us to expect that Belgium and the Netherlands should display striking differences in how political institutions produce vaccination policies and ultimately in their ability to vaccinate their citizens, with an expectation that the Netherlands would be more successful. Yet, as figures 11.1a and 11.1b show, Belgium recorded a much higher uptake of the COVID-19 primary dose (two shots) while the Netherlands' vaccination rate was below the European Union (EU) average.[1] The gap between Belgium and the Netherlands narrows if we highlight the vaccine uptake of the adult population, suggesting that a fair number of Dutch children from 6 months to 18 years old were not inocu-

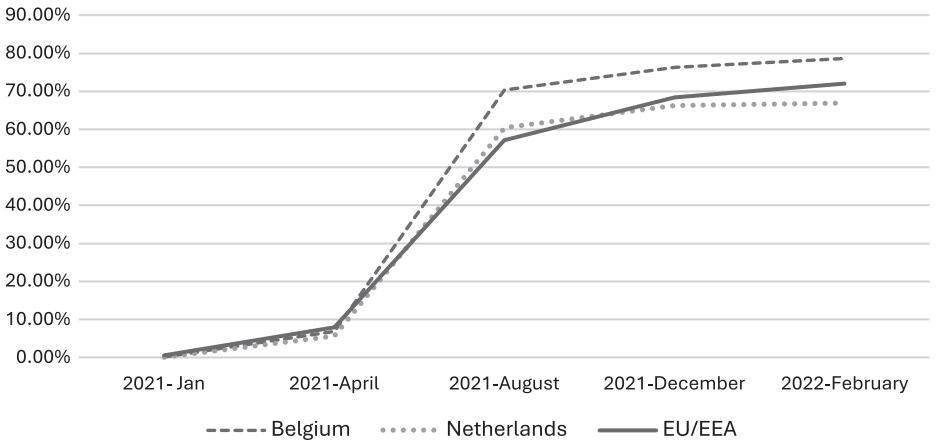

Fig. 11.1a. Cumulative uptake percentage of the primary course in the total population

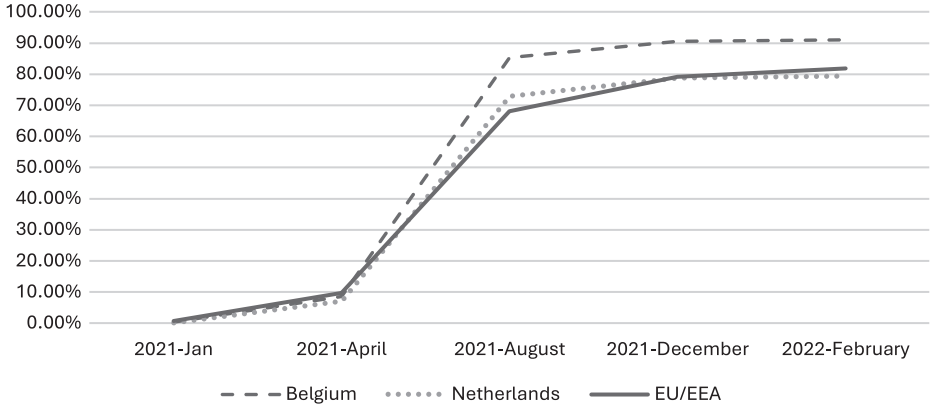

Fig. 11.1b. Cumulative uptake percentage of the primary course in the adults

lated. Why would Belgium, with a cumbersome federal system and low political trust, achieve such a high degree of success in vaccinating its citizens? And why is the Dutch vaccination rate surprisingly low?

This chapter first describes the preparation for the COVID-19 vaccination campaign; next it looks at the implementation of the campaign; and in the final section it explores the reasons behind the great success of the Belgian campaign and the modest results of the Dutch campaign. The conclusion provides some generalizations drawn from this comparative study of vaccine politics.

Vaccine Procurement and Vaccination Campaign Preparation

Both the Netherlands and Belgium have purchased vaccine doses through the contracts negotiated with vaccine producers by the European Com-

mission on behalf of the EU member states.[2] The Netherlands was eligible for 3.87% of EU advance purchase of vaccines (51 million doses for a population of 17.5 million) from six possible manufacturers, and it set aside 490 million euros to finance the first purchase and 109 million euros for extra vaccines (Schipper 2021).

In late summer 2020, Belgium's Federal Agency for Medicines and Health Products (FAMHP) hoped that Belgium, with a population of 11.7 million, would receive 1.2 million doses out of an expected delivery of 50 million doses to the EU in early 2021. Ultimately, however, Belgium purchased 33.5 million doses in 2020. This cost Belgium 279 million euros, with 500 million euros available to purchase further doses (Brzozowski 2020; Bossaert 2020). Financing and reimbursement reflected the complex federalization of vaccination politics, but an agreement was reached by which 80% of the cost would be carried by the federal government and 20% would be financed by the federated entities (Taskforce opérationnalisation 2020, 28).

Yet the shift from acquiring vaccines to conducting vaccinations reflects differences in both countries' health-care systems and in their early political experiences with managing the impact of the pandemic.

State reforms over the past 50 years dispersed health-care responsibilities among Belgium's federal government, its regions (Flanders, Wallonia, and Brussels), and its language communities (Flemish, French, and German, with Brussels a bilingual region), creating a fragmented and asymmetric system of health-care policymaking and implementation. Communities are generally responsible for "personalizable" matters, including investigating and controlling infectious and noninfectious diseases (Laible 2013; Popelier and Bursens 2021). Vaccine and vaccination policy are thus complex. At the federal level, FAMHP is responsible for the quality, safety, and efficacy of vaccines, their production, and their use. However, communities and regions are responsible for "vaccine strategy including vaccine schedule[s], public tenders for choice of vaccine, vaccine promotion (including awareness campaigns), cost evaluations, [and] vaccine coverage assessment," with some differences at the subnational level. Federal health authorities retain responsibility for aspects of vaccine governance, such as polio vaccination, the only mandatory vaccination under federal law (Wyndham-Thomas et al. 2018, 47–48). Thus, Belgium has nine health ministers who have jurisdiction over some aspect of vaccination policy, including a federal government commissioner for coronavirus, a position that was created in mid-2020.[3] Belgium's federalism operates with exclusive policy jurisdictions, but these can seem nontransparent, as different entities may have responsibility for different aspects of the same health-care issue (Luyten and Schokkaert 2021; Popelier and Bursens 2021).

By comparison, the Dutch health-care system is straightforward. Dutch governments over time have encouraged health-care decentralization with the result that the municipalities acquired more competencies, and

25 regional public health services (Gemeentelijke Gezondheidsdienst [GGD]) play a role in planning and implementation with the help of a limited funding contribution from the subnational budget (Helsloot and Heijndijk 2022).

Concerning infectious disease control, the Ministry of Health, Welfare, and Sport is ultimately responsible for a national vaccination campaign, but the technical, medical, and logistical support is provided by the National Institute for Public Health and Environment (RIVM). The institute falls under the jurisdiction of the ministry, but it operates as a standalone agency, with different departments in charge of infectious disease, statistics, occupational health, and environmental pollution. While the institute monitors infectious disease outbreaks, the 25 regional public health services (GGD) manage an outbreak if it is contained geographically and if no further coordination is required. The 2008 Public Health Act introduced an institutional framework in case of a large-scale disease outbreak. In that instance, the RIVM sets up a separate body, the Outbreak Management Team (OMT), chaired by the institute's director while representing different medical and health subfields such as microbiologists, epidemiologists, pediatricians, internists, and other medical specialists. During the pandemic, the OMT, consisting of about 40 medical specialists, became a powerful actor, giving advice to the cabinet and engaging with the media (Hodges et al. 2022). In addition, the Ministry of Health consulted with the Health Council, whose 100-plus members include medical, health, and epidemiological experts. The council members advised the government on the safety, effectiveness, allocation, and distribution of the COVID-19 vaccine (Aarts et al. 2022; Gezondheidsraad 2020a).

With its centralized structure, robust health-care system, and extensive disease control capacity, the Netherlands, according to the 2019 Global Health Security Index, was ranked 3rd out of 117 countries. It fell just below the United States and the United Kingdom in terms of capacity and resources to combat a hypothetical pandemic. By comparison, Belgium came in 19th and was placed below Malaysia and above Portugal. The Global Health Security Index bases this ranking on 140 different questions, grouped around six categories related to prevention, detection, rapid response, health systems, compliance with international norms, and overall risk environment (Global Health Security Index 2019). Based on this ranking, we would expect that the Netherlands would have greater success in inoculating its population.

Vaccination Policy Process in Belgium

At the start of the COVID-19 pandemic, the complexity of health policy in Belgium's federal system and the ongoing struggle of its political parties to form a government seemed to condemn the country to a disastrous

public health scenario. Initial decision-making about vaccines began in the context of a governing crisis that had persisted since federal elections in May 2019, when surges for far-left and far-right parties complicated efforts to form a governing majority. In March 2020, the main political parties agreed to empower the minority caretaker government with special powers to enable it largely to bypass parliament (Bursens et al. 2021, 43–44) until a majority government was finally formed on October 1. However by late spring 2020, Belgium was the focus of international attention, as it reported the highest COVID-19 death rates in the world, with the most deaths proportionally to reported cases (16.3%) and the most deaths per 100,000 people (80.65) of any country (Desson et al. 2020, 433; Stevis-Gridneff et al. 2020). Belgium was unusual in reporting confirmed and suspected COVID-19 deaths occurring both in and out of hospitals, which likely contributed to the high death rates (although early policy failures regarding the treatment of nursing home patients had an impact on high death rates among this population) (Desson et al. 2020, 433), but the public impression of a country on the brink of a health disaster seemed to be confirmed in autumn 2020 when Belgium experienced a severe second spike in cases.[4]

The crisis pressured the government to formulate a vaccination strategy that would prioritize the most vulnerable and reassure the public of the competency of governing officials. In anticipation of determining priority groups and the timetable for vaccinations, the Inter-ministerial Conference on Public Health (IMC), including the nine health ministers, announced on November 16, 2020, that Belgium would participate in the EU procurement procedure for COVID-19 vaccines; that its goal would be to vaccinate at least 70% of the Belgian population; that vaccination would not be compulsory; and that the vaccine would be free for every citizen. Furthermore, the Vaccinnet+ network, a Flemish government initiative, would be extended to the rest of the country to record the administrators and recipients of vaccine doses. Implementing the vaccination strategy was the responsibility of four of the federated entities: Flanders, Wallonia, Brussels, and the German-speaking Community. The IMC also announced the creation of a coordinating taskforce on operationalizing the COVID-19 vaccination strategy within the office of the federal commissioner for coronavirus, composed of Belgian federal and substate actors, scientists, and other relevant actors to oversee the vaccination strategy and to manage public communication (FAMHP 2020a).

Based on recommendations from the taskforce, the IMC announced its planned vaccination schedule on December 4, 2020, with the expectation that vaccinations would start on January 5, 2021. The initial EU contract covered 80 million doses, including 2 million for Belgium (FAMHP 2020b).

Given anticipation that vaccine supplies would initially be limited and would require complex storage facilities, the first phase of vaccination was split into two tiers. The first tier included residents and health-care profes-

sionals in residential care centers for the elderly, followed by others in group care institutions and then health-care professionals in hospitals and other frontline health-care personnel and staff. A second tier of the first phase would extend to people over the age of 65, at-risk people between the ages of 45 and 65 with certain underlying comorbidities, and some other professionals in essential social or economic roles. The shift to this tier assumed expanded supplies of vaccines and less complex storage requirements. Finally, a second phase, expected to be possible when larger supplies of several vaccines were available, would include low-risk individuals and much of the adult population. This timeline was ultimately shifted slightly later, with a short "pilot phase" in some nursing care facilities in late December 2020 and with nursing home residents and staff given initial priority over hospital care professionals and other frontline health workers (Taskforce opérationnalisation 2020).

In the initial tier of the first phase, given the clustering of priority populations, vaccines for the most part were delivered to hospital pharmacies and then prepared and transported to elder care facilities. For the subsequent tier and phase, Belgium emphasized that unlike the decentralized distribution of other vaccines, the unique properties of COVID-19 vaccinations required a centralized approach for mass distribution. The delivery of the vaccine in multidose packaging and requirements for low-temperature storage shaped Belgium's strategy of creating a smaller number of mass vaccination centers, as opposed to a larger number of geographically dispersed locations that would be easier for some Belgians to access (Taskforce opérationnalisation 2020, 22–23). The Brussels Region was projected to have 10 vaccination centers opening in February and March 2021, with a combined monthly capacity of 375,000 vaccines, which, given the number of doses available, could potentially vaccinate 70% of the Belgian population (Brzozowski 2021b). By March 2021, three vaccines were available in Belgium: Comirnaty (Pfizer-BioNTech), Moderna, and AstraZeneca; this would rise to seven vaccines by early 2023, with varying recommendations for usage based primarily on age-related risk factors (Sciensano, n.d.).

Yet the early stages of the vaccination campaign were marred by logistical and technical challenges. In January 2021, an AstraZeneca subcontractor in Belgium reported production problems that cut anticipated production for the EU market by 75 million of a promised 100 million doses (Deutsch and Wheaton 2021). Furthermore, challenges of coordinating information from the federated entities meant that gauging the initial success of the vaccination campaign was hampered by a lack of official data. Even as Belgium began to open mass vaccination centers in mid-January, there was no official database on vaccinations, despite the taskforce's efforts to develop a "Coronabarometer." It took nearly three months from the start of vaccinations in Belgium for a legal agreement to enter into force to manage data related to vaccinations and to create a database

for the country—the extended Vaccinnet+ system—that would enable the activation of the invitations necessary for legal residents to be vaccinated (Vaccination Task Force 2022, 20–22).

Vaccination Policy Process in the Netherlands

In the Netherlands, serious preparations began in the fall of 2020 to design a COVID-19 vaccination program. The approach or discourse matched, to some extent, the child immunization campaign for the MMR vaccine (measles, mumps, and rubella). There would be no mandatory or compulsory COVID-19 vaccination. It was a purely individual choice to get the vaccine; however, failure to vaccinate carried implications for the individual, the community, and for ending the pandemic and returning to normalcy.

In November 2020, the Health Council advised that everybody should be vaccinated eventually, although there would not be sufficient doses of the COVID-19 vaccine to do so until later in 2021 (RIVM 2020; Gezondheidsraad 2020b). Therefore, it seemed prudent to prioritize certain groups based on three criteria: reducing mortality and hospitalization, reducing the spread of the infection, and avoiding social disturbances. Since the vaccines were not yet on the market, the first goal was to protect those who ran a high risk of hospitalization or mortality (van Dullemen and de Bruijn 2022). The RIVM proposed to adopt the same model as with the annual flu campaign, which divided the population into four priority groups. The first group consisted of about 4.3 million vulnerable people (elderly and/or immunocompromised) who would be inoculated by a general practitioner. The second group included all those over 70 years old, which came to 2.3 million people and somewhat overlapped with the first group of vulnerable people. They would obtain their shot either at a general practitioner clinic or at one of the 25 regional health services that fell under the jurisdiction of the Ministry of Health, Welfare, and Sport. A third group represented the health-care and medical professionals, who would get their primary dose in a hospital or at their workplace. Finally, the rest of the population of ages 0 to 70 who were not yet assigned to a specific category would be able to obtain the COVID-19 vaccine at the municipal public health authority (Onderzoeksraad voor Veiligheid 2022, 74–81). In short, by the late fall of 2020, the Ministry of Public Health and the RIVM worked out an organizational chart to reach the priority target groups in a systemic way. Family physicians were recruited to inoculate residents of nursing homes and assisted living residences, those who were homebound, and people up to the age of 60 with underlying medical conditions. The GGD would be responsible for vaccinating the rest of the population.

The Netherlands began its vaccination on January 6, 2021, the last EU member state to do so, which generated a fair amount of media discussion

and unflattering attention. Moreover, by January 29, the Netherlands had only used 28.5% of its stored vaccines. It had ordered 85 million doses (for a population of 17.5 million), yet the rollout was not only delayed but also protracted (Bahçeli 2021; Corder 2021).

What happened? The Ministry of Public Health had gambled that the first vaccine on the market would be AstraZeneca, and it mobilized a network of distribution points so that general practitioners could organize the vaccinations. Instead, Pfizer-BioNTech was the first on the market, which required special handling and storage instructions such as unique freezers to keep the temperature at an extreme low of between −90°C and −60°C. Moreover, once the package of 1,000 doses was opened, the vaccine would last for only up to five days.[5] In hindsight, this type of vaccine was not suitable for the small-scale vaccination program envisioned by the health authorities, while no immediate provisions had been made for mass vaccination campaigns. The 25 regional public health services would oversee mass vaccination sites, but they planned to organize those in the summer of 2021 once the priority groups had been vaccinated. In addition, the regional public health services had to connect their IT system to that of the RIVM, which registered each shot so it could monitor the progress of the vaccine campaign. In early 2021, the IT system had not yet been upgraded, and it was only in September 2021—more than six months after the launch of the vaccination campaign—that the national registration system operated fully, though it was estimated that still around 12% of the shots were not registered (Onderzoeksraad voor Veiligheid 2022; Schaart 2021).

The careful rollout was partly by design because the cabinet feared that opposition to the vaccine would grow if the authorities did not demonstrate deliberate and responsible planning, as the minister of health explained in a letter to parliament (Sterling et al. 2020). In contrast to Belgium, Dutch officials avoided mass vaccination sites at first, and the RIVM, instead, sent out letters inviting people to schedule their appointment for the COVID-19 shot. The first group, consisting of employees who worked at care homes and institutions, received a letter by email from their employer inviting them to make an appointment with the public health services.

Rollout and Equity Issues

Despite Belgium's initial challenges of implementing its vaccine strategy, in 2021 some observers hailed it as a model country for vaccination, and by late 2022 Belgium had the sixth-highest vaccination rate in the EU (Vanham 2021; Our World in Data 2022). By autumn 2021, more than 70% of the Belgian population had received a primary course of vaccine, although regional inequalities in vaccination rates were emerging, with Flanders surpassing Wallonia and Brussels in ages 18 and over com-

pleted primary course vaccinations. In October 2021, Flanders had vaccinated 92% of its adult population with a full primary course; Wallonia (minus Ostbelgien) had vaccinated 81%; Ostbelgien (the German-speaking Community) had vaccinated 75%, and Brussels had vaccinated 68%. The disparities were more striking at the local level. At one extreme, some Flemish provinces (e.g., West Flanders and East Flanders) had vaccinated over 90% of adults with a full primary course, with a quarter of municipalities in the Flemish region achieving a 95% rate. In contrast, in several Brussels municipalities, the rate was below 60%, including Molenbeek-Saint-Jean/Sint-Jans-Molenbeek, an area with a high proportion of immigrants, at 57% and Saint-Josse-ten-Noode/Sint-Joost-ten-Node at 59% (Catteau et al. 2021, 16–17).

These differences partly reflect long-standing trends in vaccination uptake in Belgium. Before the pandemic, uptake for certain vaccines (such as MMR) was lower in Wallonia and Brussels than in Flanders, a fact that has been attributed to greater vaccine hesitancy, higher vaccination rates in private practices (which may not be recorded), and less use of vaccinations in public health facilities (Wyndham-Thomas et al. 2018, 49–50). Vaccinations specifically for COVID-19 exacerbated this regional distinction.

Ultimately, the Belgian Covid Safe Ticket pass, enacted in October 2021, required vaccination as a condition for access to various public and private facilities. The pass had some success in convincing residents of French-speaking Belgium to get vaccinated so that they could facilitate travel or "recover freedom" in everyday life, even if protection from COVID-19 was not their primary motivation (Gbenonsi et al. 2022). In addition, in the spring of 2021, the Belgian federal government confirmed that undocumented immigrants could be vaccinated, and the Brussels region began to use mobile teams to administer the single-dose Johnson & Johnson vaccine to undocumented immigrants and others who were difficult to reach (Siepmann et al. 2021).

The Netherlands also faced some equity issues. From the beginning, the Dutch authorities decided that they would not issue a mandatory order for COVID-19 vaccine. Since vaccination was an individual choice, the Dutch communication strategy was based on motivating people to make the right choice for themselves and the community in line with the approach toward childhood immunizations. The emphasis was placed on supplying reliable information, reflecting the latest scientific findings, and explaining that the pandemic's end depended on the population's overall high vaccination rate. At first, the primary goal was to convince those who were receptive to the vaccine to schedule an appointment once they received a letter of invitation. Later, the communication strategy tried to reach undecided and hesitant people. An earlier survey held in the summer of 2020 concluded that the "undecided" represented about 10–15% of the population (Onderzoeksraad voor Veiligheid 2022, 160–62).

In the summer of 2021, nonvaccinated people were found in different pockets of the country. In particular, in urban areas, communities with a high concentration of non-Western migrant backgrounds remained unvaccinated. The low vaccination rate was due to literacy barriers, linguistic differences, and health inequalities. In addition, non-native Dutch struggled with the internet appointment system after they received their letter of invitation to schedule their shot. After consultation, the RIVM embarked on a different campaign to reach migrant households who were still unvaccinated by cooperating with local nongovernmental organizations with links to specific migrant communities and by mobilizing migrant community leaders. In addition, in the summer of 2021, the authorities sent vaccination buses to urban neighborhoods so that people could just show up and obtain a shot without a prior appointment (Bakuri and Antwi-Berko 2022; RIVM 2021).

Resistance and Opposition to Vaccination Campaign

Trust in government and trust in experts are key factors that shape people's intention to get vaccinated. People are more likely to accept a vaccine if they have confidence in the vaccines themselves, which in turn involves trusting scientists, political leadership, and health professionals. By the same token, vaccine hesitancy reflects a lack of confidence in science and political leadership.

Surveys of confidence in the national government in 2020 revealed that Belgium had one of the lowest levels of confidence in the Organization for Economic Cooperation and Development (OECD), with 29% answering "yes" to the question, "Do you have confidence in the national government?" Belgium also had the largest drop in confidence in government since 2007 in the OECD: 31 percentage points (OECD 2021). The Netherlands, by contrast, is a country known for its high trust levels, and confidence in national government in 2020 stood at 78%, more or less unchanged from 2007. We would expect, therefore, that vaccine uptake in Belgium would be low, below the EU average, and that of the Netherlands would be above the EU average. In the next section, we explain why the uptake of the COVID-19 vaccine was ultimately much higher in Belgium.

Rise of Trust in Belgium

Early in the pandemic, explanations of high COVID-19 infection and death rates in Belgium referred extensively to the problem of public trust in the government. Numerous mistakes by the caretaker government in 2020 had tested public trust. The federal government had not maintained strategic stocks of medical material such as masks, and it relaxed social mea-

sures to mitigate the spread of COVID-19 in the fall of 2020 despite warnings from scientific experts, contributing to a spike in cases (Luyten and Schokkaert 2021). Furthermore in 2021, the spread of new variants, the emergence of conflicts among representatives of the all-government Concertation Committee about economic reopening, and the perception of incoherent government decision-making contributed to protests against public health measures (Rihoux et al. 2021).

Yet neither initial low levels of trust nor protests significantly derailed the vaccination campaign in Belgium. Early protests had focused on the possibility of mandatory COVID-19 vaccinations, and by 2021, demonstrators challenged new lockdown requirements including the tightening of rules on face masks and the introduction of vaccination passes. Yet in November 2020, the IMC had already agreed that vaccination would not be mandatory (although this was later reconsidered for health workers). Furthermore, vaccination passes had the ultimate effect of motivating more people to get vaccinated.

Nor did significant party opposition to vaccinations emerge, despite the fragility of the federal governing coalition. The most serious potential challenger to federal COVID-19 policies was the New Flemish Alliance (N-VA), the largest vote winner in the 2019 federal elections, but it was excluded from the caretaker and governing coalitions in 2020, setting up a source of tension between the federal government and the Flemish Parliament, where it led the governing coalition. Yet the N-VA generally fell in line with the national consensus on COVID-19 policies. Typically, contentious language politics were muted as the impracticalities of different COVID-19 policies for the language communities and regions became apparent, and no federated government wanted to risk pushing distinctive measures that might prove worse than those of the other governments (Sinardet and Pieters 2021).

At most, the N-VA and the more extreme right-wing Flemish nationalist Vlaams Belang (VB) criticized the Belgian government for incompetence in managing the initial stages of the vaccination rollout. From the start of the pandemic, VB conceded the importance of empowering the federal government to act decisively, but it simultaneously argued that Belgium's fragmented political system impeded an effective response, claiming this showed the importance of Flemish independence after the crisis had passed. As the vaccination campaign accelerated, VB switched its focus to criticizing the lack of government support for businesses and to raising concerns about "political elites" who were purportedly using the pandemic to strengthen financial solidarity between Flanders and Wallonia (Sijstermans and Van Hauwaert 2023, 253–56). However the party supported vaccinations, and unlike many far-right parties, VB did not challenge the role of scientific experts in decision-making about the pandemic. Instead, federal institutions, including the Concertation Committee with representation from the different Belgian governments

and the federal scientific institution Sciensano, along with the elevation of health experts to key advisory roles, contributed to defusing the ordinarily contentious regional and nationalist politics of Belgium (Sinardet and Pieters 2021).

By late spring 2021, public trust in the Belgian government had actually increased to 41%. While this decreased slightly at the end of that year, it remained higher than it had been at the outset of the pandemic, and it represented a surprising endorsement of a political system that had managed to deflect both party and mass public opposition to COVID-19 mitigation measures. Combined with high levels of public trust in medical experts (which exceeded 95% from summer 2020 through summer 2021, declining to around 88% in late 2021), Belgium's complex political environment did not prevent it from producing a highly successful vaccination campaign (Stivas and Cole 2023).

Decline of Trust in the Netherlands

In the Netherlands, at first, trust in government and public health measures was high and opposition or criticism of the cabinet's efforts to minimize the loss of life and the loss of livelihoods was muted. The lack of organized opposition to the decisions made by the cabinet of Prime Minister Rutte meant that governing parties fared well during the parliamentary elections of March 2021. With a turnout of 78%, the election results were a vote of confidence in the leadership of the outgoing government, and they were also a testimony of Dutch consensual politics because all of the political parties, except for the right-wing populist Forum for Democracy (FvD), supported the existing measures and policies. Consensual norms dampened loud criticism by the opposition and the handling of the vaccine campaign (NOS 2021). Even the populist right-wing Party of Freedom, led by Geert Wilders, endorsed vaccination against COVID-19 since many of its voters were older and, in turn, were keen to complete the campaign and return to normalcy (van Holsteyn and Irwin 2022).

The only political party that campaigned consistently against the government's handling of the pandemic was the recently established FvD. Founded in 2016, under the leadership of Thierry Baudet, it disputed the existing research on COVID-19 and labeled the virus "just a flu" and was one of the main organizers behind the anti-vax movement (de Lange 2023). With a share of 5% of the 2021 parliamentary election (equal to about half a million voters) and eight seats in parliament, its appeal was nonetheless limited to a small slice of the electorate. Not surprisingly, FvD voters were strongly associated with lower vaccination rates (Afonso and Votta 2022).

Yet, trust in the Dutch government's handling of the pandemic and vaccination campaign declined while that in Belgium's government rose. For example, Dutch trust in government policies to combat COVID-19 was

74% in April 2020 and dropped to 42% in March 2021, falling further to 30% in March 2022 (RIVM 2022). Another survey chronicled a decline in government trust between March 2020 and March 2021 from 75% to 45%, while confidence in the RIVM dropped from 78% to 55% (IPSOS 2021).

The decline in trust was driven by two major factors: preexisting vaccine hesitancy and policy blunders. As in Germany and Austria, the Netherlands possessed a sizable community of parents who questioned the utility and efficacy of childhood immunizations. By 2015, an increasing number of families did not get the full series of childhood immunizations for their young children. In 2016, only 95% of infants received their MMR immunization and 90% of school-aged children had received the second series of childhood vaccines such as DT-IPV (diphtheria, tetanus, pertussis, and poliomyelitis). In 2018, the undersecretary of the Ministry of Health, Sport, and Welfare sent a letter to parliament, urging action to arrest any further decrease in childhood vaccine take-up and pointing to the health risks of dipping below herd immunity (RIVM 2018). This is to say that already before the global pandemic, a growing pool of vaccine-hesitant parents skipped the normal course of childhood immunizations.

Moreover, the timing of the vaccine campaign was such that it took off just when the government debated a harsh lockdown and a night curfew despite earlier promises that the Netherlands would not replicate the policy decisions of other countries by closing down the country, imposing a curfew, and mandating face masks. The turnabout fueled questions about the government's pledges and commitments (Aarts et al. 2022; Kurzer and Ornston 2023).

There was also confusion about the vaccines themselves. The AstraZeneca vaccine was approved in early spring 2021, removed from the market because of fears of blood clots, and reintroduced for those who were 60 years or older because they were unlikely to suffer ill effects (Dallison 2021). The Janssen vaccine, available in March 2021, was also associated with possible fatal side effects for a very small proportion of the inoculated population, and its release was postponed by the Dutch health authorities. However, it was approved for use a month later and aggressively promoted to young people because it required a single shot and, according to the Dutch (caretaker) government, would enable people to go clubbing immediately after their shot. Using the catchphrase "dansen met Janssen," the government claimed that the Janssen shot would provide immediate immunity, even though the OMT had warned that the vaccine required at a minimum two weeks in order to be effective. Indeed, there was a peak in coronavirus infections in late summer, partly attributed to the mishandling of the communication surrounding the Janssen vaccine while ignoring expert advice (Dutch News 2021).

Ethnographic studies uncovered the impact of the conflicting messaging and the abrupt volte-face by the Health Ministry concerning the safety

and effectiveness of different COVID-19 vaccines. Routinely, vaccine-hesitant people searched for alternative opinions and found those across the social media ecosystem (Hartman and Vroon-Najem 2023). Exposure to contrary information deepened the skepticism toward vaccines among those who were already unsure about the utility of vaccinations.

Conclusion

Our chapter compared the COVID-19 vaccination experiences of two similar European countries that differ along two variables considered of the utmost importance when examining the success of a vaccine campaign: trust and state structure. In Belgium, trust in political authorities is/was low, among the lowest in the OECD. Belgium has also designed over the decades a complicated federal system that divides the country into regional and linguistic political jurisdictions. Yet its vaccination coverage rate is higher than that of the Netherlands, which is/was considered a model of public health efficiency, with a unitary state structure, a robust health-care system, and a centralized infectious disease control agency. Moreover, Dutch trust in expertise and in elected officials is/was high, in contrast to Belgium.

To some extent, the Netherlands and Belgium traded places. Whereas the Belgian population began the pandemic by viewing the political leadership with great suspicion and accused it of bungling the vaccination rollout and showing favoritism, politicians invested enormous resources in correcting the situation and addressing rising concerns and anger. It created a task force responsible for addressing logistics and capacity issues, and it promised to lift a lockdown, introduced in the spring, if vaccination rates were sufficiently high. In the Netherlands, trust in the Dutch government's handling of the pandemic started high but fell over time with the rollout of the COVID-19 vaccine. The first wave of the pandemic was also more manageable and less traumatizing in the Netherlands, instilling a sense of complacency, while Belgian officials coped with a high COVID-19 fatality rate, which spread fear among the population.

Our chapter raises both practical and theoretical questions about whether trust and state structures matter when comparing vaccination policies in advanced industrialized countries. The literature suggests that federal states were less capable in organizing and administering a vaccine campaign because it involved coordination across multiple level of governance, with each level claiming jurisdiction over different aspects of the vaccination campaign. Yet the exceptional nature of the pandemic convinced the regional and community governments in Belgium to accept greater coordination and centralization of decision-making.

Likewise, public trust is not immutable and can be gained (or lost). In the Netherlands, trust was lost as questions arose about the handling of

the vaccination campaign, the effectiveness of the vaccines, and the messaging of the government. In Belgium, trust was gained as the federal government took charge and regional leaders accepted the need for centralized decision-making.

The experiences of the Netherlands and Belgium in vaccinating against COVID-19 suggest that the pandemic is a novel form of political crisis that challenges conventional explanations of health policy outcomes that operate in otherwise normal times. Even public hesitancy about vaccinations, a factor that has constrained vaccination campaigns in other countries, has not proved to be an obstacle to achieving high rates of vaccination, at least in Belgium. Further research on public policy implementation in contexts of crisis may contribute to more robust explanations of high performance on COVID-19 vaccinations in the Netherlands and Belgium.

NOTES

1. Due to space constraints, we omit a discussion of booster shots.
2. See Greer, "COVID-19 Vaccination in the European Union: Forging Union in Crisis," chapter 6, this volume.
3. These are ministers from the Flemish government, the federal government, the Walloon government, and the government of the German-speaking Community; two ministers from the government of the French Community, which divides responsibility for vaccinations based on population age; two ministers from the Joint Community Commission of Brussels, one for the French Community Commission and one for the Flemish Community Commission; and the (federal) government "commissioner for coronavirus."
4. Daily confirmed cases per million reached nearly 1,400 by mid-October (compared to the next most seriously impacted European country, France, at about 850 cases per million) (Luyten and Schokkaert 2022, 38–39). Between the start of the recording of cases on March 18, 2020, and early December of that year, nearly 57% of the total number of COVID-19 deaths in Belgium were residents of eldercare facilities, of which 77% died in their care facility and 23% died in a hospital (as of November 22, 2020) (Taskforce opérationnalisation 2020, 9).
5. In May 2021 the US Food and Drug Administration decided that an opened box could be stored in a fridge for up to a month. https://www.fda.gov/news-events/press-announcements/fda-brief-fda-authorizes-longer-time-refrigerator-storage-thawed-pfizer-biontech-covid-19-vaccine

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12 | COVID-19 Vaccination in the United Kingdom

Substantial Supply but Diminishing Demand

Holly Jarman

Much about COVID-19 vaccination in the UK seems contradictory. It is both an exemplary success story and a sad example of the shortcomings of governments and governance. So much went right, at least in the initial stages of the pandemic. Facilitated by early attention to the problems of securing vaccine supply, and the risky but ultimately successful decision to contract for vaccines prior to approval, the UK was the first country to grant emergency approval to a COVID-19 vaccine after a clinical trial in early December 2020.

Just a few days later, the first doses went into arms. The COVID-19 vaccination programs in England, Northern Ireland, Scotland, and Wales were some of the largest ever attempted in each of these jurisdictions, with rollout proceeding quickly until summer 2021. The UK had a choice of effective vaccines (deploying products from Pfizer-BioNTech, Moderna, and AstraZeneca and eventually approving three others) and experienced relatively few constraints in terms of vaccine availability. One of the vaccines, made by AstraZeneca in partnership with Oxford University, was lauded by politicians as a British vaccine that demonstrated the country's strengths in research and innovation. Described as "Britain's gift to the world," it would be made available to other countries on a not-for-profit basis. Many were excited by the vaccine's potential to improve the global vaccine supply due to its lower cost and less stringent storage requirements (Walsh 2022).

Vaccine stocks procured by the UK government were used and stored effectively, with far less waste than predicted, and mostly distributed according to evidence-based policy priorities. The national targets set by the Department of Health and Social Care (DHSC) for vaccine uptake in England were met (National Audit Office 2022), which is not always something that can be said of UK health policy targets. For the first few months of the rollout, all four UK regions experienced high levels of vaccine uptake that compared favorably to the records of many other high-income countries.

But there were also significant challenges experienced when acquiring and distributing vaccines in the UK. After the summer of 2021, the pace of

vaccination in the UK slowed considerably. As the pandemic dragged on, attitudes toward vaccination hardened a little among the UK public, while opinions softened somewhat in comparable countries such as France. While the UK continued to do well at providing booster doses to those who needed them, momentum slowed in terms of increasing the proportion of people who were fully vaccinated (those with at least two doses) relative to the population. More countries with similar resources, and some with fewer, began to surpass the UK on this metric (see fig. 12.1 below).

Vaccine uptake was not equally or, many would argue, equitably distributed among the population. Younger adults, teenagers, pregnant women, and people with disabilities had less uptake compared to the population as a whole. In England, the most populous part of the UK, people identifying as Black Caribbean, White Other, and Black African were most likely to be unvaccinated, while White British and White Indian groups were most likely to have received a COVID-19 vaccination. People in "deprived areas" were less likely to get vaccinated compared to those living in wealthier parts of the country (Office for National Statistics 2023).

By early 2022, the UK's domestic vaccine, produced by AstraZeneca in a partnership with Oxford University, was not being used much within the UK. After several blows to its reputation, including policy announcements by France and Germany that cast doubt on its effectiveness for older people and caused reputational damage, online misinformation, concerns about rare blood clots, and changes in expert recommendations about who should be vaccinated with AstraZeneca, the vaccine became a little-used option for providing booster doses (Walsh 2020; Wise 2021; Head 2022).

Finally, vaccine procurement and distribution suffered from some of the same governance issues that affected the UK's overall pandemic response. In early 2023, the National Audit Office raised serious concerns about the DHSC and the UK Health Security Agency's accounting practices and waste related to personal protective equipment (PPE), medicines, and vaccines, including a GBP 2.7 billion write-down for vaccines bought during the global rush to vaccinate (Hall and Campbell 2023). Effectiveness in procuring vaccines early was a double-edged sword as demand for shots diminished.

The following sections discuss the UK's approach to acquiring and approving vaccines, the UK's vaccination programs, and the reasons why the country's early reputation as a vaccine leader became somewhat tarnished over time.

Vaccines

On December 2, 2020, the UK became the first country in the world to approve a COVID-19 vaccination after a clinical trial (Ledford et al. 2020).

The market authorization of vaccines in the UK is centrally governed by the UK-wide Medicines and Healthcare Products Regulatory Agency (MHRA). The MHRA granted emergency use authorization to a COVID-19 vaccine based on mRNA technology and produced by Pfizer-BioNTech. From the perspective of many, this was an astonishing achievement. Routine authorization of vaccines in the UK would normally have taken years, yet the Pfizer-BioNTech vaccine was approved just seven months after the start of clinical trials.

Early approval won praise from many in the public health and healthcare sectors, while other public commentators raised concerns about the speed of the regulatory process. The decision surprised some officials in other countries. Dr. Anthony Fauci, the director of the US National Institute for Allergies and Infectious Diseases, was called to the White House to explain why the United States had not approved the vaccine first. Fauci commented that the United States had the "gold standard of the regulatory approach" and that "the UK did not do it as carefully," although he later apologized for those remarks (Mahase 2020). The European Medicines Agency (EMA) put out a press release asserting that their longer process was safer and more thorough, and several European Union (EU) legislators and member state leaders criticized the speed of the UK decision and raised concerns about the quality of the approval process (Aljazeera 2020). As December progressed, however, other actors began to criticize the relatively slow pace of their own regulators, particularly the EMA, fielding criticisms from members of the public and their own supporters (Deutsch and Furlong 2020; Euractiv/Reuters/AFP 2020).

The UK quickly moved to approve another two vaccines: the Oxford-AstraZeneca vaccine on December 30, 2020, and the Moderna mRNA vaccine on January 8, 2021. By comparison, the EMA provided conditional marketing authorization to the Pfizer-BioNTech vaccine on December 21, 2020; the Moderna vaccine on January 6, 2021; and the Oxford-AstraZeneca vaccine on January 29, 2021. The UK government's approach, which at the time seemed risky, ultimately paid off—all three vaccines were shown to be effective, particularly in reducing the severity of COVID-19 and preventing hospitalization and death, and the UK got a small head start on vaccination over some of its European counterparts. Ultimately, six vaccines were approved for use in the UK, but only three—AstraZeneca, Pfizer, and Moderna—were deployed. The pattern of rapid approval would repeat itself later on in the pandemic, such as when the UK became the first country to approve Moderna's bivalent vaccine against the Omicron variant in August 2022 (Grover 2022).

Why was the UK able to approve a vaccine more quickly than its neighbors? Both critics of the UK's process and those who boasted about its success had strong political reasons to act as they did, and the rapid approval quickly became a matter for political debate. On one side, critics claimed the approval process was somehow poor quality, without present-

ing any substantiating evidence. On the other hand, UK ministers, most prominently Health Secretary Matt Hancock and Prime Minister Boris Johnson, claimed that the MHRA was only able to act quickly due to Brexit and an alleged reduction in red tape. This was patently false. As stated by June Raine, chief executive of the MHRA, the approval process took place under existing EU rules, which allow national regulators in EU member states to conduct approvals in emergency situations (Smyth et al. 2020; Dayan et al. 2023). It seems much more likely that the speed of approval was facilitated by bureaucratic factors that include the MHRA's decision to switch to rolling submission for evidence under consideration, the relative centrality of political decision-making in the UK, and the lower workload of MHRA evaluators versus their EMA equivalents at that time, which was a temporary and unintentional effect of Brexit (Strasburg et al. 2020).

The UK was also relatively successful in terms of procuring vaccine supply when compared to other countries, again due to the UK government's decision to take on risk at an early stage. Part of this success seems to be due to the early establishment of a Vaccine Taskforce (VTF) in May 2020. Established by the UK's chief scientific officer and originally governed by the Department for Business, Energy and Industrial Strategy (BEIS), the VTF was designed to secure a supply of COVID-19 vaccines for the UK as quickly as possible, manage the international distribution of vaccines, and bolster the UK's ability to make its own vaccines in the future.

The VTF had several characteristics that many bureaucratic bodies lack that likely contributed to its success: substantial ring-fenced funding, senior civil servants and industry representatives with a lot of relevant experience, and an accountability structure that meant reporting directly to the prime minister. However, like other public bodies making decisions about pandemic response, the VTF was criticized by public interest groups for its lack of transparency. The government was criticized for appointing the initial chair of the VTF, Kate Bingham, via a less than transparent process (Conn 2021). The membership of the VTF was only known months after the body was established, and public interest groups subsequently questioned the close links between members of the VTF and companies that stood to profit substantially from the government's purchase of COVID-19 vaccines (Thacker 2020). The VTF's method of operation, while successful in securing supply, could also be questioned. The body was able to contract with six suppliers to secure over 450 million doses through the end of 2023, primarily by signing contracts prior to regulatory approval (House of Commons Committee of Public Accounts 2022). This approach mirrors the often successful advance market commitment mechanisms used by lower-income countries to incentivize vaccine development, but it does require governments, not companies, to take on the risks of failure (Center for Global Development 2022).

Of the three vaccines deployed against COVID-19, the Oxford-AstraZeneca vaccine was the only non-mRNA candidate. UK government

officials touted it as a uniquely British vaccine that represented the UK's potential to lead in the life sciences industry, although the reality is far more complicated. The Oxford-AstraZeneca vaccine was not a brand-new technology, but was only made possible due to two decades of funded research at Oxford University and the ability to adapt an existing vaccine created to combat MERS. As such, the development process was supported primarily through grants from public sources and charitable foundations, including substantial funding from the European Commission and the UK government (Cross et al. 2021).

AstraZeneca's involvement in the development of the vaccine happened at a relatively late stage and changed plans for deployment. Initially, researchers at Oxford University partnered with an existing consortium of investors (not including AstraZeneca) to develop the vaccine. The product was originally intended to be a globally accessible vaccine that could be made available to many countries around the world at low cost, with the developers initially claiming that they would not seek to make a profit. The established technology behind the vaccine meant that it had less stringent storage requirements and could be produced at relatively low cost, unlike the newer mRNA vaccines, which required ultra-cold chain storage, making the vaccine suitable for deployment in settings with fewer resources. Facing constraints on production capacity, however, the team decided to grant an exclusive license to AstraZeneca to manufacture the vaccine. This decision was controversial—because it went against previous statements that investors would not make money from the vaccine—and caused global health advocates to call for greater transparency around the decision-making process (Garrison 2020).

The UK was ultimately able to create one of the largest COVID-19 vaccine stockpiles of any country in the world, benefiting people in the UK but potentially reducing the supply of vaccines available to other countries. The UK's international donations were substantial but more modest than some comparable countries. Against a public pledge to donate 100 million doses to other countries, as of June 2022 the UK government stated it had donated 84.1 million COVID-19 vaccines—76.5 million to COVAX and 7.6 million through bilateral arrangements (UK Parliament 2022)—although as of March 2022 the Multilateral Leaders Task Force on COVID-19 listed 59 million doses as donated or delivered—less than the United States, Germany, France, Italy, or Spain but more than Japan, the Netherlands, or Canada (MLTFC 2022). On a per capita basis, the UK ranked 13th for donations out of 29 donor countries (Our World in Data 2023). However, the UK was also a significant financial donor, the "largest sovereign donor" across all core programs within Gavi, the world's largest public-private vaccine partnership (Gavi 2022).

In mid-2021, uncertainty around the future of COVID-19 vaccines increased at the same time that the governing Conservative Party was becoming more critical of its leadership. Health Secretary Matt Hancock

resigned in June after it was publicly revealed that he had broken the government's own distancing guidelines. Hancock was replaced by Sajid Javid. Kate Bingham was replaced as VTF chair by Sir Richard Sykes, and in August, the VTF was transferred from BEIS to the Department of Health and Social Care. Amid this disruption, there were delays in settling the vaccine program's budget for 2022–23 and a change of policy advice from the Joint Committee on Vaccination and Immunization (JCVI) that reassessed the risk-benefit balance of COVID-19 vaccination among younger groups and children (House of Commons Committee of Public Accounts 2022).

As quickly as they were set up, some of the bodies and facilities involved in vaccine procurement and production were wound down. The VTF ended its work in October 2022. The newly created Vaccine Manufacturing and Innovation Center in Harwell, which was funded by GBP 200 million of public money, was sold to an American private pharmaceutical company in April 2022, despite criticism that this would undermine the UK's ability to develop vaccines in the future (Glover 2022).

Vaccinations

While purchasing and procurement are handled centrally across all four regions in the UK, vaccination rollout is a devolved matter, with devolved governments and health systems in Northern Ireland, Scotland, and Wales responsible for implementation on the ground in their territories and implementation in England handled by the UK government and NHS England. Across all states, however, policy decisions were guided by nonbinding advice from the JCVI, a UK statutory advisory committee, which in practice exerted a degree of centralization on policy decision-making. While the MHRA was the agency providing market authorization to vaccines, JCVI was the main body advising on vaccine eligibility.

Official data series on vaccination in the UK and its regions provide an incomplete record of immunization that makes comparison across systems or with other countries a bit difficult. Scottish data end in October 2022, Welsh data end in April 2023, English data end in June 2023, and Northern Irish data end in July 2023. Aggregated UK data, therefore, end in October 2022. Reporting delays also affect some data in mid-2022. The UK also did not publish data on vaccinations administered by manufacturer, unlike some other countries. Official categories used to collect data on ethnic and racial groups in the UK vary by state, which can make comparisons between England and Wales, Scotland, and Northern Ireland more difficult (Cabinet Office 2023).

Nevertheless, we know that the COVID-19 vaccination program was by far the biggest in the history of the UK. Anticipating initial constraints on vaccine supply, JCVI established priority groups for COVID-19 vaccination, beginning with care home residents, frontline health and social care

workers, and those aged 80 and over. Older populations and groups with underlying health conditions that put them at greater risk of serious consequences from COVID-19 were prioritized (Majeed et al. 2022).

Across the UK, vaccination against COVID-19 was carried out by a variety of bodies including general practitioners' (GPs) offices, hospitals, specialized vaccination clinics, and local community pharmacies. Ultimately, GPs and community pharmacies would end up playing a much bigger role than expected, while COVID-19-specific vaccination clinics were somewhat underutilized and proved more expensive per dose, contrary to planning expectations (National Audit Office 2022). This mode of delivery had consequences, with some reports emerging that the vaccination campaign took systemic capacity away from routine care. This caused some healthcare organizations to redouble their calls for investment in primary care and recruitment of more GPs within the National Health Service (NHS) (Campbell 2020; Bostock 2022).

Between December 2020 and July 2021, the four UK systems vaccinated their populations at a pace that exceeded that of many comparable wealthy countries with access to vaccines. Vaccine uptake exceeded initial assumptions, and the program met all of its targets through July 2021. Each of the four states, particularly Wales, experienced a rapid initial uptake of vaccines in the first half of 2021. All vaccines deployed in the UK required two doses to be fully effective; a person with two doses of an authorized vaccine was considered fully vaccinated. Wales fully vaccinated 60% of its population in mid-July 2021, Scotland reached this milestone in early August, England in mid-August, and Northern Ireland a week later (see fig. 12.1). Relatively low vaccine hesitancy, relatively good vaccine availability, and a relatively high-capacity, centrally governed healthcare sector likely improved the pace at which vaccines were administered during this period. These vaccines were delivered with comparatively few doses wasted compared to expectations. Although planning documents assumed that 15–20% of vaccines would be wasted during deployment, actual wastage was remarkably lower, at 4%, or 4.7 million doses. Initial restrictions on how mRNA vaccines could be stored seem to account for most of this waste, and these restrictions were later abandoned (House of Commons Committee of Public Accounts 2022; National Audit Office 2022).

After August 2021, however, the pace of vaccination across the UK slowed. More countries began to surpass the UK states in terms of the proportion of their populations receiving a full course of a COVID-19 vaccine, and the gap between the four constituent states of the UK was more visible. Wales and Scotland reached 70% fully vaccinated at the end of September, but England reached this threshold at the end of December, and Northern Ireland became 70% fully vaccinated only in mid-March 2022. The proportion of the population receiving a full initial protocol as of the end of September 2022 (when comparable data end) was 75.2% for the UK, 78.3% for Scotland, 77.5% for Wales, 75.4% for England, and 71.5%

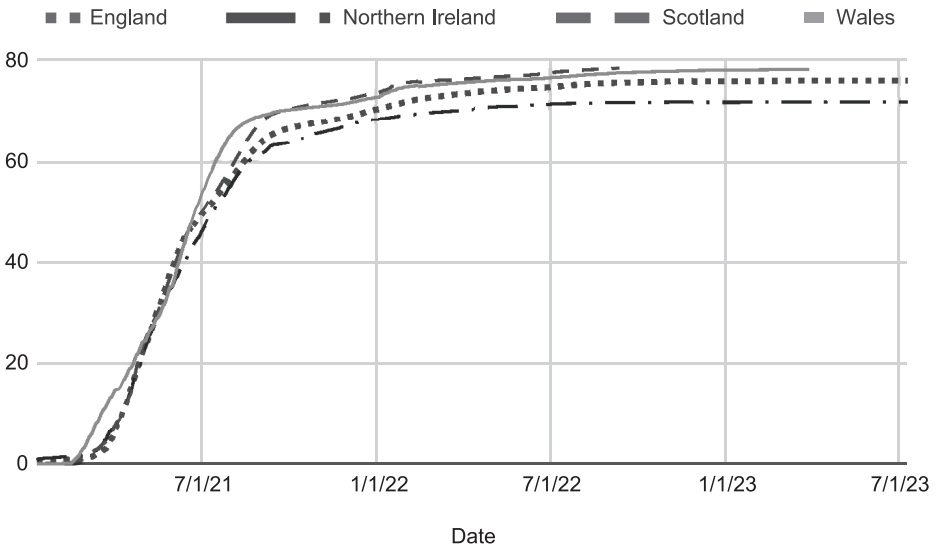

Fig. 12.1. Share of population who completed the initial COVID-19 vaccination protocol. (Data from Our World in Data 2023.)

for Northern Ireland. It is likely that in all states this was close to the peak—as of July 2023, figures for the UK and Northern Ireland had not changed very much, at 76% and 71.8% respectively.

In terms of how doses were deployed, the UK took a different path from some other countries. First, partway through the initial rollout of vaccines, JCVI went against its initial plans and chose to prioritize first doses over completing the course of vaccination. This meant that some individuals received their second dose three months, rather than three to four weeks, after their first dose. Some people had their vaccination appointments for second doses canceled and rescheduled, which likely had some impact on uptake in spring. Some health researchers have questioned whether this decision to change strategy actually followed the available evidence (Majeed et al. 2022).

Second, the UK gave more booster doses to individuals who had already received a full course of a vaccine than many other countries (fig. 12.2). As of mid-2023, Wales, England, and Northern Ireland all had rates of boosters per 100 persons that were way above the average for high-income countries. Of jurisdictions reporting this data, only Chile, Japan, and Gibraltar deployed more booster shots than Wales, England, and Northern Ireland (Scottish data are not available after October 2022). No studies exist that explain why the UK was more prolific with its booster program, but there are some potential explanatory factors. For one thing, the UK was the first country to approve a booster vaccine and so began offering booster doses earlier than some other countries. And while boosters were initially offered six months after the second dose of the initial protocol, in

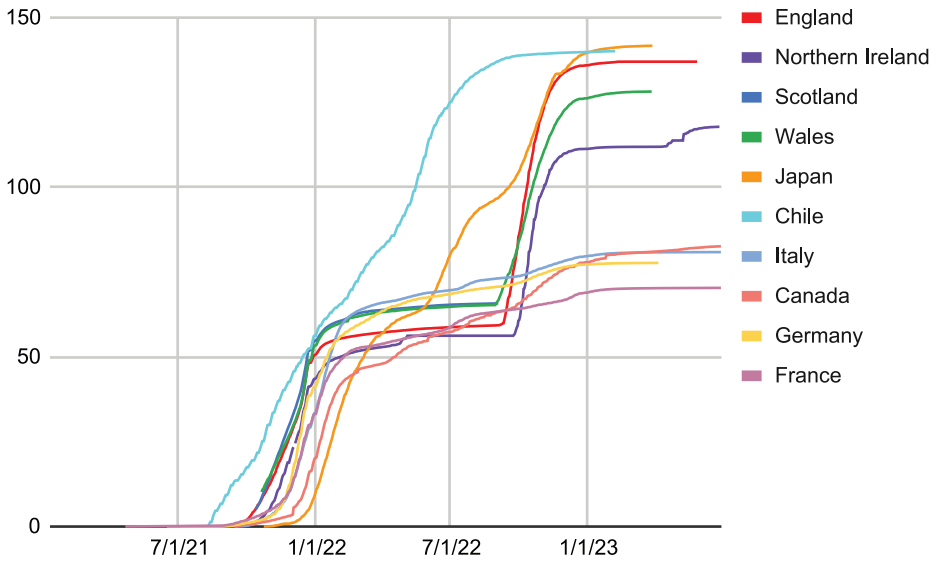

Fig. 12.2. COVID-19 vaccine boosters administered per 100 people

November 2021, JCVI advised the government to cut this waiting period to three months, anticipating a wave of cases attributed to the Omicron variant (JCVI 2021a). Thanks to a substantial "autumn booster" campaign, as of March 2023, 15 million people in the UK had received a fourth dose of a COVID-19 vaccine, although uptake was much higher among the oldest age groups and among those identifying as White British compared to other racial and ethnic groups (Office for National Statistics 2023).

Despite these successes, the Oxford-AstraZeneca vaccine would not be as widely deployed in the UK as originally hoped by the politicians who praised it as a homegrown vaccine. In 2021, the VTF assessed candidates for booster vaccines and decided to contract only with Pfizer-BioNTech and Moderna, and not AstraZeneca, with use of the AstraZeneca vaccine then phased out (House of Commons Committee of Public Accounts 2022). This seems to have been a response to changes in clinical advice for how to use AstraZeneca following concerns about very rare adverse effects in some populations.

A final difference in how the UK systems deployed doses compared to other countries is in the availability of vaccines for younger people and children. The UK was somewhat slower to reach decisions on vaccinating these age groups than France or Germany and much slower than the United States. The MHRA approved the Pfizer-BioNTech vaccine for use in people aged 12 to 17 in June 2021 and approved the Moderna vaccine for use within this group in mid-August. In terms of eligibility, however, JCVI was cautious. In July 2021, JCVI recommended that "children and young people aged 12 and over with specific underlying health conditions that

put them at risk of serious COVID-19, should be offered COVID-19 vaccination" of two doses (JCVI 2021b). A few weeks later, however, the recommendation was expanded to include one dose for all 16- and 17-year-olds (JCVI 2021c).

The difficulties in dealing with a complex risk assessment and rapidly evolving evidence continued. At the start of September, JCVI recommended against vaccinating all 12–15-year-olds, stating that from a health perspective, the benefits were marginal and the risks not fully clear. But just a few days later, on September 13, the UK's Chief Medical Officers and JCVI representatives recommended that all 12–15-year-olds should receive one dose of a COVID-19 vaccine through a schools-based program. The difference between the two sets of advice seems to have been that while JCVI did not consider the contributions of vaccination to preventing disruptions in education, the Chief Medical Officers were not so constrained (Zahawi 2021). In December 2021, a low dose version of the Pfizer-BioNTech COVID-19 vaccine designed to be offered to younger children received regulatory approval. JCVI advised in December that clinically vulnerable children aged 5 to 11 years should receive the vaccine, but it was not until mid-February 2022 that JCVI advised that all children in that age group be given the vaccine. By this time, some other countries had vaccinated a higher proportion of children than the UK.

A mixture of clinical and political considerations appear to have influenced the speed of rollout for adolescents and children. The rollout among these groups was described by Health Secretary Sajid Javid as "non-urgent," with the government choosing not to conduct a full public health messaging campaign (Devlin et al. 2022). Clinically, advisers had some concerns about the risks of vaccines for teens and argued that the risks to young children from COVID-19 were minimal. Meanwhile, global health advocates argued that distributing doses to UK children while people in some other countries had vaccine shortages was unethical. In late January 2022, large numbers of school-aged children across the UK were contracting COVID-19, causing significant disruptions to school attendance and education and increasing the pressure on politicians to fix the problem. The UK government was also preoccupied with releasing its vision for "Living with COVID-19," a strategy that relied heavily on the UK's vaccine coverage to justify the elimination of remaining lockdown measures, including legal requirements to self-isolate if testing positive for COVID-19. Some suggested that the vaccine rollout announcement was delayed so that the government could include it in its new policy platform (Walker and Davis 2022).

One significant aspect of the vaccine rollout in the UK, in which slow uptake among youth played a part, is the unequal distribution of vaccines across the population. Younger adults, teens, and children were far less likely to be vaccinated than older adults, in part reflecting differential

risks and messaging for those groups. Uptake among pregnant women was much lower than in other groups, reflecting increased hesitancy (House of Commons Committee of Public Accounts 2022).

Each of the UK's four systems experienced inequities in vaccine uptake by ethnic group, religion, disability, and socioeconomic status. In England, as of the end of August 2022, people identifying as Black Caribbean, Black African, and White Other were much more likely to remain completely unvaccinated than those in other ethnic groups, despite many in the overall population having received four doses of a vaccine. People living in economically deprived areas, people who had never worked or were unemployed long-term, people limited significantly by a disability, and people identifying as Muslim or as having an "other religion" were more likely to remain unvaccinated (Office for National Statistics 2023). In Scotland, as of 2022, people who identified as Other African (54.1%), Polish (52%), or Gypsy/Traveler (44.9%) were less likely than other ethnic groups (whose vaccination rates range between 88.6% and 82.2%) to have been vaccinated with at least one dose against COVID-19 (Public Health Scotland 2022). In Wales as of April 2021, uptake of one dose of any COVID-19 vaccine was lowest among people identifying as Black (73.9%) and highest for those identifying as White (94.1%). Vaccine coverage in the most deprived areas was lower than that in the least deprived areas (89.7% versus 94%) (Perry et al. 2021).

More thorough and nuanced accounts of the extent to which vaccines in the UK were equitably distributed will emerge in the coming years. However, the ways in which the UK's different systems dealt with some of these equity concerns are telling. Despite inquiries from journalists, Northern Ireland did not publish uptake figures by ethnic group, but rather only raw numbers of vaccines given, making it impossible to determine progress (McConville 2021). In England, a high-level political decision was made to abolish Public Health England (PHE) in early 2021 and replace it with a new agency, the UK Health Security Agency (UKHSA). The UKHSA was more focused on infectious disease control and preparedness, while some of PHE's population health functions were siphoned off into the Office for Health Promotion. It remains to be seen to what extent separating these functions will affect how equity concerns are represented in future health policy decision-making in England. At the very least, the disruption caused by reorganization likely had some effect on the ability of the agency to promote equitable vaccine uptake.

Why?

The UK government has been rightly criticized for inadequate aspects of its pandemic response, including its inability to provide adequate PPE to frontline NHS staff, the sidelining of expert scientific advice, the slow

speed of initial decision-making around lockdowns, policy violations by government ministers and their staff, and premature declarations that the pandemic was "over" (see BMJ Covid Inquiry Series 2022). Lives were undoubtedly lost and impaired as a result of policymakers' choices. In terms of vaccine discovery, approval, procurement, and distribution, however, the UK did better than many of its peers, despite strong evidence of inequitable vaccine uptake across the population. Why did the UK perform relatively well in acquiring and approving vaccines? Why did uptake start strong but stall in mid-2021? And why did the pattern of uptake fail to match the need across different demographic and socioeconomic groups? The full answers to these questions will likely emerge with time. But there are some key factors that likely contributed to these outcomes, namely, government capacity throughout the UK, the degree of centralized decision-making and intergovernmental coordination, the state of public trust in government and science, and a lack of attention among policymakers to equitable vaccine uptake.

Government Capacity

On paper, the UK should have been in a relatively good position to mount a major vaccine campaign compared to other countries with fewer resources. In 2019, prior to the start of the pandemic, the NTI/Johns Hopkins Global Health Security Index ranked the UK second in the world overall for its global health security, in the top 5% of countries for health financing, and first among all countries for its ability to rapidly respond to and mitigate a pandemic (GHSI 2019). However, these rankings often emphasized technical compliance with international norms and preparedness for disaster response rather than taking a deep dive into countries' existing resources and funding.

The UK's national health services were, arguably, a great asset in attempts to vaccinate the population. The UK has four separate national health systems, one for each of its four territorial governments, and the policies governing these health systems have diverged somewhat since devolution in the late 1990s (Greer 2004). Nevertheless, these four health systems still have more commonalities than they have differences, including that they are single-payer healthcare systems in which their respective governments own most of the facilities and directly employ the majority of the workforce, arguably enhancing the governments' ability to deliver vaccinations relative to countries with fewer trained vaccinators working for the public sector.

However, it is important to note that both the UK's national health systems and its public health systems have been under mounting stress over at least the past decade, experiencing significant workforce shortages, frequent reorganizations, and levels of funding that have not kept up with

demand for care and services. The English public health system, in particular, has seen its budget brutally slashed under Conservative/Liberal Democrat coalition and Conservative governments since the 2010s. Going into the pandemic, public health capacity varied a great deal across the UK and was worst in poor and more marginalized communities (Jarman 2023).

Centralized Decision-Making and Intergovernmental Coordination

In addition to asking whether a country has enough raw capacity, we must examine how well that capacity is used. The UK employed a relatively centralized policy decision-making structure for COVID-19 vaccinations, with both positive and negative consequences. Despite devolution in some areas of health policy, decisions about vaccine purchasing and approval happen at the UK level. Vaccine distribution in the UK is often a more bottom-up process. Demand for annual influenza vaccines, for example, is driven by actors such as NHS providers and community pharmacies, who assess need, order vaccines directly from suppliers, and arrange vaccination appointments with patients.

During the COVID-19 pandemic, much of the decision-making on the UK's COVID-19 vaccination activity was centralized, but as of yet, published evidence is not clear on whether centralization was a help or a hindrance. On the one hand, centralized decision-making may have helped the UK government to manage supply across the whole population. The UK's central authorities adopted a truncated regulatory process for vaccine approval and sought to purchase vaccines prior to approval, resulting in both an early start to the vaccination campaign and ongoing good access to vaccine supply overall. However, some managers in the English NHS saw this process as inefficient, preventing them from effectively managing staff schedules and vaccine stocks, and experienced supply shortages and cold storage restraints that likely harmed vaccine uptake. Others pointed out that central control may have prevented the formation of effective local partnerships and outreach tailored to local communities, particularly minoritized or excluded groups (Mounier-Jack et al. 2023).

The central retention of COVID-relevant data was a concern for local governments during the early stages of the pandemic when poor coordination mechanisms and missing data-sharing agreements damaged local pandemic response. This experience was not even across the UK, with local governments in Wales reporting quicker access to data due to the presence of pre-pandemic data-sharing agreements that were absent in other areas. Poor coordination mechanisms continued to hamper local outreach about vaccination, although to a lesser extent. However, local public health officials felt that vaccination data was often not put to good use (Shepley and Freeguard 2023).

Public Trust and Government Messaging

The UK started the pandemic in a good position relative to other countries in the Organization for Economic Cooperation and Development as far as overall public trust in vaccines was concerned. Across the UK, public trust in government was low—with half of respondents in a 2022 survey by the Office for National Statistics (49%) saying they did not trust the UK government. But trust in the NHS—the most trusted of the public institutions mentioned in the survey—was much higher (69%) (Office for National Statistics 2022). This may have been an important factor influencing uptake, because a substantial proportion of COVID-19 vaccines were delivered through the NHS. Members of the public use the NHS frequently, and many people are either employed by the NHS or know someone who is. And for over two months during early pandemic lockdowns, large numbers of people in the UK stood in front of their houses at eight o'clock in the evening on Thursdays clapping and banging pots and pans to show support for NHS workers who were risking their lives. While this display quickly became politicized, it is nevertheless a clear indicator of public support. It is likely that relatively high trust in the NHS had some effect on individuals' vaccination decisions.

Survey data show that the UK had high levels of public acceptance for COVID-19 vaccines when compared to similar countries. In January 2021, when asked about their willingness to be vaccinated against COVID-19, only 12.8% of respondents were "unvaccinated and not willing to get vaccinated." This compares favorably to the other 14 countries surveyed, including Australia (27.7%), Canada (31.4%), Denmark (30.5%), France (46.5%), Germany (30.7%), Italy (26.2%), Japan (21.4%), Spain (25.6%), and the United States (32.7%). From June 2021, however, the proportion of respondents unvaccinated and unwilling to get vaccinated increased markedly over prior months (Our World in Data 2023).

While there are no formal studies explaining this change, its timing may be significant. In the spring of 2021, JCVI's decision to deviate from its original plan and delay second doses likely disrupted uptake for some. In early May 2021, JCVI issued revised advice about who should receive the Oxford-AstraZeneca vaccine, suggesting that those aged 18 to 39 should be offered an alternative vaccine when possible. This reasoning was based on a revised risk-benefit assessment that took into account a small number of reports of blood clots and low platelet counts among people of that age group following vaccination with the Oxford-AstraZeneca vaccine, as well as referencing lower risks of serious illness and death among younger people (JCVI 2021d). Younger adults already viewed their risks from COVID-19 as much lower than those of older adults, and the government's change in policy likely reinforced that message for this group. The same could be said of plans to vaccinate young children, where parental support for vaccination was relatively low and was likely reinforced by JCVI's

assessments that children were at low risk from COVID-19 overall. JCVI's position is seen by many as a valid interpretation of the available scientific evidence. But the UK's stance was distinct from other countries that more strongly recommended and pushed for vaccination for children.

Vaccine Hesitancy and Structural Barriers to Uptake

Furthermore, trust in vaccines was not uniform across the UK population. Marginalized groups, including some racial and ethnic minority groups and economically disadvantaged people, were less trusting of government and/or the medical professions than the population overall, contributing to worse uptake within those groups. Studies of COVID vaccine hesitancy that examine differences of opinion between demographic groups are limited by the age of available household survey data, which end in mid-2021. As of that time, however, trust in vaccines was higher among White British people than most other racial and ethnic groups in the UK, particularly respondents identifying as Black, Bangladeshi, or Pakistani. Older people, those more clinically vulnerable to COVID-19, men, people with higher incomes, and people with more years of education were more willing to be vaccinated. As in other countries, a lack of trust in the COVID-19 vaccines was associated with a lack of trust in government officials (Chaudhury et al. 2022).

Racial and ethnic disparities in vaccination uptake across the UK are not new and are influenced by historic and current injustices within healthcare, public health, and social policy that affect both access to care and attitudes toward medicine and public health. At the start of the pandemic, members of the UK government's core scientific advisory body, the Scientific Advisory Group for Emergencies (SAGE), were aware that uptake would likely be lower among racial and ethnic minority groups and advised the government accordingly. In an evidence review, SAGE's Ethnicity Subgroup stated with "high confidence" that factors including "perception of risk, low confidence in the vaccine, distrust, access barriers, inconvenience, socio-demographic context and lack of endorsement, lack of vaccine offer or lack of communication from trusted providers and community leaders" were likely to contribute to lower levels of vaccination among those groups (SAGE Ethnicity Subgroup 2020).

This advice becomes even more important when contrasted with the impact of COVID-19 on minority ethnic groups. Almost all ethnic minority groups in the UK were more likely than White British people of the same age to contract COVID-19, experience severe consequences from the disease, and die from COVID-19 (Hussein et al. 2022; Platt and Warwick 2020). Minority ethnic groups were overrepresented relative to the general population among people living in more crowded areas, people relying on public transport, and people who could not afford to miss work, making them more likely to contract COVID-19 than those who could stay isolated from

others. Some groups, primarily Black African women and Indian men, were disproportionately likely to work in health or social care roles with higher risks of exposure (Platt and Warwick 2020).

Nevertheless, UK governments arguably did not meet the scale of the challenge laid out by the SAGE Ethnicity Subgroup. The UK's public health messaging, particularly early messaging at the national level, was considered by experts to lack "cultural competence." Not only were many public health messages issued solely in English, but the content and delivery of these messages was not sufficiently tailored in ways designed to reach minority groups. Local government outreach was thought to be more effective than national efforts (House of Commons Health and Social Care and Science and Technology Committees 2021) but was underutilized in the early stages of the pandemic and variable across different areas of the country.

Conclusion

The UK is an important case for both scholars and policymakers trying to draw lessons from COVID-19 vaccination campaigns. The headlines about COVID-19 vaccination in the UK emphasize top-line victories: the UK approved vaccinations rapidly, was the first country in the world to administer a COVID-19 vaccine to patients, and managed to secure a reasonable supply of vaccines. Initial vaccination rollout was relatively rapid and largely efficient, and uptake was significant among older age groups. But the UK's vaccine rollout was not particularly equitable, sometimes failing to reach marginalized groups who were relatively exposed to COVID-19 and its worst consequences. Vaccination slowed considerably as the pandemic dragged on, amid more complex risk assessments, confusing messaging, and declining public support.

As much as this case highlights the relative strengths of the UK's single-payer healthcare systems, public health systems, and its health and care workforce, it also shines light on the potential fragility of these systems absent sufficiently good governance. Despite the availability of an established scientific advisory system, decision-making about COVID-19 vaccines and vaccination in the UK relied heavily on central politicians and bureaucrats to make rapid and reasoned decisions supported by the scientific advice they received, which they were not guaranteed, or required, to do. The means by which decisions were reached, and the details of who made and influenced decisions, were often not clear to outside observers and members of the public at the time, and the rationale for some decisions is now only becoming clearer in hindsight. Should the UK be confronted with a similar situation in the future, the success of future vaccination policies may well rest on the politics, ethics, and competence of those steering the ship.

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Part III

Vaccination Politics in the Americas

13 | COVID-19 Vaccination in Canada

Navigating Global Diplomacy, State Capacity, and Public Trust

Joslyn Trowbridge and Patrick Fafard

At the outset of the COVID-19 pandemic, Canada's federal and provincial governments leaped into shared action. Amid changing scientific evidence of the disease and the need for new extraordinary public health measures, governments worked alone and together to provide public health surveillance, testing, advice, guidance, and ultimately regulatory action across the country. As was true in many other countries, almost from the beginning, the central question for many Canadians was when a COVID-19 vaccine would become available. Faced with the fact that Canada lacked sufficient domestic production capacity, the federal government announced advance purchase agreements with seven non-Canadian firms. The first shipment of COVID-19 vaccines arrived on December 13, 2020. Despite delays in delivery, within eight months, over 80% of Canadians had received two vaccine doses. The success of Canada's procurement and distribution strategy helped get Canadians vaccinated faster than populations in other comparable importing countries. However, this success came at a cost, and Canada's story may provide some lessons for future wide-scale vaccination efforts and pandemic response. Canada's international reputation as a diplomatic global health and development leader was damaged when the country was accused of hoarding vaccines and securing a staggering nine doses per person, more than any other vaccine-purchasing country (Brown 2022). Canada's vaccine distribution strategy missed large pockets of racialized and low-income communities where vaccination was inaccessible and low uptake persisted (Aylsworth et al. 2022; Howard-Bobiwash et al. 2021). However, one of the biggest lessons to learn from Canada is the downside of the politicization of vaccination mandates. By linking vaccination status to jobs and participation in public life, governments elevated the personal cost of vaccination leading to a protracted protest that made news headlines worldwide. In Canada, as elsewhere, controversy over vaccination and public health measures more generally has eroded public trust in the public health function of government. Rebuilding public trust in public health is urgent to ensure understanding and compliance in future public health emergencies.

Vaccine Federalism

Canadians generally assume that "health" is the responsibility of the 13 provincial and territorial governments. This is not surprising given the delivery of health-care services (e.g., doctors and hospitals) and public-facing public health (e.g., administering vaccinations) are their responsibility. But, in fact, in Canada, public health and health services delivery are a shared responsibility of federal, provincial, territorial, and, more recently, Indigenous governments (Brock and Hale 2023; Lecours et al. 2021; Paquet and Schertzer 2020). In the case of vaccination, the government of Canada is responsible for regulating and authorizing vaccines for use and, by means of a variety of trade and industrial policies, ensuring vaccine supply. During the COVID-19 pandemic, the federal government also took responsibility for procuring and financing vaccines (James and Hale 2023). For their part, provincial and territorial governments are largely responsible for the final, critically important process of distributing vaccines in each province and territory and administering vaccines to the people who most need them. This includes making difficult decisions about who should get priority access when vaccine supply is limited, addressing vaccine hesitancy, and implementing the often controversial policies required to maintain sufficiently high levels of vaccination coverage.

Vaccines

At the outset of the COVID-19 pandemic in March 2020, Canada did not have the private or public domestic production capabilities to rapidly produce and distribute a new COVID-19 vaccine. The National Research Council of Canada (NRC), a federal agency, created a Vaccine Task Force to identify promising vaccine candidates and create a pathway for testing, approval, and domestic production. The task force's early efforts focused on a government-owned production facility, to the displeasure of the private pharmaceutical and biomanufacturing sectors (Ling and Walsh 2020). To secure a made-in-Canada vaccine, the federal government provided funding to many potential domestic vaccine producers but acknowledged that, even if successful, new domestic production would be too little too late. In response, the government also partnered with China's CanSino Biologics, which was developing an adenovirus vaccine and had a history of collaboration with the NRC. To produce the vaccine once approved, the government invested $126 million to build a biologics manufacturing center and a clinical trial material facility. The deal fell apart in August 2021, possibly a reflection of strained diplomatic tensions between Canada and China (Anderson et al. 2021). Exports of the vaccine for further testing were blocked, and the clinical trials in Canada stopped at phase 1. Canadians were left without a clear path toward vaccination.

The federal government turned to additional agreements with foreign suppliers. To meet the needs of a population of 38 million, advance purchase agreements were negotiated with seven vaccine manufacturers (Public Services and Procurement Canada 2021). Deals with Pfizer-BioNTech and Moderna were announced in August 2020, representing approximately 132 million doses, with options to purchase an additional 76 million. A second agreement with AstraZeneca for 20 million doses followed in September 2020. By the end of November, deals with Johnson & Johnson, Novavax, Sanofi-GlaxoSmithKline, and Medicago were in place. The result was that Canada moved to the top of the list of vaccine "hoarders"—countries with the highest preorder of vaccine doses per capita (Abbas 2021; Mullard 2020; Win 2020). Estimates show that Canada had secured 282 million doses of different vaccines, which is almost nine doses per person (Cotnam 2020). Canada also came under criticism of "hoarding" at the expense of poorer countries for its approach to participation in the COVAX program (Houston et al. 2023). The federal government announced a $440 million agreement to participate in the program in September 2020, splitting the doses between Canadians and the low-income countries participating in COVAX. In February 2021, Canada announced it would receive 1.9 million doses from the COVAX program by June, making it the only G7 country to receive doses in the first allotment.

On December 9, 2020, Health Canada, the federal authority responsible for regulating vaccines under the Food and Drugs Act, approved the emergency use of Pfizer-BioNTech's COVID-19 vaccine. Health Canada used its authority under the "Interim Order Respecting the Importation, Sale and Advertising of Drugs for Use in Relation to COVID-19" (Government of Canada 2020). This special order expedited authorization for both human and veterinary drugs for COVID-19 in the face of urgent public health needs. Vaccine manufacturers were allowed rolling submissions where data was presented as collected during clinical trials. Moderna's COVID-19 vaccine was the second approved under the "Interim Order" on December 23, 2020. With these approvals, the first shipments of vaccines began arriving in Canada, with 30,000 doses of Pfizer-BioNTech and 168,000 doses of Moderna arriving before the end of the year. Emergency approval was granted to the Oxford-AstraZeneca vaccine in early February 2021 and the Janssen vaccine in March 2021. The first vaccination efforts began on December 14, 2020.

While the federal government has responsibility for vaccine procurement, financing, and authorization, provincial and territorial governments are responsible for the allocating, administering, monitoring, and reporting of vaccines and vaccinations (Public Health Agency of Canada 2021a).

Vaccinations

Canadians were eager to receive their COVID-19 vaccination as news of vaccines becoming more widely available spread in early 2021, with almost 70% of Canadians reporting that they were very likely to voluntarily get vaccinated when a vaccine became available (Frank and Arin 2020; Tang et al. 2021). Canadians were also receptive to prioritizing the nation's vulnerable populations to receive the vaccine first (Zhao et al. 2021). The devastating toll that COVID-19 infections were taking on the elderly in long-term care homes galvanized many younger Canadians to stay at home to "flatten the curve" of rising case rates. Provincial and territorial governments were ultimately responsible for deciding on vaccination prioritization and logistics. Many did so based on the advice of the National Advisory Committee on Immunization (NACI), a committee of volunteer experts mandated by the Public Health Agency of Canada (PHAC) (some provincial governments, notably Quebec and Ontario, have their own advisory committees). Early in the pandemic, PHAC mandated NACI to create a set of priority vaccination groups, assuming that vaccine procurement, supply, and distribution would be uneven and require difficult choices in the first year of a vaccination program. NACI recommended a staged vaccine rollout, first focused on four groups: (1) those at high risk for severe illness and death due to age or illness; (2) those likely to transmit COVID-19 to others who are at high risk (e.g., health-care providers); (3) workers who maintain essential services for the functioning of society; and (4) people who have an elevated risk of infection based on living or working conditions where infection could have disproportionate consequences (such as those living in congregate settings like prison or care facilities) (Ismail et al. 2020). Indigenous populations across the country were included in the fourth group based on several elevated risk factors (First Nations Health Authority 2021). This spurred Indigenous-led vaccination campaigns in most provinces (Anderson and MacKinnon 2023).

Provincial and territorial governments, in some cases with logistics help from the government of Canada, began vaccination rollout in December 2020 and January 2021, focusing on phase 1 to vaccinate frontline health-care workers in hospitals, long-term care homes, and individuals over age 80 (Driedger et al. 2023). The rollout stalled soon after it began, as Pfizer abruptly reduced its deliveries to Canada in January 2021 and Moderna reduced its shipments in February (Tasker 2021b). Canada quickly fell to 20th in the world for vaccine doses administered (Tasker 2021a). In March 2021, the responsible federal minister, Anita Anand, cited Canada's "diplomatic efforts" as key to bringing in more vaccines (Standing Committee on Government Operations and Estimates 2021). These efforts—along with a revised NACI recommendation that expanded the second dose administration from 8 to 16 weeks—reversed the rollout slowdown. Provinces and territories moved on to phase 2, expanding pri-

ority to those over age 70, adults in Indigenous communities, and others living in congregate settings. By the summer, most provinces and territories had implemented a system for the general population. Children were vaccinated much later, with the Pfizer and Moderna vaccines authorized for ages 12–15 in late summer, children aged 5–11 in November, and children aged 6 months to 5 years in July 2022.

There were, of course, significant challenges during the vaccination rollout. At the national level, the work of NACI, PHAC, and Health Canada to provide guidance on critical issues (e.g., timelines between dosages and the type of vaccine to use for which subpopulations) was fast-paced and sometimes confused parents and other members of the public (Canadian Press 2021). Notably, advice changed several times regarding the Oxford-AstraZeneca and Janssen vaccines (the latter was never administered in Canada) due to reports of side effects and quality control concerns. The inclusion of vaccine brand names in public communications led to Canadians "shopping" for their preferred vaccine, as they opted to wait longer to receive a Pfizer or Moderna vaccine despite the availability of others (Loewen 2021; Merkley and Loewen 2022). Canada could not donate unused Oxford-AstraZeneca doses to countries in need before the vaccines expired, causing approximately 13.6 million doses to be thrown out (*The Guardian* 2022).

Provincial and territorial governments used different approaches to managing the rollout of vaccines. Some used centralized management processes and city-run vaccination centers. Others used a decentralized approach, relying on privately run pharmacies with their own booking systems and processes, and were slower to meet vaccination targets (T. Fitzpatrick et al. 2023). The strong interest in getting vaccinated and the confusing process of finding and booking vaccination appointments, as well as "vaccine shopping" for a preferred brand, led to long lineups in urban centers and prompted headlines focused on the hunt for and race to vaccination centers (Samuel 2021). The confusion and frustration led to the creation of a volunteer citizens group, Vaccine Hunters Canada. Using a website and social media posts, this group helped Canadians navigate the booking systems and mix of pharmacy, community, pop-up, and mass vaccination sites (Carter 2020; Weeraratne and Cueva 2022).

Demand exceeded capacity for the first six to eight months of the vaccination rollout, compounding vaccine availability in many of Canada's urban centers. This coincided with a troubling trend of COVID-19 cases and hospitalization rates rising faster in racialized and low-income communities (McKenzie 2021). There had been little attention to collecting COVID-19-related health data that could be disaggregated by race, ethnicity, income, job sector, and other socioeconomic factors, making it difficult to understand how marginalized populations were faring in the pandemic (Blair et al. 2021; Mac-Seing and Ruggiero 2023; Mulligan et al. 2020). As community leaders and local government officials began to work

together to document and understand this trend, a clearer picture of where vaccination was most needed emerged (National Collaborating Centre for Determinants of Health 2021; Newport 2020; Shariff et al. 2022). This allowed community leaders and local public health officials, at least in Canada's largest cities, to devise "hyper-local" vaccination strategies that increased vaccine uptake overall (T. Fitzpatrick et al. 2023; Kholina et al. 2022).

By the end of August 2021, 83% of the eligible population had received at least one dose. Canada seemed on track to reach a high level of vaccination and avoid a major increase in COVID-19 cases over the fall and winter, when many would be returning to indoor activities. However, approximately 6 million people had yet to get vaccinated. Modeling from the largest province of Ontario suggested that an 85% vaccination rate was needed, in addition to other public health measures like masking and social distancing, to avoid further business and school closures in extended "lockdowns" (Draaisma 2021). The federal government announced the first vaccine mandates, which would require core public servants and all federally regulated air, rail, and marine transportation employees and travelers to be vaccinated with two doses of a COVID-19 vaccine, citing the efficacy of the vaccine in reducing cases and the leadership role of government employees for other Canadians (Employment and Social Development Canada 2021).

Vaccine mandates became a cornerstone of public discussion and political party platforms during Canada's federal election campaign in August and September 2021. Liberal Prime Minister Justin Trudeau, reelected for a third term with a minority government, repeatedly emphasized the need for vaccination mandates in federally regulated sectors. Earlier polling from August had suggested that Canadians broadly supported mandatory vaccination for travel and the public service and would support a "vaccine passport" system for entry into public services and businesses if required (Bricker 2021). Unsurprisingly, vaccine mandates became a wedge issue in the campaign, with the Conservative Party of Canada proposing negative COVID-19 test results as an alternative to allow unvaccinated people to travel (Aiello 2021). The Conservative Party lost the election, and their leader attributed much of the result to the issue of vaccine mandates (Fife and Chase 2024).

The federal mandates took effect on October 30, 2021, and provincial and territorial governments followed with their own announcements. Generally, these governments mandated vaccines for health-care workers and those working in long-term care and in some provinces later extended mandates to all public service employees. Finally, with national vaccination rates below 85% of eligible people and with cases rising as Canadians moved back to indoor environments at work and school, several provincial governments created proof-of-vaccination entry requirements (vaccine passports) that required members of the public to show vaccination

records to enter restaurants, bars, entertainment centers and other businesses. Most of these requirements were in place or enacted by November 1, 2021, just before the Omicron wave hit Canada and before the third-dose booster recommendations were clear.

Early modeling estimated that the announcement of provincial and federal mandates sped up the rate of new vaccinations, especially in provinces with a short timeline between announcement and enforcement and where initial vaccination rates were lower (Karaivanov et al. 2022). Additional analysis suggests that mandates increased vaccine uptake between 3% and 8%, depending on the initial vaccination rate in the province (Maquiling et al. 2023). While vaccine mandates helped reduce hospitalizations and deaths from COVID-19, opposition started to grow in the fall and winter of 2021 (Miller 2022; Wynoch and Zhang 2022). The Omicron wave and other "variants of concern" were increasing COVID-19 case rates across Canada, and post-vaccination transmission was becoming evident. This, combined with incessant campaigns of vaccine-related disinformation, may have reduced the public's view of the vaccine's effectiveness (Bardosh et al. 2022). The federal election had politicized mandates, and provincial political commitment to implement mandates was uneven (Cukier 2021). Some provinces, such as Ontario, opted for a policy of "vaccination mandates, but not mandatory vaccinations," where the decision to require vaccinations or proof of negative COVID-19 test was left to individual hospitals and businesses (Ferguson and Benzie 2021). Other provinces, such as Alberta, reluctantly established mandates as pressure increased on hospital services (Leavitt 2021).

In early 2022, border crossings between Canada and the United States became a major consideration for national vaccination mandates. In November 2021, the US Department of Homeland Security announced that it would require two-dose vaccination for all travelers entering the United States via land and ferry (Department of Homeland Security 2021). While the border continued to be closed to nonessential travel, cross-border trucking continued, and the industry was given until January 22, 2022, to comply. Canada responded by imposing its own vaccination requirement for all travel, both at the US border and internationally. For most travelers over age 12, this was enforced on November 30, 2021. However, to prevent supply chain disruptions, the Canadian trucking industry was given until January 15, 2022 (Public Health Agency of Canada 2021b). In protest, truckers and others opposed to vaccine mandates blocked border crossings to the United States, including the Ambassador Bridge to Detroit, which accounts for approximately 25% of two-way traffic between the two countries (George-Cosh 2022). Several other groups began a convoy across Canada to protest in front of parliament in the nation's capital, Ottawa. Once there, the protest blocked several square blocks in the downtown core and created havoc for residents and the apparent inability of the police to enforce local bylaws. The protest in Ottawa and at border

crossings lasted for three weeks. To try and bring it to an end, the government of Canada declared a limited national emergency under the authority of the Emergencies Act to make it easier for police and other services to remove the protesters both in Ottawa and at the border. While there was broad public support for the government's decision, the Conservative opposition opted to take a more sympathetic position to the protesters in Ottawa, further deepening the partisan divide. The controversial decision was, as the law requires, later reviewed by a commission of inquiry, which found that the government met the threshold for invoking emergency powers (Rouleau 2023). Interestingly, in a separate case, the Federal Court held that the government of Canada's decision to deploy powers under the Emergencies Act was unreasonable and breached Canadians' Charter of Rights and Freedoms (*Canadian Frontline Nurses et al. v. Canada [Attorney General]* 2024). Not surprisingly, in the aftermath of the protest and as the number of cases fell, most provinces and territories ended their vaccine mandates between the last week of February and the first two weeks of March 2022. By June 20, 2022, all federal vaccine mandates were also removed.

Why?

To summarize, the Canadian experience with vaccination from 2020 to late 2022 is a mixed bag. On the one hand, governments worked quite well with each other and with local community organizations, so Canada achieved relatively high overall vaccination quickly once vaccines became available. On the other hand, Canada was overly reliant on foreign suppliers and governments were generally slow to identify and respond to the needs of historically marginalized communities. Over the first three years of the pandemic, not surprisingly, governments and public health officials made some poor choices and were required to amend or reverse certain decisions. Finally, beginning in 2021, vaccine mandates became a source of political polarization, albeit not on the scale of some other countries, notably the United States. Several factors help explain this mixed experience with COVID-19 vaccination.

First, public health state capacity in Canada is relatively strong and explains much of the success. While underfunded (Caldwell et al. 2021; Fiset-Laniel et al. 2020), public health governance is more effective than a generation ago due to changes made following the SARS crisis. Some observers raise concerns about fragmentation and a lack of coordination (see, e.g., Clark et al. 2023). There are real challenges with public health data sharing (Bubela et al. 2023). But for public health in general, governments in Canada have built strong coordination mechanisms that worked well at the outset of the pandemic (Lecours et al. 2021; Paquet and

Schertzer 2020). In the first several months of the pandemic, the prime minister and the provincial and territorial premiers met almost monthly, their health ministers met almost weekly, and officials, notably the federal chief public health officer and her provincial and territorial counterparts, were in constant, almost daily, contact (Public Health Agency of Canada 2020). For pandemic vaccination, intergovernmental cooperation and coordination were generally effective, vaccines were distributed quickly, and while policy and program choices differed somewhat across the country, government messaging was broadly consistent. Variations in policy and messaging result from the natural experiments that arise from crisis decision-making in a decentralized federation accentuated by the fact that "the science" was disputed and expert advisers interpret the evidence differently and in ways that reflect their local reality (Cassola et al. 2022; MacAulay et al. 2023). Variations in pandemic and vaccination policy and program choices also reflect the reality that, quite normally and arguably as they should, politicians come to different conclusions on how to balance scientific, social, economic, and, yes, partisan considerations.

That said, there are lessons to be learned and, in some cases, several ways to strengthen public health capacity in Canada. One intractable challenge is how to ensure that sufficient vaccines are available while at the same time avoiding overbuying and legitimate concerns about hoarding to ensure a more equitable distribution of vaccines between countries. The absence of a domestic vaccine production capacity reflects the longstanding Canadian strategy of relying on pharmaceutical companies to build this capacity in exchange for enhanced patent protection (Lee et al. 2023; Lexchin 2021; Ling 2021). The oversupply of vaccines in Canada and the resulting wastage undoubtedly reflects the simple calculus that, in purely domestic terms, it is preferable to be accused of doing too much rather than too little. But, as the pandemic demonstrated, this strategy undermines Canadian foreign policy and Canada's attempts to position itself as a progressive leader in global affairs (Brown 2022). The solution probably lies not in asking Canada or any other country to balance supply and demand more accurately but in finding ways to maximize supply and equitable distribution on a global scale. This means trying again to develop a better arrangement for sharing what will always be a scarce resource: vaccines at the outset of a pandemic. The voluntary, charitable model that underlies COVAX would appear to be insufficient for the task (Yoo et al. 2022). More importantly, equitable access to vaccines and other essential medicines will require changes to international trade rules to require better sharing of intellectual property and licensing of new vaccines. This is a global challenge. Unfortunately, Canada's negotiating position in the current World Health Organization negotiations of a new pandemic instrument suggests that Canada will not be a leader in this area (Fierlbeck et al. 2021). Extensive and sophisticated lobbying by Big Pharma means

that when it comes to creating a domestic vaccine capacity or changing the global rules on access to medications, major change is unlikely, at least in the short term (Fierlbeck et al. 2021).

Second, the COVID-19 vaccination experience in Canada underscores the importance of high levels of public trust in both the health system and the choices made by governments in addressing the pandemic threat. Early on, most Canadians were excited and eager to get vaccinated (Frank and Arin 2020; Tang et al. 2021). Yet by the middle of 2022, vaccination rates began to plateau and then decline for adults, especially children. Rates of childhood vaccination are also lower in Canada now than they were before the start of the COVID-19 pandemic (MacDonald et al. 2022). There are several possible explanations for this. While trust in government may rise and fall, in Canada, rates of vaccine hesitancy are associated with levels of trust in public health officials (Cooper 2023). Early in the pandemic, the chief medical officers of health and the federal chief public health officer were the subject of considerable and generally favorable public attention (M. Fitzpatrick 2020; MacAulay et al. 2022). Lower vaccination levels may reflect a generalized decline in the stature of senior public health leaders, who are increasingly the subject of strong criticism. Some feel they have not done enough to insist on continuing with strong public health measures, while other, more libertarian critics object to their role in enacting what are deemed to be onerous and unnecessary public health measures that unduly limit personal freedom and autonomy. Finally, in Canada and elsewhere, the decline in rates of COVID-19 vaccination that began in mid-2022 is also probably the result of the feeling that "the pandemic is over" (a feeling reinforced by the end of most COVID-related public health measures initiated by governments).

Third, the overall context of public health dramatically changed during the pandemic. Broad early public support for pandemic measures masked deeper disagreement coming from at least three directions. For example, people from Indigenous communities and racialized and disabled groups were more skeptical of public health messaging and government efforts to encourage, if not require, vaccination due to the historical and ongoing effects of racism and colonialism (Howard-Bobiwash et al. 2021; Mosby and Swidrovich 2021; Newman et al. 2022; Sebring et al. 2022). While local public health authorities and community organizations did a good job of finding ways of increasing vaccination rates, more work is required to learn from this and make that which was voluntary, spontaneous, and rather extraordinary into standard public health practice. A second example is that in Canada, as elsewhere, significant groups do not share the general deference to public health experts. Vaccine hesitancy is an ongoing reality and will not change as long as governments rely on a "knowledge deficit" model that assumes that if people knew more, they would embrace vaccination (Goldenberg 2016). Finally, the so-called "freedom convoy" revealed that a small but very vocal minority of Canadians are

deeply disaffected. Public opposition to vaccine mandates is a window to a larger and deeper social and political challenge. This challenge is made bigger because in Canada, as elsewhere, some political leaders have chosen to campaign on vaccination policies (and public health measures more broadly). The current leader of the Conservative Party of Canada has staked out a clear position in opposition to vaccine mandates, and the party is home to candidates who echo some of the disinformation about the pandemic and the vaccine response (Bailey and Walsh 2021; Tasker 2022). Similarly, the premier of Alberta, elected in 2023, has described those who chose not to get vaccinated as "among the most discriminated people in the world" and expressed support for opponents of government public health measures (Leavitt 2022). To some extent, this is a positive development, as it brings these debates into the political system. On the other hand, vaccine mandates may be a continuing wedge issue, and public health measures more broadly may become a dividing line in Canadian political discourse. The result will be that vaccination and public health more generally are no longer seen as largely apolitical and become an area of even greater social and partisan disagreement. This is not to say that public health is, or ever was, divorced from politics. That is impossible and undesirable. But considerable effort will be required to rethink public health governance in a world where vaccination becomes a dividing line between political parties. The willingness of large numbers of people to get vaccinated depends on public trust in the vaccines and the public health officials and governments that recommend their use. If vaccination becomes a partisan dividing line, rebuilding public trust in public health institutions and leaders will be that much more challenging.

Conclusion

The Canadian vaccine journey between 2020 and 2022 offers valuable insights into the challenges of governance during emergencies, the balance of global interdependence, and the unpredictability of public sentiment. Canada's agile intergovernmental cooperation and effective public health state capacity are significant strengths. This underscores the importance of having adaptive systems that learn from past missteps. The distribution of vaccines across the vast Canadian geography and the quick decisions to prioritize vulnerable and elderly populations and the nation's health-care workforce saved lives.

However, Canada's reliance on foreign vaccine supplies highlights the trade-offs between the long-standing bargain between government and the pharmaceutical industry designed to foster investment (Fierlbeck et al. 2021) and the twin challenges of meeting Canadians' needs in response to a public health crisis and the broader crisis of the inequitable distribution of essential medicines more generally. Perhaps the most profound

takeaway, however, is the impact of oscillating public trust. The journey from enthusiasm about vaccines to hesitancy and skepticism underlines the precarious nature of public trust in public health. Canada's struggles with addressing concerns of historically marginalized communities and managing the politicization of health mandates serve as a cautionary tale for any government. The erosion of trust in public health leaders and the impact of political posturing on essential health decisions spotlight the fragility of public sentiment in a charged environment. Canada's experience reiterates that public health can never be divorced from its sociopolitical context. The rise of movements opposing public health measures and the politicization of vaccination highlight the delicate balance between public sentiment, political opportunism, and public health decisions. Canada's future public health direction must integrate these lessons to regain public trust.

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14 | COVID-19 Vaccination in the United States

A Constrained Success

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The US Vaccine Policy: A Fragmented Approach

At the onset of the COVID-19 pandemic, much of the response in the United States focused on tertiary prevention measures: safe distancing, masking, and lockdowns. The initial strategy, out of necessity, was to "Stop the Spread": Federal and state governments alike implemented measures to limit the number of individuals exposed to the virus, with poor results (Singer et al. 2021). At the same time, the hopes of a long-term solution to containment rested with biopharmaceuticals and the development of a vaccine that was safe and effective (Guzman 2021). In President Trump's first televised addressed in response to COVID-19, in March 2020, he cited government spending to support vaccines (Trump 2020).

Although no vaccines for the COVID-19 virus existed in the early days of the pandemic, the United States had significant scientific infrastructure that positioned it to be a leader in the race to create an effective vaccine. Pfizer, Moderna, and Johnson & Johnson—three American companies—led the race to create a viable vaccine (Congressional Research Service 2021). So, with such technological might, expertise, and funding, why did a million Americans die in just two years of the pandemic (Johnson 2022b)?

The fractured public health infrastructure in the United States, as it often does, proved to be detrimental to the national vaccination campaign (Geyman 2021). At the national level, a lack of a cohesive plan for distribution hampered the initial advantage of American-produced vaccines (Hennigan et al. 2021). While the role of leadership during a national health crisis would normally be filled by the federal government, the Trump administration was neither prepared nor willing to do so (Rozenblum 2023). At the state level, differences in eligibility for the vaccine varied widely, and expected racial disparities in vaccine uptake began to surface (Siegel et al. 2022). The patchwork American health care system also complicated vaccine rollout nationally—despite vaccines being made free at the point of service (US Department of Health and Human Services 2023). A country in which 27.5 million Americans are uninsured (Tolbert et al.

2022) and 23% are underinsured (Collins et al. 2022), was, unsurprisingly, ill-equipped to handle such a strain on its medical system.

Some of the systemic issues related to the logistics of putting shots in arms dissipated as the Biden administration took control of the executive branch in 2021 (Biden-Harris Administration 2023). Unfortunately, this success would prove to be constrained. Institutional forces such as the judiciary (Supreme Court of the United States 2022), Republican state legislatures, and Republican governors blocked vaccine mandates that would have required millions of Americans to be vaccinated (National Academy of State Health Policy 2023). Individual political polarization also played a role, as many Republicans, distrustful of government in general, and the Biden administration specifically, saw vaccination as a partisan act (Golos et al. 2022). Misinformation from conservative politicians and on social media only fueled these divisions.

In this chapter we explore the timeline of vaccine production, distribution, rollout, and uptake in the United States. To do so, we explore the shift in strategy during the transition from the Trump administration to the Biden administration and how this change affected both the government response and the individual decision that millions of Americans made to get—or, critically, not to get—the COVID-19 vaccine. The American story is one of success, albeit constrained.

Vaccine Development: The United States at the Forefront

While the US healthcare system is marred by fragmentation and decommodification (Bambra 2011), extremely high levels of investment in pharmaceutical research and development make the United States one of the main epicenters of biomedical research in the world (Carpenter 2010). By virtue of these investments in pharmaceutical research and development, the United States was not surprisingly the site of three vaccine candidates: Johnson & Johnson, Pfizer, and Moderna. Ultimately, two of the primary, and subsequently most reliable, COVID-19 vaccines, Pfizer and Moderna, were developed and produced in the United States.

This foundational biotech enterprise set the United States, and ultimately the global vaccine trajectory, up for what was medically a wild success. Vaccine scientists in the United States had developed genetic technology decades prior to the COVID-19 pandemic, presenting the opportunity for an alternate kind of vaccine to be developed and, critically, to be developed in short time periods—unprecedented from anything seen before (Dolgin 2021). This technology—mRNA technology—allowed scientists to sequence a virus's genome and encode it in a piece of mRNA material. When a vaccine is given, the mRNA sends "instructions" to the body to make its own antigen response to the virus. This process not only is more effective in stimulating an antibody response compared to

older technologies, but also speeds up the vaccine development process by decades. Traditional vaccine technology relies on an attenuated version of a virus to generate an antibody response. The existence of mRNA technology in the United States allowed scientists to sequence COVID-19's genome and jump-start the vaccine development and production process in an unparalleled timeframe. It also allowed for many more competing vaccine candidates (Beyrer 2021; Dolgin 2021). Given this breakthrough success, which centered and took place in the US biomedical research industry, the United States would have presumably led the world in the most successful vaccine campaign, ending, or driving the end of, the pandemic.

As a result, the United States did have access to vaccines months before nearly all other countries in the world and before most other high-income democracies. Yet, as far as the types of vaccines approved in the United States, the Food and Drug Administration (FDA) had approved only three vaccines. By comparison, the European Medicines Agency in Europe approved four vaccines and Health Canada approved five (Falkenbach and Willison 2022). High levels of regulatory capacity and expertise in the FDA (Carpenter 2010) often make it an international point of reference for pharmaceutical approvals, even though standards of evidence are often higher (in the case of medical regulatory approval) (Van Norman 2016). In the case of COVID-19, regulatory gatekeeping and literal gatekeeping of vaccine supply by the United States incentivized and, in some cases, necessitated approval of less effective or in some cases riskier[1] vaccines in other countries while those nations waited on supplies of Moderna and Pfizer from the United States.

Ultimately, the United States ended up with millions of vaccines before nearly all other countries around the world (Our World in Data 2024). However, this amassing of essential pharmaceutical interventions against COVID-19 not only constrained access to crucial vaccine supplies for other countries—in particular Global South countries with limited health care capacity (Kavanagh and Singh 2023)—but also failed to sufficiently translate into a successful vaccination *campaign* in the United States.

Vaccinations: Distribution, Rollout, and Access

The COVID-19 vaccination strategy underwent massive shifts during the Trump and Biden administrations. What resulted was a patchwork approach, with poor rates of vaccination uptake, inequities across racial and ethnic groups, and increased political backlash against vaccinations in general.

Chronology

Operation Warp Speed (OWS) was the Trump administration's effort to partner public resources with private companies to speed up the process of vaccine developments. While OWS had some success in helping to support development of vaccines, this was more akin to a pyrrhic victory, due to the policy failures of the administration to support vaccine outreach and uptake.

OWS was formally announced by the Trump administration in the White House Rose Garden on May 15, 2020 (Congressional Research Service 2021), with $10 billion appropriated by the Coronavirus Aid, Relief, and Economic Security Act. A few days after the announcement of OWS, the Department of Health and Human Services (HHS) announced a joint partnership with AstraZeneca and an HHS agency, the Biomedical Advanced Research and Development Authority, to make 300 million doses of the vaccine (AstraZeneca 2020).

In December 2020, an advisory panel for the FDA approved the Pfizer and BioNTech vaccines through an emergency use authorization (US Food and Drug Administration 2020). Throughout the summer of 2020, the Trump administration had been partnering with pharmaceutical companies, pharmacies, and insurers to prepare for the initial rollout of vaccines. There was some initial success in the rollout of vaccines, with HHS announcing that the shots would be free at the point of service; by December 24, 2020, more than one million doses had been administered, with high-risk individuals, including healthcare workers and long-term care patients, designated as first to receive the dose (Thomas 2020).

Yet, the initial vaccine rollout was marred by several self-inflicted injuries. First, like the Trump administration's non-pharmacological interventions (Singer et al. 2021), the vaccine rollout was marked by confusion and conflicting plans. A report by the American Hospital Association found that there were 64 "microplans" in operation (Pollack 2021). These microplans, developed by states and municipalities, designated different rankings of individuals with preferences for receiving a shot, based on different criteria of essential workers, ages, and other demographic factors.

Second, policy decisions made by the Trump administration limited vaccine uptake and availability. Initially, produced and purchased vaccines were held back, because the distribution plan approved by the Trump administration wanted to ensure that individuals who received the first shot would be able to receive the second shot (Levin 2021). However, this placed an artificial choke point on vaccine distribution, with reserves of the vaccination sitting in freezers as millions of individuals remained unvaccinated (Sun et al. 2021). This policy was changed in the waning days of the Trump administration, as case counts and deaths surged, to allow vaccines to be disbursed to the general public. As he announced this policy change, HHS Secretary Alex Azar placed the blame on states, deeming

their "heavy handed micromanagement" as the cause for lagging uptake (Rodriguez 2021). Yet, at the same time, officials in HHS were lobbying Congress to withhold vaccine distribution funding for the states, raising concerns among state public health officials. Congress ultimately appropriated the needed funds, but the initial vaccine rollout was hampered by an acute lack of money (Rodriguez 2021). Vaccine availability was further hampered by shortages in vaccination purchasing strategy (LaFraniere et al. 2020). The Trump administration contracted with six pharmaceutical companies to purchase a set number of vaccines before approval, a strategy that sought to maximize the likelihood of purchasing an effective vaccine. Yet, this strategy also resulted in supply problems when the Trump administration rejected an offer to purchase additional doses of Pfizer (LaFraniere et al. 2020), allowing other countries to purchase the stock of shots.

From December 2020 through January 2021, the portion of the pandemic when Trump was in office, less than half of all distributed vaccines had been administered and only two million people had been fully vaccinated (Centers for Disease Control and Prevention 2023a). The central goal of the Biden administration was to reverse those trends. Prior to his inauguration, Biden set a goal of administering 100 million vaccines in the first 100 days of his presidency (Stolberg and LaFraniere 2020). The Biden administration met this goal more than a month ahead of schedule (Miller 2021). In response, Biden doubled this goal to administer 200 million vaccines, which they again met ahead of schedule (Murphy 2021).

The Biden administration introduced a multipronged approach to spur vaccination uptake, each of which either expanded on what the Trump administration had enacted or created new policies. This included vaccine mandates (or weekly testing) for large employers, federal employees and contractors, health care workers, and teachers; partnering with pharmacies and dialysis centers (White House 2021a) to provide scheduled and walk-in vaccination appointments (White House 2021b); purchasing additional stock of vaccines to fully vaccinate 300 million people (Stanley-Becker et al. 2021); and invoking the Defense Production Act to support vaccination production (Lupkin 2021). By the end of 2021, 95% of the population aged 65 and older and 62% of the total adult population were fully vaccinated (USA Facts 2023).

In September 2021, booster shots were approved for individuals over 65, as well as individuals who were at high risk due to comorbidities. The FDA expanded eligibility for boosters to all adults two months later (US Department of Health and Human Services 2021). In September, October, and December 2022, boosters were approved for the age groups 12–17 years, 5–11 years, and 6 months–4 years, respectively (Hause 2023). As of summer 2023, 17% of the total population had received a booster, with 43% of the population aged 65 and older and 20% of the

adult population receiving a booster (Centers for Disease Control and Prevention 2023a).

Vaccine uptake and the rollout plans were also marked by racial and ethnic disparities. From the beginning of the pandemic, both case counts and deaths due to COVID-19 have been higher for Black, American Indian/Alaska Native, and Hispanic individuals compared to Whites. Racial and ethnic disparities were evident in vaccine uptake as well, particularly during the earliest period of the vaccine. While the disparities narrowed over time, they have been replicated by booster vaccine uptake (Centers for Disease Control and Prevention 2023b), with Black and Hispanic individuals nearly half as likely to have received the booster compared to Whites. Similar disparities were evident for other high-risk populations, including individuals with disabilities (Ryerson 2021).

Vaccine uptake after the successful development of vaccines was impaired by partisanship and polarization (Kirzinger et al. 2021). Donald Trump was repeatedly booed during rallies after encouraging his supporters to get vaccinated (Smith 2021) or after mentioning that he had received the booster shot (Merica 2021). This response underscored the disparities in vaccine uptake based on partisanship. Researchers have found widespread partisan differences in vaccine uptake and intentions over time (Ben-Shahar et al. 2023; Block et al. 2022; Golos et al. 2022). Even before vaccines were approved for emergency use in the United States, Republicans were much more likely to indicate hesitancy at receiving the shot (Hamel et al. 2020). As vaccines were made broadly available to the public, the divide between Republicans and Democrats continued to widen (Liz Hamel et al. 2021). In April 2021, 42% of unvaccinated adults identified as Republican, compared to 36% as Democrats; by October 2021, 60% of unvaccinated adults identified as Republican, compared to 17% as Democrats (Kirzinger et al. 2021). The political polarization in vaccine uptake was shaped by the broader electoral politics of the 2020 general election, where Trump did not want to antagonize his base but also wanted to draw attention to the achievements of OWS under his administration (Rozenblum 2023).

Further limiting Biden's vaccination campaign was the role of the judiciary. All of the Republican-appointed members of the US Supreme Court struck down a vaccine mandate for all large employers, which would have required 84 million individuals to be vaccinated (Totenberg 2022). Additionally, federal courts blocked vaccine mandates for federal employees and federal contractors, leading to the Biden administration's revocation of the mandate after the public health emergency officially ended in May 2023 (White House 2023).

Without a federal approach to vaccine mandates, states created a patchwork of policies. Eleven states mandated that a public employee be fully vaccinated, while 17 states *banned* any mandate for public employees (National Academy of State Health Policy 2023). The rollout and uptake of

the vaccine then fell victim to so much of contemporary American politics—shaped and limited by partisanship and polarization, hindered by federalism, and ineffectual.

Famine in the Midst of Plenty: Explaining Limited Success

In order to understand the choices made by the Biden administration in the development and rollout of the COVID-19 vaccine strategy, we must look to two interrelated factors: the role of the Trump administration and the growing antidemocratic movement of the Republican Party in the United States, and the preexisting challenges of the United States' fragmented and low-capacity health care system. The Biden administration's COVID-19 vaccination strategy was necessarily influenced and constrained by the Trump administration. The vaccination strategy choices employed by the Biden administration sought to overcome the antipathy to public health measures sowed by the Trump administration and Republican Party (Simmons-Duffin and Huang 2022). Conservatives strategically leveraged mistrust in and opposition toward government—here, specifically hostility toward public health practitioners, bureaucrats, and public health policy interventions—in tandem with vaccine misinformation, as a tactic to further generate and mobilize support for their base coalition built on populist nationalism (Greer et al. 2022; Moynihan 2022). The Biden administration faced a double-edged sword in the development of their vaccine campaign: making up for very real public health failures to contain the pandemic and mitigate morbidity and mortality under the Trump administration, while simultaneously counteracting antidemocratic and anti–public health tactics and boosting vaccination efforts. To accomplish this feat, the Biden administration relied heavily on the idea that vaccination would end the pandemic, telling the American public in May 2021, "A July Fourth with your loved ones is the goal" (Cahill 2021). Ultimately, unprecedented levels of anti-government and antidemocratic sentiment leading to disparate policy approaches and vaccine uptake across the states and party lines, paired with a foundationally fragmented health care system engendering inequities and externalities, negatively influenced vaccine access and reduced the success of the vaccination campaign, with the United States having one of the lowest vaccination rates among high-income peer countries.

Mistrust in Public Health and Republican Authoritarianism

Vaccine hesitancy in the United States is an increasingly complicated issue given the rising influence and confluence of populist nationalism, the embrace of antidemocratic objectives by the Republican Party, mistrust

in government, and the anti-vax movement. Globally, high-income countries are broadly more vaccine skeptical, yet the United States has always had notably higher rates of vaccine skepticism or hesitancy compared to peer nations (Lunz Trujillo and Motta 2021). The ways in which the pandemic was leveraged for antidemocratic tactics by the Trump administration also affected vaccine hesitancy. Extremely high levels of politicization of COVID-19, or politicization of public health, within the political realm decreased the support for governmental messaging and evidence-based messaging (Gadarian et al. 2020; Mitchell et al. 2020).

The anti-vax movement in the United States has always been strong (Sorell and Butler 2022). Yet, the movement received a boost, and took a turn, after gaining momentum and mobilization from the populist radical right agenda of the Trump administration (Singer and Willison 2021). The modern anti-vax movement in the United States began as a movement among wealthy liberals (Lillvis et al. 2014). Yet, in 2020 at the height of COVID-19 vaccine policy debates, vaccine skepticism was highest among conservative or Republican Americans (Wright 2021). Populism, and specifically the right-wing nationalist populism that gained traction in the early 2000s in the United States, further spurred and taken up as a platform by candidate and then president Donald Trump, ensconces anti-government sentiment around perceived threats to what is the "true" identity of a nation (Howell and Moe 2020). In the United States, nationalist populism increased as racial resentment and animus rose among White Americans against racialized groups (Jardina 2019), as backlash toward economic concerns and perceived threats to status quo racialized hierarchies after the election of Barack Obama (Mutz 2018; Williamson et al. 2011). Populism challenges the legitimacy of governing regimes, including governing officials, both elected and unelected, as a mechanism to further question the integrity and representation of the government for whom the movement has identified as the "true" identity of the country (here, White Americans). The resulting threats to institutional legitimacy may have adverse consequences for bureaucrats in their ability to carry out their policy tasks. In the case of COVID-19, anti-government sentiment was consequential for public health officials charged with protecting public safety, including developing and administering vaccine policy, where vaccine skepticism became a tool of the populist radical right movement (Moynihan 2022).

Over the past nearly two decades, mistrust in government has grown substantially (Doherty et al. 2015). In 2016 the Trump campaign ran on a platform of populist radical right rhetoric, denouncing existing norms, political institutions, and processes and stoking public opinions of racial resentment and economic threat to garner support (Lacatus 2019). Here, populist nationalism both promoted racialization and undermined democracy by simultaneously sowing discontent in the legitimacy of government and prompting outgroup threat to racialized demographics,

which played a key role in politicizing the pandemic. During his time in office, President Trump regularly incited blame against racial and ethnic minority groups for "causing" the pandemic. Such racialized overtones further flamed anti-government protests over public health measures, increasing animus and genuine threats to public health bureaucrats (Gollust et al. 2020; Ward et al. 2022). In the first year of the pandemic, supporters of President Trump stormed local and state government buildings, homes of elected officials, and homes of appointed public health officials, in armed protests against governing officials and COVID-19 policy (Ecarma 2020). New research has found increasing rates of support for violence, anti-government sentiment, and authoritarianism, among Trump supporters and increasingly among the Republican Party, all strongly predicted by ethnic antagonism (Bartels 2020).

A key part of the anti-government tactics leveraged by the Trump administration during the first year of the pandemic was the broad, high-level misinformation campaigns about the risks and realities of the COVID-19 pandemic (Gollust et al. 2020). Importantly, Republican Party members continued widespread use of misinformation regarding COVID-19 after Donald Trump left office (Gadarian et al. 2022). Social media and the lack of regulation or monitoring of anti-vaccine and COVID-19 misinformation on social media sites were further integral to conservatives' misinformation campaigns.[2] Specifically, on social media, elected government officials in the Trump administration and the Republican Party were able to actively share and spread COVID-19 misinformation (Columbus Associated Press 2021; Singer et al. 2021; Weisman and Stolberg 2021). Ultimately, the ongoing promotion and proliferation of misinformation about COVID-19 risks, public health policies and measures, and vaccination contributed to increasing vaccine skepticism and hesitancy among Americans, with concentrated effects among conservatives and thus conservative states and localities (Golos et al. 2022; Kirzinger et al. 2021).

The use of anti-government tactics alongside vaccine misinformation is part of an active, authoritarian political strategy among the Republican Party and broadly among contemporary conservatives in US politics. Specifically, the strategy is an explicit effort to destabilize the federal bureaucracy and sow further discontent in political institutions as a tactic to retain support for their coalition. Furthermore, dismantling the federal bureaucracy is also a mechanism for retaining additional power and thwarting accountability mechanisms attempting to check or manage concentrated power, a strategy often used in authoritarian regimes (Bauer and Becker 2020; Moynihan 2022). In many ways, the conservative dismantling of the federal bureaucracy began with COVID-19, when the CDC was, in an unprecedented move, sidelined from pandemic policymaking in favor of an elected official, Vice President Mike Pence. After the 2020 election, any COVID-19 policy moving forward would have to contend with these active, antidemocratic efforts and their aftereffects.

When President Biden took office in January 2021, the new administration had the task of continuing vaccine rollout and broadening the rollout to the entire population. Yet this task was built on the backbone of well-organized Republican opposition to public health and vaccines (Adolph et al. 2020; Gadarian et al. 2022). Critically, as a first-order affair, the Biden administration sought to make up for the gross failures under the Trump administration to contain the pandemic due to lax or broadly absent public health measures (Singer et al. 2021). Biden's broad sweeping use of the public health bureaucracy for the vaccination campaign was also an effort to tackle both the anti-government sentiment—even stronger after the January 6 insurrection—and the strong anti-vaccination misinformation. In an effort to protect public health and restore trust in government and the public health bureaucracy, the new public health campaign under President Biden pursued a robust, fast-tracked vaccination strategy. All Americans were guaranteed vaccine eligibility by May 1, 2021, with a hope to return to a "new normal" by July 2021 (Cahill 2021). Compared to other high-income democracies, the United States had a far greater and expedited supply of vaccinations. Yet, other countries with fewer or slower supplies ultimately exhibited far higher rates of vaccine uptake, such as Canada, Denmark, and Germany, among many other countries (Falkenbach and Willison 2022; Kavanagh and Singh 2020). Higher levels of trust in government, specifically in the public health bureaucracy, mediate vaccine uptake (Macaulay et al. 2021). The Biden administration's efforts were mired by the antidemocratic tactics of the Republican Party, organized around COVID-19 politicization and polarization, engendering low levels of trust and high levels of vaccine hesitancy across the country, particularly in conservative jurisdictions.

Fragmented Welfare State and Vaccine Access

Amid unprecedented contemporary threats to public health institutions and policies, the Biden administration still had to contend with what would have always been a long-standing challenge to any vaccine campaign in the United States: the US health care system. Where finding out how to get vaccinated would have always been challenging, the confluence of this fragmented administrative state alongside targeted misinformation and animus toward public health policy and practitioners, and COVID-19, further inhibited the success of the vaccine campaign.

Vaccine *access* includes the ability to navigate or gain access to systems of care, pay for care, and physically receive care (Falkenbach and Willison 2022). Despite the Biden administration's lofty efforts to help patients navigate access to vaccines and ensure vaccines were free of charge regardless of insurance status, long-standing barriers of fragmentation and inequality were difficult to overcome. The US healthcare system is infamous for

its complexity and inequality, with the country spending more on healthcare than any other nation yet having the highest rate of uninsurance compared to any other high-income democracy (Berchick et al. 2019). Where spending on health care has remained high and grown exponentially since the latter half of the 20th century, spending on public health has been precipitously cut (Himmelstein and Woolhandler 2016). As a result, key preventative public health bureaucracies are notoriously underfunded, constraining their capacity to carry out programming. Spending on public health infrastructure at the federal and local levels was cut by nearly 20% during the Trump administration (Krisberg 2020).

Access to health care services in the United States is notably affected by low welfare state generosity (Bambra 2010), including constraining access to routine vaccines (W. Williams et al. 2017). While the Biden administration made COVID-19 vaccines free of charge, many Americans were unaware of this benefit because of the historic challenges regarding the ability to pay for, and thus access, medical care (Morris 2021). Furthermore, decades of low and insufficient funding for public health departments constrained the rollout of vaccine programs (NACCHO 2024). Specifically, hindered public health resource capacity negatively affected the ability to effectively staff and implement communication and outreach programs to low-income and minority groups. Overcoming barriers to vaccine access for low-income and marginalized groups is essential. Low-income and racialized communities often face substantial barriers navigating access to healthcare services, including time, transportation, and administrative barriers, all of which may restrict vaccine access (Michener 2018). In the late spring of 2021, more than half (55%) of unvaccinated Black adults and almost three-quarters (64%) of Hispanic adults were concerned about having to miss work due to vaccine side effects, and over half of Hispanic adults were concerned about having to pay out-of-pocket costs for vaccine access (Kaiser Family Foundation 2021).

Critically, despite the time lag, the reduction in administrative barriers to access COVID-19 vaccines, including cost, did improve vaccination rates overall (Simmons-Duffin and Huang 2022; Wallender et al. 2023; C. Williams et al. 2023). Importantly, disparities in vaccination status by race and ethnicity disappeared in the fall of 2021 and were eclipsed by disparities in vaccination status by *partisanship*, with levels of vaccination lowest among Republicans (Galston 2021).

Conclusions

The United States has always had a complicated relationship with vaccinations (Dubé et al. 2021). Historically, this has stemmed from a mistrust in science and medicine, whether due to misinformation surrounding long-term side effects or a legitimate history of racial mistreatment in the

American medical system (Yearby et al. 2022). The COVID-19 pandemic marked a turning point, in that the government and politicians played a major role in Americans' decision of whether to get vaccinated.

Critically, the Trump administration spearheaded Operation Warp Speed, an initiative that benefited both the United States and the rest of the world in terms of vaccine development (Government Accountability Office 2021). However, this initial advantage was diminished by the lack of a comprehensive approach to vaccine disbursement (Hennigan et al. 2021). Choosing Vice President Mike Pence to serve as the lead of the nation's pandemic response, not purchasing enough doses in 2020, and implementing a faulty strategy in getting shots in arms slowed down the initial rollout of vaccines in the United States. Add to this the racialization of the virus and the sowing of misinformation from President Donald Trump—the head of the executive branch—and the prospect of slowing the death rate from COVID-19 down from the equivalent of one 9/11 per day seemed unlikely (Johnson 2022a).

The Biden administration's catchy "100 Million Shots in 100 Days" campaign was the beginning of a shift in the United States' strategy to end the COVID-19 pandemic. If the virus was to be endemic, the only way to reduce the number of deaths as life settled into a new normal was to give ordinary Americans lasting protection against the virus. To accomplish this goal, the administration dealt with numerous structural and societal challenges. From an access perspective, the vaccine rollout faced a health care system in which millions of Americans do not routinely receive care due to being uninsured or underinsured (Centers for Disease Control and Prevention 2020; W. Williams et al. 2017). Routine vaccination after childhood was also an unfamiliar concept in the United States prior to the pandemic; less than half of the American population received the flu shot prior to the pandemic (Centers for Disease Control and Prevention 2020). The administration and states also faced partisan challenges stemming from misinformation and legal and political challenges to vaccine mandates.

While the United States successfully combated many of these challenges during the national vaccine campaign—today more than 270 million Americans have received at least one shot of a COVID-19 vaccine (Centers for Disease Control and Prevention 2023a)—this success was constrained by the fractured and underfunded welfare state in the country, as well as a growing trend of right-wing populism that emphasizes mistrust of government. It is difficult to estimate the full effect that these challenges to vaccine uptake had on the death toll in the United States, though the number is likely in the hundreds of thousands (Simmons-Duffin and Nakajima 2022). Preventing a similar outcome during the next infectious disease outbreak in which the virus does not have a ready-made vaccine will require preplanning. Public health institutions must be sufficiently funded, even when a crisis is not actively occurring. The patchwork of health care access points must be linked and made accessible for

Americans of all demographics. Perhaps most importantly, government officials must find a way to instill trust in American public health institutions, invest in initiatives that dispel misinformation, and limit the power of political polarization on health outcomes. It is not hyperbole to say that lives depend upon it.

NOTES

Acknowledgments: The opinions expressed in this chapter are the authors' own and do not necessarily reflect the views of the US Government Accountability Office.

1. Concerns related to increased risk of blood clots and the Astrazeneca vaccine led to decreased use and eventual removal of the vaccine from the approved options (Dyer 2023).

2. Facebook and YouTube did not agree to retract posts containing misinformation about the coronavirus or the COVID-19 vaccines until fall 2021.

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15 | COVID-19 Vaccination in Brazil

Coalitions to Defend Against Obstructionism

Elize Massard da Fonseca and Jessica A. J. Rich

Brazil was among the countries most affected by the COVID-19 pandemic. It ranked third globally in terms of confirmed cases, surpassed only by the United States and India, and has had the second-highest death toll attributed to COVID-19 (Mathieu et al. 2020). When vaccines became available in January 2021, the country was grappling with a high death rate and the threat of a new variant (P.1) that had been identified in Manaus (Sabino et al. 2021).

Brazil was well equipped to deliver COVID-19 vaccines. Historically, the country has had high immunization coverage and one of the most successful vaccination programs in the world. Despite its continental size, Brazil has built an impressive infrastructure and achieved impressive health outcomes (Domingues et al. 2012). However, as happened with the initial wave of the pandemic, the COVID-19 vaccination effort became entangled in fraught political conflict.

President Jair Bolsonaro undermined all stages of the vaccination program. He interfered in vaccine procurement, impeding the Ministry of Health from purchasing doses that were made in partnership with the Chinese developer Sinovac. He also spread misinformation about vaccines and discouraged pediatric vaccination, fueling the country's anti-vax movement.

Nevertheless, Brazil achieved solid COVID-19 vaccination coverage relatively quickly. By July 2021, seven months after the start of the campaign, hospitalizations and deaths from COVID-19 in the country had decreased markedly (Percio et al. 2022). What happened?

The country overcame formidable political and institutional hurdles thanks to the support coalitions that not only facilitated local vaccine production but also staunchly defended the national immunization program using diverse strategies in multiple arenas.

This chapter begins by analyzing Brazil's strategy to acquire and regulate vaccines. The next section discusses how the Brazilian government approached COVID-19 vaccination and the challenges associated with that approach. The third section analyzes the elements that explain Brazil's success in immunizing its people against COVID-19. The chapter

concludes with lessons for future analyses and for the Brazilian health-care system.

Vaccines

Brazil's strategy for accessing COVID-19 vaccines combined local production, emphasizing technology transfer, with other forms of procurement. These vaccine decisions occurred in the context of fraught political conflict, as President Jair Bolsonaro disrupted vaccine procurement in many ways. Therefore, although purchasing vaccines was historically coordinated by the Ministry of Health (Domingues et al. 2012), Congress and state governments played important roles in the process during the COVID-19 pandemic.

Brazil was the first low- or middle-income country to procure COVID-19 vaccines, concluding an agreement with AstraZeneca on August 6, 2020, to locally produce 90 million doses, which would cover 21.3% of its population with a first dose.[1] After a thorough prospecting investigation of COVID-19 vaccine candidates, the Brazilian health ministry opted to partner with Oxford-AstraZeneca for three reasons: their vaccine was the most advanced in clinical trials; the health ministry's main public laboratory, BioManguinhos, had experience with the technological platform; and AstraZeneca was willing to transfer the manufacturing knowledge (Fonseca et al. 2023). By mid-2021, the AstraZeneca/BioManguinhos partnership was responsible for more than 50% of vaccines distributed in Brazil. Although President Bolsonaro was a well-known vaccine skeptic, the Oswaldo Cruz Foundation (Fiocruz) was able to form a coalition of congressmen, philanthropists, and pro-vaccine agents within the state to support the agreement, as we describe in the penultimate section of this chapter.

A public laboratory from the state government of São Paulo, Instituto Butantan, advanced a local production initiative as well, through an agreement with the Chinese biopharmaceutical company Sinovac Biotech. The Sinovac vaccine used inactivated SARS-CoV-2 virus, a well-known technological platform with which Butantan had experience from producing rabies and dengue vaccines (Batista 2020). Through the agreement, Brazil conducted phase 3 clinical trials of its novel vaccine candidate and took charge of the final stages of production in Brazil (fill-and-finish steps). Because the agreement with Sinovac was a state government initiative, however, the governor did not have the authority to promote a comprehensive procurement strategy for Brazil's health-care system. Initially, the purchasing commitment involved coverage in the state of São Paulo, with the possibility of expanding it nationally at the discretion of the Ministry of Health. Yet President Bolsonaro viewed the governor of São Paulo, a political rival, as a threat due to the visibility he gained for the partnership

with Sinovac. Consequently, only in the face of vaccine undersupply and a Supreme Court ruling did the Bolsonaro administration agree to include the Butantan-Sinovac product in the national vaccination strategy.

Although technology transfer for local production was an important feature of the Brazilian approach, the health ministry needed to expand vaccine procurement as well, because Butantan and BioManguinhos could not rapidly fulfill vaccine demand on their own. Initially, the health ministry entered contract discussions with Pfizer, beginning in July 2020. These discussions stalled, however, due to disagreements over the number of doses, the designated jurisdiction for resolving disputes, and Pfizer's demand for protection against any claims from citizens in the event of adverse reactions (Al Jazeera 2021). Frustrated with the delay, given that the Pfizer vaccine was the first to receive market authorization in the UK and the United States, governors and congressional representatives pressured the health ministry to enter a deal with Pfizer (Câmara dos Deputados 2020). Only in March 2021 did the Ministry of Health complete a contract for 100 million doses (on Pfizer's terms, enabled by a change in Brazilian legislation that assigned Brazilian states and municipalities responsibility for adverse events).[2]

Like most countries, Brazil also signed an agreement with the COVAX Facility, in September 2020, which would procure doses covering 10% of the population. However, the health ministry viewed COVAX as a backup to their primary objective of procuring vaccines through local production and technology transfer. Such efforts, if successful, would allow the country access to more doses at a lower price and absorb novel knowledge on vaccine production—a strategy that has long been used in Brazil (Fonseca, Shadlen, and Bastos 2021).

Prompted by delays in local production due to slowness in regulatory authorization, in procuring vaccines from Pfizer, and in deliveries from COVAX, a coalition of state governors, Congress, and civil society actors pressured the health ministry to pursue contracts with additional suppliers from Russia and India and urged the regulatory agency to expedite the review process (Vargas and Barcellos 2021). Later, however, a congressional investigation found evidence of corruption in the Ministry of Health contract with Indian and Russian vaccines. Ultimately, the National Health Surveillance Agency suspended imports of both vaccines.

By July 2021, Brazil had procured vaccines from four different suppliers (BioManguinhos/AstraZeneca, Butantan/Sinovac, Pfizer, and Janssen) in addition to the COVAX Facility and had initiated discussion on importing vaccines from India and Russia that were lately suspended (Fonseca, Davidian, et al. 2021). Information on vaccines procured and produced in Brazil between 2020 and July 2021 indicates that the vaccine with the highest price was Covaxin (from Bharat Biotech, India), at USD 15 per dose (table 15.1). The contract was suspended based on the recommendations of the federal auditing institution due to procurement process inquiries.

TABLE 15.1. Procurement and Production of COVID-19, Brazil (September 2020–July 2021)

Supplier	Vaccine	Technological platform	Volume millions	Value per dose (US$)	Total value millions (US$)	Acquisition
Pfizer-BioNTech	Pfizer	mRNA	100	10	$5,630.06	Mar. 2021
Pfizer-BioNTech	Pfizer	mRNA	100	12.25	$5,630.00	May 2021
Fiocruz/AZ	ChAdOx1 nCoV-19	viral vector	100	3.16	$1,703.79	Aug. 2020
Fiorcruz/AZ Serum Institute	Covishield	viral vector	2	5.44	$59.86	Jan. 2021
Butantan	Coronavac BRA	inactivated vaccine	54	10.82	$3,142.80	Feb. 2021
Butantan	Coronavac CHI-BRA	inactivated vaccine	46	10.82	$2,677.20	Jan. 2021
Covax Facility	AstraZeneca/Pfizer	various	43	10.55	$2,421.90	Sept. 2020
Janssen	Janssen	viral vector	38	10	$2,139.40	Mar. 2021
Procurement						
Supplier	Vaccine	Technological platform	Volume millions	Value per dose (US$)	Total value millions (US$)	Acquisition
Bharat/Precisa	Covaxin	inactivated vaccine	20	15	$1,614.00	Feb. 2021
União Química/ Gamaleya	Sputnik V	viral vector	10	12.47	$693.60	Mar. 2021

Source: Adapted from Fonseca, Davidian, et al. (2021).

The second most expensive vaccine was the Russian Sputnik V, negotiated at nearly USD 13 per dose. The Oxford-AstraZeneca vaccine had the lowest cost, ranging from USD 3 to USD 5 (the vaccine produced in BioManguinhos or the Indian Serum, respectively). The main suppliers of COVID-19 vaccines in Brazil were Pfizer-BioNTech, AstraZeneca and BioManguinhos, and the Butantan and Sinovac partnerships. However, the agreement with Pfizer involved deliveries throughout 2021. Until July 2021, 15.5 million doses had been delivered, and a contracted 200 million doses were expected by the end of 2021.

Finally, Brazilian universities developed several research projects to produce a new vaccine (Hallal 2021), two of which progressed to clinical trials. However, investment in science and technology was reduced considerably during the Bolsonaro presidency, which, together with his administration's anti-science approach, explains Brazil's failure thus far to produce an indigenous vaccine despite the country's leading role in previous epidemics and recent efforts to strengthen its pharmaceutical base (Flynn and Fonseca 2023).

Brazil's health regulator, Anvisa, was responsible for market authorization (Peres et al. 2021). Anvisa is among the most stringent health regulatory bodies in Latin America, where it serves as a reference agency (Pan American Health Organization 2021). During the pandemic, however, the agency quickly adjusted its internal procedures to speed the process. Anvisa made officials available on short notice for unscheduled meetings with vaccine developers. It created new regulatory pathways, such as rolling submission, which allowed developers to submit documentation as clinical trial results were being released. It also expanded emergency use authorization to include the entry of novel vaccines. Yet Anvisa, too, became caught up in political conflict. During the approval process for pediatric vaccines, President Bolsonaro attacked the agency, arguing that too few children had been dying to justify vaccination and threatening to publicly identify officials who approved pediatric doses (Martins-Filho and Barberia 2022). These presidential attacks fueled anti-vaccination movements.

Vaccinations

Brazil began to roll out COVID-19 vaccinations on January 17, 2021, almost a month after its peers in Latin America (Argentina, Chile, and Mexico). Despite the delay in initiating the vaccination campaign, Brazil quickly caught up with other middle-income countries as soon as the first vaccine was authorized.

The National Immunization Program (Programa Nacional de Imunizações, or PNI) is historically one of Brazil's most successful public health programs and the flagship of the National Public Health System. The Min-

istry of Health defines the vaccination campaign, while states are responsible for coordinating it, and municipalities execute the vaccination in their jurisdictions. Brazil has impressive cold chain logistics, with 27 state-owned cold network facilities, 273 regional cold network centers, and more than 38,000 immunization rooms at the local level (reaching 50,000 during vaccination campaigns). Annually, this network distributes 300 million doses of the 47 vaccines the PNI offers (Ministerio da Saude 2022). In 2020, the Technical Advisory Committee on COVID-19 Immunization was created to advise PNI decisions on COVID-19 vaccination. This committee included representatives of subnational governments, the Brazilian Society of Immunizations, and others (Ministerio da Saude 2021).

The Ministry of Health was thus well prepared to conduct a mass immunization campaign. The ministry released the first version of its COVID-19 vaccination strategy on December 12, 2020, before any COVID-19 vaccine was authorized. This initial version stipulated that immunization would begin with health professionals, the elderly, patients with comorbidities, and other individuals with increased vulnerability—an approach that aligned with the World Health Organization's framework for the allocation and prioritization of COVID-19 vaccination (World Health Organization 2020). The Brazilian plan also included truck drivers and public transportation professionals, due to a strong lobbying effort by truck drivers for preferential vaccine allocation (Brito 2021).

The health ministry faced criticism over the first version of its plan for not providing adequate details, such as a definition of what constituted health-care professionals entitled to vaccination (Werneck et al. 2021). As a result of this absence of national guidance, state and municipal governments had to operationalize the Ministry of Health's guidelines locally, establishing their own definitions and logistics.

As soon as immunization started, the Ministry of Health modified the plan to include other priority groups. For example, lobbied by the Ministry of Defense and the Brazilian National Confederation of Industry, the health ministry requested that military service members and industry workers be treated as a priority too (Cancian 2021; Sassine 2021). By February 2021, the "priority" population had increased by more than 50% to 77.2 million people (Werneck et al. 2021). Other relevant adjustments were the inclusion of urban cleaning workers as a priority group in the sixth version of the plan (April 2021), the expansion of vaccination to all adult populations in May 2021, and pediatric vaccination starting in October 2021. Brazil began offering booster doses for the elderly population in August 2021. Ultimately, the National Immunization Program on COVID-19 was updated 14 times between 2020 and September 2022.[3]

Complicating the situation, President Bolsonaro undermined the National Immunization Plan by discouraging vaccine uptake. He made alarming statements suggesting that vaccines could have dangerous side effects, such as turning people into "crocodiles," referring to possible side

effects of Pfizer's vaccine (Daniels 2021). He suggested the vaccine could give people HIV. Bolsonaro declared that he himself would not take the vaccine. And he was emphatic that Brazil would not use "the Chinese vaccine," thereby discrediting Sinovac's vaccine (Gullino 2021).

Bolsonaro further undermined the National Immunization Plan on COVID-19 by attempting to disrupt vaccine regulation. Vaccination in Brazil is not compulsory, but federal and subnational governments were allowed to restrict and sanction unvaccinated individuals, such as by forbidding their entrance into restaurants or disqualifying them from receiving certain benefits. When Anvisa recommended that the Ministry of Health request vaccine certificates for incoming travelers to Brazil, Bolsonaro publicly criticized the agency for proposing a vaccination passport, lamenting: "Anvisa wants to close the country's airspace now. Not again, damn it" (Reuters 2021). Again, the Supreme Court was forced to act, ruling that all travelers arriving in the country would have to show proof of vaccination against COVID-19.

In mid-2022, President Bolsonaro attempted to reverse the decision to expand vaccination to children aged 5 to 11 years old. Speaking to his constituency, Bolsonaro criticized the decision, arguing that "children have not been dying in a way that justifies a pediatric vaccine" (Martins-Filho and Barberia 2022). He also consistently cast doubts on the effectiveness and safety of COVID-19 vaccines for children (Martins-Filho and Barberia 2022). Moreover, he threatened to publicly identify the officials responsible for approving pediatric doses. Because of President Bolsonaro's pressure, the Ministry of Health guidelines specified that only individuals legally responsible for a child could bring them for vaccination and that written authorization was required in the absence of the responsible adults. The guidelines further specified that children had to remain at the vaccination site for 20 minutes to observe possible side effects. According to specialists, these guidelines communicated a degree of distrust that had never been observed in previous vaccination campaigns in Brazil (Fernandez et al. 2022).

Bolsonaro's public statements about the dangers of vaccines undermined vaccine confidence and, thus, the population's willingness to receive vaccinations. A survey of COVID-19 vaccine acceptance across 23 countries found that COVID-19 childhood vaccine hesitancy increased by 56.3% in Brazil between 2021, when COVID-19 vaccines for children were awaiting regulatory approval, and 2022 (Lazarus et al. 2023). Another study showed that there was a greater resistance among Brazilians toward vaccines from China and Russia compared to vaccines from the United States and England. The rejection of Chinese vaccines was especially prominent among Bolsonaro supporters (Gramacho and Turgeon 2021). A similar finding of an association between political views and vaccine hesitancy was reported by Paschoalotto et al. (2021). Yet vaccine hesitancy was still not the majority opinion, even if it spread under Bolsonaro.

Brazil's National Immunization Program also faced equity challenges in vaccination. Brazil is a continent-sized country marked by profound inequalities. Several studies have mapped the demographic, geographic, and socioeconomic inequalities in COVID-19 immunization among Brazilians. Although vaccination began slowly in all municipalities, as soon as it had gained momentum, vaccination rates diverged between jurisdictions with high and low human development indices (HDIs). Municipalities with low or medium HDIs had lower vaccine coverage in relation to those with higher HDI. Municipalities with fewer Black residents and higher per capita gross domestic product accounted for higher vaccine uptake (Boing et al. 2023). Inequalities were also observed in Indigenous populations, who tend to be at greater risk during public health crises, because their territories are located in remote areas and because the Indigenous population has historically faced barriers to accessing health-care services (Pescarini et al. 2023). However, such inequalities were mitigated by the presence of primary health care. The authors concluded that primary health-care coverage guaranteed more equitable vaccine access in vulnerable locations (Bastos et al. 2022).

Despite these challenges, more than 80% of the Brazilian population was fully vaccinated (with either two doses or a single dose, depending on the vaccine) within two years, by 2023, and 50% had received a booster dose. Among children aged 5 to 11 years old, more than 86% were vaccinated with two doses (or a single dose).[4] With the election of President Luis Inacio Lula da Silva in 2022, and the nomination of Nisia Trindade, the former president of Fiocruz, as health minister, the Ministry of Health listed expanding vaccination coverage (to COVID-19 and others) as one of its priorities in 2023, particularly among children and vulnerable populations. In the following section, we discuss why and how the National Immunization Program succeeded in vaccinating so much of the population despite the challenges we outlined.

Why?

As the previous sections suggest, the president was a vocal opponent of COVID-19 vaccination who spread misinformation about vaccine side effects and disrupted procurement. Nevertheless, Brazil achieved relatively rapid and solid COVID-19 vaccination coverage. By July 2021, seven months after the start of the campaign, it was possible to observe a reduction in hospitalization and deaths from COVID-19 in the country (Percio et al. 2022). What happened?

We argue that Brazil's success in accessing COVID-19 vaccines and broad vaccination can be attributed to the actions of supporting coalitions that promoted local vaccine production and pushed forward the immunization campaign in the face of presidential obstruction. We explored these

arguments elsewhere (Fonseca et al. 2023; Rich et al. 2024) and summarize them here.

Why Brazil Achieved Local Vaccine Production

Brazil's choice to pursue local vaccine production was driven by opportunities based on the country's preexisting pharmaceutical infrastructure, including the capacity to produce viral vectors and inactivated vaccine technologies. In particular, Brazil's main public laboratories, Fiocruz and Butantan, had long experience with technology transfer. Because both are major suppliers of the PNI, partnering with vaccine developers in the production process was an opportunity to gain rapid and broad access to novel vaccine technology. However, these partnerships required legal and financial support. Obtaining such support was a challenge in the context of the Bolsonaro administration, whose main approach to the pandemic was to deny its severity.

Brazil's laboratories obtained legal backing and funding for local vaccine production by lobbying a broad spectrum of political actors for support. Fiocruz sought legal backing by requesting a risk analysis from the Institute of Applied Economics (a consultative body of the federal government), as well as by petitioning the Attorney General's Office and officials of the Ministry of Finance to vouch for the tech transfer contract. Fiocruz pursued funding by taking advantage of politicians' interest in learning more about the technology transfer project. During a visit by congressional representatives to BioManguinhos in July 2020, Fiocruz's officials expressed concerns about funds pending approval from the Ministry of Finance. When returning to Brasília, members of Congress negotiated with the Ministry of Finance to allocate funds for the technology transfer (Agência Câmara 2020). Ultimately, Fiocruz's lobbying efforts proved successful: Bolsonaro allocated USD 97 million to Fiocruz (*Medida Provisória* 994/2020) despite his obstructionist rhetoric (Fonseca et al. 2023).

Butantan obtained support from the governor of São Paulo, João Doria, to facilitate negotiations with the Chinese vaccine producer Sinovac (Borges and Rennó 2021). Using an economic development office in Shanghai, initially set up in 2019 for the state of São Paulo to attract Chinese business investment, representatives from the São Paulo–based Butantan Institute held a series of in-person meetings with representatives from the Sinovac laboratory (Instituto Butantan 2020). Although Bolsonaro heavily criticized Butantan's negotiations with Sinovac in the press, starting a Twitter campaign called #chinesevaccineNO, Butantan was shielded from Bolsonaro's attacks because it was funded by the state of São Paulo. Ultimately, Doria helped Butantan succeed in enticing Sinovac to conduct clinical trials in Brazil and to send the drug substance for Butantan to produce Coronavac vaccines locally.

Fiocruz and Butantan generated backing for their local production ini-

tiative not just from political actors but from commercial agents as well. Itau Bank and Ambev/Inbev, Brazil's largest banking company and brewing companies, respectively, provided funding to help the BioManguinhos laboratory adapt its infrastructure so that it could produce the AstraZeneca vaccine (Medeiros et al. 2022). This was the first and largest philanthropic donation ever made in Brazil, with funds coming from the companies themselves (Trindade 2020). A coalition of 35 corporations contributed BRL 170 million (USD 33.5 million) to help the Butantan laboratory produce the Coronavac vaccine (Caseff 2021). The Lemann Foundation, a Brazilian philanthropic organization, sponsored AstraZeneca's clinical trials in Brazil (Fundação Lemann 2020). Itau Bank, through Todos pela Saude—an initiative created during the pandemic—allocated funds to Butantan to build a new facility, with a level-3 biosafety laboratory to produce COVID-19 vaccines and other products with high manufacturing risk. Private businesses provided the Unified Health System (SUS) with operational support as well. For example, Ambev, one of the largest firms in South America, directed its own logistics team to help BioManguinhos obtain the necessary supplies and equipment for COVID-19 vaccine production (Medeiros et al. 2022).

Why Brazil Achieved High Vaccination Rates

While Brazil had the physical infrastructure for distributing vaccines—even in hard-to-reach areas—Bolsonaro was attacking the SUS's ability to ensure vaccine uptake. Historically, Brazil has had a strong culture of vaccination and trust in the PNI (Domingues et al. 2012). Yet, as seen in the previous section, Bolsonaro undermined pro-vaccine messaging by spreading misinformation targeted at diminishing public trust in vaccines. To counter Bolsonaro's messaging, civil society groups across the country mobilized information campaigns in support of vaccination.

Some civil society groups mobilized broad media campaigns to publicly support vaccination. A crucial network was the Todos pela Vacina (All for Vaccines), a pro-vaccination movement led by the Pro-Vaccine Union (academics from the University of São Paulo and science institutions), the COVID-19 Observatory (a network of scientists and health professionals that mobilized at the onset of the pandemic), and the UN initiative Team Halo (a group of 100 scientists who came together to tackle misinformation on safety and effectiveness of COVID-19 vaccines). Todos pela Vacina promoted informational campaigns, including podcasts, visual arts, games, and other materials to inform and engage the population. Of particular importance was the network's Twitter campaign, which received more than 50,000 interactions supporting vaccination.[5] Medical associations, celebrities, and businesses also promoted vaccination campaigns (Filippe 2021). During the disputes on pediatric doses, three medical societies—the Brazilian Society for Immunization, the Brazilian Society

for Pediatrics, and the Brazilian Society for Infectious Diseases—voiced support for initiating child vaccination[6] and joined forces with the Todos pela Vacina movement.

Civil society groups were particularly important in promoting vaccination campaigns and information for vulnerable populations such as those living in favelas (Abers and von Bülow 2021). While some groups repurposed their focus during the pandemic, others were specifically created to respond to the health emergency. Examples of such initiatives included disseminating information in community newspapers and flyers, through vans with loudspeakers, and via door-to-door walks through the community to hold face-to-face conversations. They also used digital communication strategies such as podcasts tailored to the favela communities, and favela-based social media influencers produced videos and posts calling on the community to vaccinate. Remarkably, a group from Rio de Janeiro developed a smartphone application to counter misinformation by providing daily updates and notifications regarding infection cases and fatalities within the neighborhood.

In parallel, other groups mobilized to provide digital information to impoverished and isolated communities. Indigenous organizations distributed cell phone cards and installed Wi-Fi in areas with poor connections. The magnitude of civil society involvement in the pandemic response prompted research activists to survey various civil society campaigns emerging nationwide. By the beginning of 2021, one such mapping project had pinpointed over 1,300 grassroots campaigns and more than 800 university-led campaigns (Abers and von Bülow 2021).

In the end, Brazilians made a resounding choice to follow the guidance of public health experts over following the president's guidance based on misinformation. Although Bolsonaro's anti-vaccine cues suppressed the public's expressed willingness to get vaccinated at the outset, Brazilians' willingness to get vaccinated increased from 73% to 91% between December 2020 and May 2021 (Datafolha Instituto de Pesquisa 2021). This vaccine willingness includes Brazilians of all ethnicities, income levels, and party affiliations, including many Bolsonaro supporters. Only those Bolsonaro supporters who self-identify as "far-right" *and* "very strong" expressed vaccine hesitancy after May 2021 in ongoing Datafolha surveys (Datafolha Instituto de Pesquisa 2021).

As vaccine production increased during the summer of 2021, the number of vaccines administered per capita nearly tripled, with Brazilians eager for vaccinations lining up to receive them. Vaccines administered per 100 people rose from 33.28 in July 2021 to 92.19 in September 2021. By August 2022, 88% of Brazil's adult population had received at least one dose of the vaccine and 81% were fully vaccinated. Even Brazil's Indigenous populations, whose hard-to-reach territories had been specific targets of attack under the Bolsonaro administration, achieved high vaccination rates. By October 2022, 90% of Indigenous adults had received at least

one dose and 85% had received at least two doses (Prange 2020). These vaccination rates are equal to that of high-income countries such as New Zealand and the Netherlands and are well above that of the United States, where 79% had received a first dose and only 67% were fully vaccinated (Holder 2022).

Most importantly, when the Delta variant hit Brazil in October 2021, the country experienced lower transmission levels of COVID-19, possibly due to the expansion of vaccination in combination with acquired immunity from previous variants (Alcantara et al. 2022). Similarly, in January 2022, the third wave of the virus coincided with the introduction of the Omicron variant, resulting in a sharp peak in prevalence. As in other countries, Omicron led to an increase in cases and deaths across all regions in Brazil, but it quickly declined, reflecting the effects of the vaccination program (Alcantara et al. 2022).

Conclusions

Despite Brazil's controversial response during the first wave of the pandemic and Bolsonaro's continuous disruption of vaccination efforts, the country succeeded in immunizing people against COVID-19. Without a doubt, the country's existing capacity and infrastructure for production and distribution were indispensable in acquiring and deploying vaccines; but on their own, these factors would likely not have secured a successful outcome. Fiocruz's and Butantan's ability to mobilize support within and outside government institutions proved critical for the local production and timely delivery of COVID-19 vaccines. Furthermore, civil society—from grassroots organizers to wealthy philanthropists—mobilized to counteract misinformation spread at the highest levels and defended the National Immunization Program through various channels.

These findings invite us to reflect on, first, the role of politics in local drug production—a variable that is often neglected and undertheorized in the literature on access to medicine and vaccines in low- and middle-income countries. Support for local production within and outside government is not a given, nor is its value widely acknowledged. Moreover, corruption in public procurement is widely feared in these contexts. Therefore, we need politically informed analyses that identify the mechanisms affecting people's support for local production. In Brazil's case, Fiocruz and Butantan relied on their reputation as established suppliers for the PNI and as institutions that could harness broad coalitions to support their projects (Fonseca et al. 2023).

Second, we should reflect on the importance of coalitions that include civil society and non-state actors in promoting health system resilience in the face of political obstruction. Although we know about civic organizations' importance in informing communities and implementing public

health campaigns (Fraser et al. 2021), researchers need to further explore their role in cultivating resilient health systems. Civil society can help build trust in government policies, as it did during Brazil's COVID-19 vaccination campaign, and feedback loops for established policies, such as the PNI. Trust and a sense of community ownership are crucial components of resilient health systems (Blanchet et al. 2017).

Brazil urgently needs to restore immunization coverage. Since 2016, there has been a drop in vaccination coverage for children, disrupting a previously stable trend of high vaccination rates (Domingues et al. 2023). Data for other age groups—adolescents, adults, and senior citizens—are also worrisome (César et al. 2020). Therefore, it is imperative that public administrators, vaccine developers, scientists, and civil society coalesce and mobilize to continue supporting the immunization program and vaccination campaigns.

NOTES

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1. Brazil was followed by Vietnam, which procured 50 million doses on August 14, 2020; next, Kazakhstan procured 2 million doses on August 26, 2020.

2. Pfizer's contract was publicly available for ten days on the Ministry of Health website.

3. In between the different versions of the National Immunization Plan, the Ministry of Health published technical notes to clarify and offer additional guidance on the COVID-19 vaccination strategy. After September 2022, instead of updating the plans, the Ministry of Health opted for updating the guidelines by issuing technical notes only.

4. "Ministério da Saúde—Vacinômetro COVID-19," https://infoms.saude.gov.br/extensions/SEIDIGI_DEMAS_Vacina_C19/SEIDIGI_DEMAS_Vacina_C19.html (accessed July 11, 2023).

5. "A campanha na mídia," https://www.todospelasvacinas.org/imprensa/a-campanha-na-m%C3%ADdia (accessed August 3, 2022).

6. "Posicionamento SBIm/SBI/SBP sobre a vacinação de crianças de 3 a 17 anos contra a Covid-19 com a vacina Sinovac," https://sbim.org.br/images/files/notas-tecnicas/carta-divulgacao-sbim-sbi-sbp-anvisa-coronavac-criancas-180122.pdf (accessed August 3, 2022).

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16 | COVID-19 Vaccination in Argentina

Politics, Capabilities, and State Visions

Gabriela Bortz, Maria Cecilia Sanmartín, and Anabel Marin

On March 19, 2020, Argentina declared COVID-19 a national health emergency under Decree 297/2020. The health crisis posed a significant challenge to the country, exacerbated by limited resources, glaring inequalities, and a 42% annual inflation rate (Perrota 2020; *The Lancet* 2021).

In Argentina, the right to health care is enshrined in the National Constitution (Art. 42). With health products considered "social goods" (Santos 2018), before COVID-19, the country had established the most complete national vaccination calendar in the region, offering over 20 mandatory vaccines free of charge to all residents. Argentina boasts one of the highest rates of vaccine trust globally, with 94% of the population expressing confidence in vaccines in 2019 (Fundación Bunge y Born 2022). The availability of COVID-19 vaccines became one of the most pressing claims by citizens to the national government during the health emergency.

Amid a chronic economic crisis, significant economic constraints[1] tensioned vaccine negotiation and procurement. Vaccination campaigns started slower than in other countries reported in this book. In February 2021, only 0.62% of the population (289,000 people) was partially vaccinated and 0.26% fully vaccinated. It progressed gradually, reaching 30% and 20%, respectively, by September 2021. By the end of 2021, 65% of the population had at least one dose and 44% were fully immunized, while by the end of 2022, most of the population was vaccinated (90% and 75%, respectively).

To secure vaccine access, the government pursued multiple avenues simultaneously. First, it engaged in negotiations with various countries and companies, resulting in agreements for 12 different vaccines from seven companies. Second, leveraging its strong tradition in biomedical research and the expertise of the National Administration of Medicines, Food, and Medical Technology (ANMAT), Argentina positioned itself as a reliable clinical research testing site for vaccines developed by major pharmaceutical companies (Bortz and Sanmartín 2025). Third, the country aimed to bolster its local manufacturing capabilities by forging technological partnerships with international firms. This was facilitated by Argentina's extensive manufacturing experience, over a century of supplying the public health system

and four decades of domestic leadership in industrial biotechnology (Stubrin 2022; Cortes et al. 2012). Last, Argentina prioritized investment in research and development (R&D) and clinical trials for new vaccine candidates, aligning with narratives of technological sovereignty. By 2021, four vaccine candidates received funding from Argentina's National Agency for the Promotion of Research, Technological Development and Innovation (Agencia I+D+i). By late 2022, one candidate had advanced to phase 2/3 of clinical trials after passing phase 1.

This chapter delves into Argentina's experience with COVID-19 vaccines and vaccination processes, drawing out key lessons. Despite facing severe economic challenges and constraints, the country managed to achieve widespread vaccination primarily through pragmatic negotiation strategies with global health actors and suppliers. This was facilitated by Argentina's culture of health accessibility and vaccine confidence, surpassing novel vaccine risks, as well as its preexisting capacities across various domains such as industry, regulation, clinical research, health logistics, and biomedical sciences. Moreover, a coordinated realignment of these capacities played a crucial role in effectively addressing the pandemic.

Vaccines

In August 2020, Argentina marked a crucial step in its vaccine acquisition efforts with AstraZeneca's agreement for technology transfer and manufacturing with mAbxience, an Argentine company devoted to biosimilar development and production that belonged to the Insud Group (MoH 2020d). This agreement involved transferring technology from Oxford and aimed to produce between 150 and 250 million doses of the vaccine's active ingredient in Argentina. Additionally, Mexico's Liomont, integrating the Slim holding, would handle filling and finishing. AstraZeneca's aim was to expand global manufacturing capacity in response to COVID-19, with its vaccine offering advantages like lower purchasing costs[2] due to Oxford's licensing conditions and easier distribution logistics compared to other options requiring ultrafreezers, scarcely available in peri-urban and rural areas countrywide (Mendonça et al. 2021).

In the last quarter of 2020, as the first global vaccine candidates emerged, the Ministry of Health (MoH) initiated simultaneous negotiations with various vaccine suppliers. Despite Argentina becoming a preferential clinical testing site for Pfizer, initial disagreements with Pfizer-BioNTech over acquisition terms delayed these negotiations (Blanco 2020).[3] On December 24, 2020, the country received its first vaccine, Sputnik V, developed by Russia's Gamaleya Institute. Similar to AstraZeneca's technology, Sputnik V utilized genetically modified adenovirus for expressing the SARS-CoV-2 spike protein. At this stage, Sputnik V offered

advantages such as thermostability, adaptability to new variants, and potent immune response generation (Mendonça et al. 2021).

Agreements were sealed with seven firms or institutions to assure access, including the Serum Institute of India, for ChAdOx1 nCoV-19 (Feb. 17, 2021), followed by ChAdOx1 nCoV-19 (AstraZeneca, UK) through the COVAX mechanism (first arrived, March 28, 2021). These would soon be followed by the Chinese Sinopharm (first arrived, Apr. 21, 2021) and CanSino (first arrived, Aug. 6, 2021).

By April 2021, despite the Argentinean government's advance purchase of 56 million vaccine doses, only 5 million had arrived due to logistical challenges. The AstraZeneca vaccine, produced by mAbxience-Liomont, faced delays. The first two batches of the vaccine's active ingredient were shipped to Mexico in January and February 2021 for over 6 million doses. Manufacturing challenges at the Liomont laboratory in Mexico led to the completion of the vaccines (fill-and-finish stage) at AstraZeneca facilities in New Mexico.

The first shipment of Latin American–manufactured ChAdOx1 nCoV-19 vaccine arrived in Buenos Aires on May 29, 2021, amid the Delta variant crisis. Throughout 2021, mAbxience manufactured 210 million doses, with 22.5 million allocated to Argentina, covering 75% of the agreed AstraZeneca supply. Richmond Laboratories' agreement with Gamaleya facilitated vaccine supply through technology transfer agreements, with the antigen provided by Gamaleya and the formulation, fill, and finish conducted in Argentina, for which the company built new manufacturing facilities. Local manufacturing became crucial after supply interruptions of the Sputnik vaccines during the second quarter of 2021. Richmond Laboratories began delivering locally manufactured Sputnik V doses on August 11, 2021, totaling 7 million by April 2022, when local manufacturing ceased due to pandemic relief efforts.

The United States–based mRNA vaccines, despite regulatory harmonization facilitating approval, were the last to be available in Argentina. Moderna's vaccine arrived first through a US donation on July 17, 2021, and was first purchased on December 22, 2021, following approval for pediatric use. Pfizer-BioNTech's vaccine, approved in December 2020, arrived on September 8, 2021, amid pressures for pediatric vaccination. To procure 40 million vaccine doses (20 million each from Pfizer and Moderna), the Argentinean government secured a loan from the World Bank, as per Decree 431/2021 issued on July 2, 2021. Table 16.1 systematizes all the vaccines that were applied in Argentina, their suppliers, technology choices, date of regulatory approval and arrival to Argentina, the number of doses that were purchased, the amount spent and the price per dose that was agreed.

While the MoH negotiated vaccine supply, the Ministry of Science, Technology, and Innovation (MINCyT) and the Agencia I+D+i introduced new funding instruments to support R&D efforts addressing the health

TABLE 16.1. Systematization of the Vaccines Arrived in Argentina

Vaccine	Supplier	Technology	First approved Arg.	First arrived in Argentina	Compromised dose	Delivered dose	Amount spent	Price/ dose	Effectiveness
Sputnik V (Gam-COVID-Vac)	Gamaleya Institute (Russia)	Non-replicative viral vector	Dec. 24, 2020	Dec. 24, 2020	30,000,000	22,000,000 (14.6 imported from Russia; 7.7 million manufactured by Richmond Lab)	US$223 million	US$9.95	91.6%
ChAdOx1 nCoV-19 vaccine (AZD1222)	Serum Institute (India) / Covishield	Non-replicative viral vector	Feb. 9, 2021	Feb. 17, 2021	26,00,000	30,000,000 (22.5 manufactured by mAbxience; 580,000 AstraZeneca-Covishield, Serum Institute; 3,000,000 AstraZeneca, UK/ WHO/Covax; 2,200,000 donated by Spain, Aug.–Oct. 2021; 800,000 donated by Mexico; 550,000 by Canada, Sept. 2021)	US$119 million	US$4	70%
	Oxford-AstraZeneca (UK)		Dec. 30, 2020	March 2021					
	AstraZeneca (mAbxience- Liomont)		—	May 29, 2021					

Sinopharm	Beijing Institute of Biological Products (China)	Inactivated virus	Feb. 22, 2021	Apr. 21, 2021	30,000,000	32,000,000	US$340 million	Batch 1: US$20; II: US$15; III: US$9; Covax: US$5	79.3%
Convidecia (Ad5-nCoV)	Beijing Biotechnology Institute and CanSino Biologics Inc. (China)	Nonreplicating adenovirus type 5 viral vector	June 10, 2021	Aug. 6, 2021	5,400,000	2,000,000	US$29 million	US$17	65%
Spikevax	Moderna (US / Moderna Switzerland GmbH)	Messenger RNA	Oct. 4, 2021 (pediatric use)	July 17, 2021 (US donation)	40,000,000	21,000,000	US$338 million	US$21.5	94%
Bivariant Spikevax® Original / Omicron BA.4/ BA.5				Dec. 22, 2021		(3,500,000, US donation)		US$12.25 (pediatric dose)	
Comirnaty (Pfizer-BioNTech COVID-19 Vaccine)	Pfizer-BioNTech (US)	Messenger RNA	Dec. 20, 2020	Sept. 8, 2021	40,000,000	24,000,000	US$292 million	US$12	95%
Pediatric Comirnaty Bivariant Comirarty (Original/Omicron BA.4-5)			Dec. 20, 2020	Sept. 8, 2021					

Source: Authors' own elaboration.

crisis. During 2021–22, Argentina had developed six homegrown COVID-19 vaccine candidates (summarized in table 16.2). The most promising was ARVAC, developed through a partnership between the Institute of Biotechnological Research of the Universidad Nacional de San Martín, the National Science Council, and the private pharmaceutical company Laboratorio Pablo Cassará. By December 2022, ARVAC successfully passed phase 1 clinical trials and received funding to advance to phase 2/3. Based on recombinant protein technology (analogous to Hepatitis B and HPV vaccines, both manufactured in the country, the former by Cassará), it was positioned as a safe, traditional option suitable for pediatric vaccination and booster doses, and it also expected a faster approval by ANMAT, achieved in October 2023. It incorporates variant changes to enhance protection against new virus variants (Pasquevich et al. 2023).

TABLE 16.2. COVID-19 Vaccine Development and Manufacturing

Vaccine	Institution	Technology	Development status (Dec. 2022)	Funding
Vaccine development				
ARVac "Cecilia Grierson"	IIB-UNSAM, CONICET, Laboratorio Pablo Cassará *Supporting:* Fundación Pablo Cassará, Centro de Medicina Comparada de la Universidad Nacional del Litoral (CMC-UNL), F.P. Clinical Pharma, Nobeltri, INBIRS-UBA, CEMIC, and others.	The recombinant protein technology utilized in the ARVac vaccine is deemed "safe and traditional," anticipating faster approval by ANMAT.	Completed phase 1, advancing to phase 2/3 of clinical trials	Agencia I+D+i, Laboratorio Pablo Cassará.
Santa Fe Vaccine	CONICET, Universidad Nacional del Litoral, Cellargen Biotech, Biotecnofe	Recombinant proteins. Virus-like particles platform for vaccine manufacturing.	Pre-clinical trials	Agencia I+D+i
CoroVaxG.3	Leloir Foundation Institute, CONICET, Vaxinz *Supporting:* ANLIS-Malbrán, CMC-UNL.	Single-dose formula, based on human adenovirus vectors.	Pre-clinical trials	Agencia I+D+i, Securitas VC

ArgenVac221	CONICET and Universidad Nacional de La Plata. *Supporting:* Gihon, CMC-UNL.	Nanoparticles of SARS-CoV-2 protein fractions.	Preclinical trial	Agencia I+D+i
INTA Vaccine	Veterinarian Nanomedicine Laboratory, INTA Bariloche, Bagó Laboratories	Uses as a vehicle a gene coding for a portion of the SARS-CoV-2 Spike protein delivered through dendritic cells. Based on a technology patented in 2018 by INTA Bariloche that generated immunity to coronavirus in mice.	Pre-clinical trials	Laboratorios Bagó, INTA
S-Vac	IBBM-UNLP—VacSal	Recombinant protein (SARS- CoV-2 Spike protein)	Pre-clinical trials	Agencia I+D+i
Vaccine local manufacturing				
Covishield	mAbxience, Liomont (Mexico) (transferred from AstraZeneca)	IFA manufacturing	70 million doses (half of what was agreed, *El Pais*, 2021)	Grupo Insud
Sputnik V	Richmond Laboratories (transferred from Gamaleya)	Formulation, fill and finish	9 million doses	Richmond Laboratories, Ministry of Productive Development, private investment through a trust fund

Source: Author's own elaboration.

Vaccination Process

The first confirmed case of COVID-19 in Argentina was on March 3, 2020. By December 30, 2020, all 24 provinces were affected, with 1,613,928 confirmed cases and 43,163 deaths (MoH 2020a). The MoH, in coordination with the National Immunization Commission (CoNaIn), devised an immunization strategy for the vaccination campaign. Two potential scenarios were considered: The first would start in December 2020 with 16 million doses of Sputnik V and Pfizer vaccines, followed by 10 million Sputnik V doses in January and 2 million Pfizer doses in February 2021. The second

scenario, less optimistic, aimed for 20 million Sputnik V doses in January 2021, followed by 1.5 million Pfizer doses in February 2021. In both scenarios, AstraZeneca vaccines were expected in March/April 2021, either through direct procurement or via COVAX (Burton et al. 2023).

The vaccination strategy also included a territorial approach tailored to local conditions, efficient financial resource management, training processes, and adaptation of human and physical resources while adhering to protocols. Monitoring, supervision, and evaluation of the strategy were essential, requiring capacity mobilization to execute a campaign 130% larger than any prior vaccination effort in the country (Comisión Técnica Asesora de Salud 2020). Despite challenges such as social fear and limited political resources for the newly elected government, technical expertise contributed to decision-making (Andrenacci 2023). Multilevel governmental coordination and collaboration with key actors were crucial, given Argentina's constrained state financing capabilities.

In December 2020, as the first vaccines neared arrival, the MoH released the Strategic Plan for COVID-19 Vaccination (MoH 2020b). Its primary aim was to ensure nationwide vaccine availability, free of charge, to cover the entire target population equitably. Vaccination was voluntary, with citizens required to register in their jurisdiction's vaccination register for follow-up and notification of the availability of the second dose. Despite a strong vaccination culture in Argentina and 90% positive intentions toward COVID-19 vaccination (Fundación Bunge y Born 2021), the gradual availability of vaccines differed from initial expectations.

Vaccination process governance was overseen by the national government through the MoH, with input from other governmental sectors and representatives from the Federal Health Council (COFESA). COFESA was responsible for planning and implementing the vaccination strategy in all 24 federal jurisdictions based on national guidelines, covering planning, organization, execution, registration, and follow-up. The CoNaIn provided nonbinding recommendations based on scientific evidence, lending legitimacy to decision-making through scientific expertise. While the National Immunization Program provided a foundation, the scale of the vaccination effort required substantial operational support amid the country's severe economic crisis. This included allocating budget resources for equipment, logistics, and human resources, with an estimated cost of around USD 53 million. Additionally, over 36,000 personnel were trained for vaccine administration and supporting staff (around 80,000 people). Other measures included developing web services for registration and follow-up, refurbishing 7,749 vaccination sites, and implementing countrywide logistics for vaccine distribution (MoH 2020b).

The Strategic Plan for COVID-19 Vaccination prioritized population groups based on exposure risk, susceptibility to severe complications, and the need to safeguard socioeconomic activities and vulnerable populations. Guided by bioethical principles of equality, dignity, and equity, the

plan emphasized vaccine availability (MoH 2020b). Priority groups included health personnel, elderly individuals, security forces, those with comorbidities, and educational workers. The operation aimed to administer 55 million doses to cover 23–24 million people (52% of the population) who corresponded to these groups. However, this strategy unfolded amid global demand and supply crises for vaccines and medical supplies and an unprecedented price escalation, exacerbated by logistical challenges in Argentina due to its vast territory and lack of infrastructure for storing vaccines requiring ultra-low temperatures.

Vaccination in Argentina commenced on December 29, 2020, with the first batch of 3,000 Sputnik V doses distributed to critical health workers. Aerolíneas Argentinas, the national airline carrier, played a significant role in transporting vaccines throughout the campaign, fostering national pride (*Página 12* 2020; MoH 2020c). However, concerns over the credibility of the Sputnik V vaccine persisted. Before its arrival, ANMAT, globally recognized for health surveillance, had to expedite the authorization of Sputnik V due to its absence of a harmonized regulatory framework. In December 2020, a delegation of the MoH and ANMAT visited Gamaleya's facilities, ensuring compliance with Good Manufacturing Practices rules, and granted emergency approval for the vaccine's use. To bolster trust in Sputnik, prominent politicians and public figures publicly received the vaccine (InfoBAE 2020). Public confidence received a boost following the publication of a study in *The Lancet* in February 2021, affirming the vaccine's safety and efficacy at 91.6% (Logunov et al. 2021). At the same time, a scandal erupted in February 2021 when influential personalities were vaccinated out of turn, reducing confidence in the vaccine and the vaccination process.[4] This resulted in the health minister's resignation and the appointment of the vice minister to lead the vaccination campaign (*TELAM* 2021).

Amid delays, the campaign progressed slowly but steadily from January 2021 to May 2021, targeting high-exposure health personnel, elderly individuals, security forces, adults with comorbidities, educational workers, and adults over age 60.

In the first half of 2021, Argentina faced distressing challenges with the emergence of the Delta variant. Slow vaccination rates exacerbated the impact of this highly infectious variant, leading to record daily cases and deaths by June 2021. By June 30, the country recorded up to 32,000 daily contagions and 674 deaths per day, reaching 4.5 million confirmed cases and 94,304 deaths, tripling preimmunization figures, becoming one of the hardest hit countries by the pandemic, and the third highest with the most deaths (12.16 per million) in the world (Our World in Data 2021).[5] Amid strained health-care systems and social exhaustion, the much-expected arrival of mAbxience-Liomont and CanSino vaccines boosted vaccination efforts from June to August 2021, targeting adults aged 18–59 without comorbidities. By August, six vaccines were in use (Sputnik-Gamaleya,

Sputnik-Richmond, ChAdOx1-UK, Covishield-India, ChAdOx1-mAbxience, Sinopharm, and CanSino). Donations of Moderna vaccines enabled pediatric vaccination from August, followed by Sinopharm vaccinations for children aged 3 to 11 from October. The vaccination campaign helped regain control over the pandemic in the latter half of 2021 (Andrenacci 2023).

Delays in Sputnik V vaccine supply prompted Argentina to explore heterologous vaccination schemes, combining it with more readily available AstraZeneca and Moderna vaccines.[6] Limited evidence at the time prompted cautious consideration, although some countries had implemented similar "mix and match" approaches (Ekin 2021; Gavi 2021). From July to August 2021, an interdisciplinary team led by the MoH evaluated the safety and efficacy of 15 vaccine combinations in 1,314 volunteers. Based on interim results released on August 4, 2021, Argentina announced the use of heterologous schemes (Pascuale et al. 2022). While the Pan-American Health Organization (PAHO)—the WHO's regional office for the Americas—and the WHO's initial stance remained cautious, awaiting further evidence (Aug. 25, 2021), by December 2021, WHO confirmed the safety of these schemes (Dec. 16, 2021).

Table 16.3 illustrates the progression of Argentina's vaccination campaign, depicting a gradual increase from 7.4% fully and 1.5% partially vaccinated in March 2021 to 65.3% and 44.3%, respectively, by September 2021. The introduction of AstraZeneca-mAbxience and Sinopharm vaccines in the second quarter accelerated the campaign, with weekly vaccine applications peaking at 400,000–500,000. By December 2021, mRNA vaccines boosted immunization rates, with 86% fully and 84.3% partially vaccinated (two-dose scheme). As of December 2022, a three-dose vaccination scheme had reached 75.8% of the population, as vaccination fatigue and the milder nature of COVID-19 lowered vaccination rates toward additional doses.

Why?

Procurement and Application

Since the onset of the pandemic, COVID-19 vaccines emerged as a critical scientific and industrial endeavor, with countries vying to address the global health crisis and secure market capture (Balawejder et al. 2021; Zhang 2021). Developed nations, primarily Big Pharma companies, dominated vaccine design and production, exacerbating geopolitical disparities and dependence on vaccine imports (Blinder et al. 2021). Governments worldwide scrambled to secure vaccine access amid fierce competition. In Argentina, negotiations with vaccine suppliers were complicated by global shortages and the need for advance payments amid

TABLE 16.3. Vaccination Progression in Argentina

Date	Administered doses	Partially vaccinated	% partially vaccinated	Fully vaccinated	% fully vaccinated	Dose per population
Feb. 2021	409,466	289,573	0.63	119,830	0.26	0.01
Mar. 2021	4,103,789	3,399,096	7.38	704,591	1.53	0.09
Sept. 2021	52,771,364	30,069,964	65.31	20,388,010	44.28	1.15
Dec. 2021	78,305,842	38,824,066	84.32	39,779,251	86.39	1.70
Dec. 2022	112,898,202	41,426,840	89.97	34,801,527	75.58	2.45
Aug. 2023	116,058,221	41,180,811	89.44	38,079,010	82.70	2.52

Source: Authors' elaboration based on Our World in Data (2023) and Rodillo (2023). Rates by a total of the population were calculated considering 46,044,703 habitants informed by the 2022 National Census.

economic constraints and legal restrictions on large-scale foreign currency purchases. To facilitate vaccine procurement, Law 27,573 was enacted in November 2020, declaring of public interest the R&D, manufacture, and acquisition of COVID-19 vaccines; designating the MoH as the main authority for negotiations; and enabling emergency authorizations by ANMAT for vaccines deemed safe and effective. However, concerns arose over clauses granting jurisdiction to foreign courts, advance payments outside traditional bidding schemes, indemnity against vaccine-related claims, and tax exemptions on vaccine procurement (da Fonseca et al. 2021).

In January 2021, as vaccines began arriving, Argentina faced a challenging social backdrop. The country grappled with soaring poverty rates, reaching 42% nationally and 51% in Greater Buenos Aires, alongside a notable increase in indigence to 10.5% (INDEC 2020). This economic strain compounded the pressure on an already burdened health-care system and on fatigued health-care workers (Richaud et al. 2022). Additionally, political divides reemerged, diluting the initial sense of social unity observed at the onset of the pandemic (Bracco and Porta 2022). Against this backdrop, the arrival of vaccines symbolized a national mission, reinforcing Argentina's sovereignty and commitment to safeguarding citizens' health as a fundamental right. This sentiment was epitomized by images of vaccine shipments brought home by Aerolíneas Argentinas (*Página 12* 2020; MoH 2020c). With the commencement of vaccine distribution, the execution of the Strategic Plan for COVID-19 Vaccination began.

Vaccines emerged as highly contested political artifacts (Winner 1979; Joerges 1999), reflecting deep political divisions. While there was a strong overall trust in vaccine technology and science (Fundación Bunge y Born 2022; Scharager and Gallino 2022), debates centered on *which* vaccine to trust, particularly regarding the choice of Sputnik V. Political mistrust, worsened socioeconomic indicators, and confidentiality surrounding vaccine contracts fueled skepticism, especially among opposition groups. Disagreements over Sputnik V and Pfizer-BioNTech acquisition terms fur-

ther polarized the debate, reflecting broader political cleavages and conflicting visions for Argentina's geopolitical alignment (Bracco and Porta 2022). Regulatory concerns as requested by global health agencies and data transparency on contracts also contributed to crossed mistrust.

Strengthening the Health System

The COVID-19 pandemic provided Argentina with an opportunity to transform entrenched public health policies, despite historical reluctance to change due to complex relationships among stakeholders (Bali et al. 2022). Five key capacities relevant to public health policy—governance, provision, funding, payment, and regulations—were critical for the pandemic response. Argentina managed to align and strengthen these capacities to facilitate its immunization campaign.

The implementation of vaccination across a wide and diverse federal country posed a significant challenge. While the national government, led by the MoH, established general criteria and provided vaccines and supplies, operational responsibility rested upon each jurisdiction (MoH 2020b). Building capacities for vaccine administration, logistics, and registry maintenance required substantial effort, particularly in the context of budgetary constraints. Additional resources were distributed to provincial and municipal health systems. The MoH also introduced the Public Vaccination Monitor, an online registry providing real-time information on the immunization campaign (MoH 2023a). This initiative aimed to standardize access and give transparency to the vaccination process following the already mentioned VIP vaccination scandal.

The national government also embarked on modernizing management systems through the digital health program, funded by Canada's International Development Research Centre. This initiative aimed to provide real-time data for epidemiological surveillance and monitoring at the national level, enabling the development of virus phenotypes and predictive models to aid health authorities in decision-making processes (Burton et al. 2023). Additionally, efforts were made to manage communication with the public and channel official health information effectively. The Secretariat of Public Innovation, under the Chief of Staff Office, collaborated with Google and Facebook to prioritize official information. The MoH also advanced data visualization platforms on the Argentina.gob.ar website and introduced an official chatbot to streamline communication.

Clinical trial capacities were strengthened alongside vaccine negotiations in Argentina. ANMAT authorized phase 2/3 clinical studies for various vaccines under development, including those by Janssen, Pfizer-BioNTech, and Sinopharm, leveraging existing clinical research capabilities. In 2021, amid vaccine delays, public agencies conducted immunogenicity and safety evaluations of heterologous vaccination schemes against COVID-19 (Pascuale et al. 2022). These evaluations, coor-

dinated with the CoNaIn and expert committees, were carried out in multiple provinces, including Buenos Aires, Córdoba, Santa Fe, La Rioja, San Luis, and Buenos Aires City. The trials explored combinations such as Sputnik V with AstraZeneca, Sputnik V with Sinopharm, Sputnik V with Moderna, and the homologous scheme of Sputnik V (first and second component) (Naciones Unidas 2021). This initiative strengthened capabilities for large-scale clinical trials and fostered alignment among key stakeholders.

Regulatory adaptations accompanied the changes in vaccine acquisition and distribution in Argentina. Law 27,573 provided a legal framework for these processes outside regular procurement schemes. Resolutions were enacted to execute actions, allocate funds, and standardize contractual terms with vaccine manufacturers (Cravacuore 2021). ANMAT intervened in authorizing clinical studies of vaccines and drugs, leveraging the Good Clinical Practice Regime for Clinical Pharmacology Studies. The emergency necessitated administrative and bureaucratic adaptations, enhancing technical capacities to expedite approval processes.

The Quest for Autonomy

The global push for medical supplies and vaccines underscored the interdependence and vulnerabilities of health-care systems, posing a threat to the right to health. The nationally praised concept of "health sovereignty," which emphasizes equitable access to essential resources for population health (Gómez-Arias 2022), relies on four pillars: health-care organization and financing, health workforce training, scientific research orientation, and medicine and health technology production (Fonseca 2022). The pandemic prompted an unprecedented alignment of actors and capacities in a mission-oriented approach to address COVID-19 as a health, scientific, and industrial challenge. The establishment of the COVID-19 Unit in March 2020 exemplified this initiative, bringing together multiple stakeholders (MINCyT, Agencia I+D+i, the National Science Council, and the MoH, among others) to coordinate scientific and technological capabilities for diagnostics and research and development (Bortz and Gázquez 2020).

Since February 2020, numerous R&D projects have been directly supported to enhance pandemic preparedness. Policy instruments, including competitive grants were swiftly launched to address various aspects of the pandemic response. These initiatives covered items from open calls aimed to develop diagnostic reagents, protective gear, and diverse technologies to address SARS-CoV-2 (April 2020), to areas such as scale-up and export readiness for COVID-19 kits (August 2020), development of COVID-19 antigen detection kits (February 2021), and support for *in vivo* assays of Argentine COVID-19 vaccines (April 2021). This support led to the emergence of six vaccine candidates, with four advancing to pre-clinical trials.

In December 2022, the ARVAC "Cecilia Grierson" vaccine, named after the first Argentine female physician and scientist, advanced to phase 2/3 of clinical trials, becoming the first homegrown vaccine to do so. Manufactured by Pablo Cassará Laboratory, the vaccine's productive capacity reaches up to 40 million doses per year, signifying a significant milestone in Argentina's vaccine development capabilities.

The strengthening of local manufacturing capacities in the private sector was evident through initiatives such as the mAbxience-AstraZeneca agreement for the technology transfer of vaccine production. This agreement, although private, aligned with national goals of industrial autonomy and access to more affordable vaccines. Similarly, local production of Sputnik V by Richmond Laboratories, in collaboration with Russia's Gamaleya Institute and India's Hetero Labs, showcased new capacities for technology absorption and vaccine manufacturing. Richmond Laboratories' investment in a new biotechnology plant for vaccine production further underscored this commitment. Additionally, national pharmaceutical firms like mAbxience and Sinergium Biotech expanded their biologics production capacity, being selected by the WHO/PAHO as hubs for technology transfer and local manufacturing of mRNA vaccines, heightening Argentina's role in vaccine production and strengthening the position of the Insud Group.

State manufacturing capacities were also mobilized. In 2021, a survey of the national pharmaceutical system was conducted to identify locally manufacturable supplies. This initiative, coordinated by the Ministry of Industry, the National Agency of Public Laboratories, and the Agencia I+D+i, aimed to strengthen public manufacturing of medicines and medical supplies. A total of 19 projects were approved, representing a committed investment of ARS 861 billion, which included the establishment of new public vaccine manufacturing facilities (Barton et al. 2021).

Conclusions

The Argentinean experience illustrates the complexities of ensuring vaccine supplies and vaccination in a middle-income federal country grappling with chronic economic crises and political divisions. Despite its challenges and slow start, Argentina managed to achieve widespread vaccination access thanks to various preexisting capacities. These included industrial capabilities for vaccine manufacturing (including active ingredients and fill and finish) and technology transfer agreements, quality management adhering to international standards, robust clinical research capabilities for testing vaccine candidates and heterologous schemes, and institutional capacities for coordinating pandemic responses across jurisdictions. Significant R&D efforts not only supported decision-making during the pandemic but also strengthened its preparedness for future out-

breaks, exemplified by the development of domestically produced vaccine candidates. Political capacities demonstrated through legislative measures concentrating pandemic governance and coordinating policies with provinces were instrumental in strengthening the overall health system (ventilators, hospital beds, testing capacities, tracing, monitoring, and statistics) and response infrastructure.

Regulatory capacities played a crucial role in Argentina's vaccine procurement and vaccination efforts. ANMAT's agile emergency evaluation and approval processes facilitated the swift authorization of vaccines. The government's pragmatic approach to negotiating with various actors and countries, including those not aligned with global health institutions, relied on these regulatory capabilities. Despite public mistrust, ANMAT's international recognition and local trust as a regulatory body allowed Argentina to take risks, such as being among the first to administer vaccines developed in countries without global recognition. This approach was framed within a nationalist notion of "health sovereignty," legitimizing nontraditional purchasing methods and emphasizing local industrialization capacities as a state priority. These efforts supported autonomous paths for vaccine research and manufacturing, reflecting the aspiration for an "Argentinean vaccine."

The Argentinean case highlights the imperative to capitalize on the crisis to further enhance and broaden the accumulation of existing capacities, particularly in business and regulatory domains. Moving forward, it is crucial to identify the key deficiencies in the system and prioritize new investments and initiatives to consolidate health-care capacities. This includes aligning public services with citizen needs, addressing territorial asymmetries, and strengthening pharmaceutical and biological industrial capabilities to create more resilient, adaptive, and prepared health systems.

NOTES

1. The "external constraint" refers to the lack of foreign currency, the problem that Argentina does not produce enough dollars to sustain its economy. Governments tended to solve this by going into debt or with capital controls.

2. A key element of Oxford's partnership with AstraZeneca was the joint commitment to provide the vaccine on a not-for-profit basis for the duration of the pandemic across the world (in a $3 to $4 per dose range) and in perpetuity to low- and middle-income countries. Oxford-AstraZeneca's vaccine manufacturing capacity was also augmented through agreements with independent vaccine manufacturing facilities globally, including the Serum Institute of India, Fiocruz, and mAbxience.

3. There were different versions on the disagreements. These were attributed to requests for jurisdiction extension, logistical challenges linked to ultrafreezer storage, and the national government's emphasis on local manufacturing by established players in the pharmaceutical industry. Some argue that the delayed Pfizer vaccine arrival was actually part of the agreed-upon timeline with the company, suggesting that there were no significant disagreements.

4. These open debates over vaccine efficacy, the initial lack of data on Sputnik, and holistic approaches to health led in 2020 to a 7.2% decrease in the national confidence in vaccine technology (86.9% in 2020) (Fundación Bunge y Born 2021; Fundación Huésped 2022).

5. By December 31, 2022, Argentina ranked 12th worldwide in total COVID-19 deaths since the beginning of the pandemic. Likewise, the 2021 vital statistics reported an excess mortality rate in Argentina of 26.3% for 2021—a measure that compares the expected number of deaths with the number of deaths actually recorded. This figure was lower than that observed in several other countries in the region, including Brazil (34.3%), Ecuador (35.3%), Mexico (42.6%), Colombia (44.2%), Paraguay (55.2%), Bolivia (57.9%), and Peru (60.9%) (MoH, 2023b).

6. People who received the Sputnik V vaccine were given the chance to opt to wait for its second component or become vaccinated in a mixed scheme.

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17 | COVID-19 Vaccination in Chile

From Political Distrust to Universal Coverage

Claudio A. Méndez

Chile has experienced political instability in recent years because of the political and social unrest that began on October 18, 2019. This unrest meant that the country, especially the government of President Sebastián Piñera, was forced to respond to the COVID-19 pandemic in an adverse political environment (Méndez et al. 2020). Despite these issues, once the COVID-19 pandemic began, the health system responded effectively to the various waves of the pandemic and virus variants that emerged. Moreover, the planning of the COVID-19 vaccines was successful, despite the adverse political and policy environment and technical decisions by the government, the Ministry of Health, the Ministry of Finance, and others.

While vaccines were being developed by research teams in the Global North, the Chilean government began early negotiations with potential suppliers using advance purchase agreements. The countries selected for these negotiations were those with the most promising vaccine clinical trials at the time. Consequently, one of the main advance purchase agreements was with Pfizer-BioNTech; under this agreement, Chile would receive 9,750 vaccines, which arrived on December 24, 2020. This vaccine was the first in Chile to obtain emergency authorization from the Institute of Public Health (Instituto de Salud Pública), the national regulation agency (Ministerio de Salud 2022b). Thereafter, in February 2021, Chile initiated a large-scale vaccination campaign focusing first on health-care workers, older adults, and individuals with underlying diseases (Pertuze et al. 2024).

The second key aspect of Chile's response to the pandemic relates to the strong primary health-care centers (Centros de Salud Familiar) across the country. Primary care centers have been responsible for the Chilean vaccine program for decades and thus were responsible for running the implementation of the National Immunization Program (Programa Nacional de Inmunizaciones). Recently, the program was recognized as one of the best in Latin America (Rombini et al. 2020).

The third and final factor in Chile's response to the pandemic was its strong national regulatory agency, the Chilean Institute of Public Health. Using a decision-making process involving a set of experts, the national

regulatory agency could provide emergency authorization for various COVID-19 vaccines. Similarly, the advisory body of the Ministry of Health, the Advisory Committee on Vaccines and Immunization Strategies (Comité Asesor en Vacunas y Estrategias de Vacunación), made decisions assuming that the country would have the required doses of vaccines. Therefore, once the campaign started, vaccines were available for the first prioritized population group. The mission to prioritize the groups for being vaccinated came from the recommendations given by the Advisory Committee on Vaccines and Immunization Strategies (Dabanch et al. 2021).

Overall, this chapter discusses the policy decisions regarding advance purchase agreements and the planning process for the COVID-19 vaccine rollout in Chile. The first section describes the country's strategy for selecting, purchasing, and financing the vaccines and providing emergency vaccine authorization. Additionally, the chapter describes the elements that defined the policy strategy for the vaccine rollout in Chile. Second, this chapter explains the factors that allowed Chile to achieve high levels of vaccination among its population. Finally, local and comparative lessons are addressed.

Defining the Policy Strategy

Chile's advance purchase agreements were facilitated by the work of the Ministry of Foreign Affairs, aided by their economics servants, who oversaw negotiations with the United States, Europe, and Chile (Torres et al. 2024). Two of the most successful commercial agreements were with Sinovac and Pfizer-BioNTech (Félix 2022). Overall, Chile's advance purchase agreements for COVID-19 vaccines were successful. Moreover, in September 2020, Chile signed an agreement with the Gavi Alliance for the COVAX Advance Market Commitment to purchase vaccines (Ministerio de Salud 2022b). As a result, in the first shipment, Chile received 158,000 doses of AstraZeneca (Organización Panamericana de la Salud 2021a), and in the second shipment, the country received over 600,000 doses of Pfizer-BioNTech and Oxford (Organización Panamericana de la Salud 2021b).

The Ministerial Scientific Advising Committee for Seeking COVID-19 Vaccines was created with the mission to move forward in the relationship between scientists, universities, and the public and private sectors to select the best vaccines for performing clinical trials in Chile (Ministerio de Ciencia, Tecnología n.d.). After assessing different vaccines, one of which was in clinical trials, the committee did not recommend the Pfizer vaccine because it was not undergoing clinical trials in Chile, warning the government that if it purchased the vaccine, maintaining the cold chain would be crucial for its effectiveness. Instead, the Ministerial Scientific Advisory Committee recommended starting clinical trials in the country

with Sinovac (Ministerio de Ciencia, Tecnología n.d.). Therefore, from December 2020 to June 2021, Chile purchased vaccines from the following producers, in chronological order: Sinovac, Pfizer-BioNTech, AstraZeneca, and Janssen (Castillo et al. 2021).

Chile's policy strategy involved securing advance purchase agreements and developing an effective vaccination campaign across the country. The advance purchase agreements were the core strategy for securing the vaccines with the highest effectiveness and safety. On December 24, 2020, President Sebastián Piñera announced the arrival of the first shipment of 9,750 Pfizer-BioNTech vaccines primarily for administration to health-care workers across some of the country's 16 regions (Ministerio de Salud 2022b). The president also followed the recommendation of the Advisory Committee on Vaccines and Immunization Strategies to prioritize population groups such as older adults, people with chronic illnesses, and other at-risk groups (Prensa Presidencia 2020). However, the College of Physicians criticized the fact that people with noncommunicable diseases were not part of the first wave of vaccination (Cooperativa 2021).

Because the Chilean Ministry of Health publishes a universal coverage vaccine schedule every year as a public good, no market authorization was necessary from the Institute of Public Health for the COVID-19 vaccine rollout. The vaccine rollout was based on universal health coverage, meaning vaccines were provided to the entire Chilean population as well as foreigners living in the country at the time. A panel of experts called by the Institute of Public Health decided, on the basis of the best evidence available, whether a COVID-19 vaccine could be provided to the general population or only specific groups. To access the vaccine, the general population had to wait until the vaccine schedule for the target population had been completed before visiting the public facilities that served as vaccination centers. During this time, the government provided constant information on the target population and vaccine coverage, calling different target groups to come to a vaccination center for their vaccines.

For this segmented health system, the universal health coverage policy strategy meant that vaccine rollout, a key public health intervention, could be delivered by public institutions on a large scale. Additionally, through public health-care providers' efforts, the Chilean vaccine policy strategy benefited from advance purchase agreements instead of relying on public–private arrangements.

The main source of funding for the implementation stage of the vaccine rollout was the public treasury (Biblioteca del Congreso Nacional 2021). Therefore, the Chilean state was financially capable of securing the necessary quantity of vaccines to start the rollout and ensure the immunization of its population, prioritizing the various at-risk groups. When other countries were focusing on the expansion of intensive care units and oxygen provision, the primary health-care system and other institutions in Chile were working to implement the vaccine policy strategy as soon as

possible to avoid more acute COVID-19 cases. Moreover, Chile used the COVID-19 vaccine fund not only for vaccines but also for the logistics of distributing these vaccines around the country.

The Quest for Universal Health Coverage

Following the success of the vaccine rollout and the acquisition of vaccines throughout COVAX, Chile donated 20,000 Sinovac doses each to Ecuador and Paraguay (AP News 2021) and later donated 100,000 doses of AstraZeneca to Uruguay, specifically for health-care workers (Ministerio de Salud 2021b). However, some criticism of these donations emerged, leading President Piñera to state that these donations would not affect the vaccination strategy in Chile (RadioUchile 2021b). Subsequently, the donations were not criticized further, and the vaccine rollout continued as planned. Furthermore, the tension surrounding the donations did not escalate, as the vaccination policy strategy was well coordinated and effectively executed by the health workforce and public compliance with the vaccine schedules was high.

The campaign was given the green light in February 2021. The prioritization of population groups led to a high vaccine coverage rate, even rapidly surpassing that of European countries with early access to vaccines and early rollout (Aguilera et al. 2021). The prioritized groups began to visit the vaccine centers on a large scale to receive the first shot of either of the vaccines available at that time (Sinovac or Pfizer). The priority groups were elderly people aged over 85 years, health-care workers, and health students who were in their final year or completing their residency. In the subsequent weeks, vaccines were provided to older adults, essential government staff, and public service workers (Ministerio de Salud 2021a).

The policy strategy for the vaccination rollout did not change from the original plan, as the government and the Ministry of Health worked to maintain the population target groups and manage the logistics of the vaccination campaign following the arrival of the first shipment. Additionally, the Ministry of Health emphasized how the vaccines worked and what the target groups in the population would be at the beginning of the vaccine campaign (Ministerio de Salud 2022b). Similarly, the Ministry of Health published a weekly calendar designed for social networks to specify the target populations who could access the vaccine. This weekly calendar also allowed the Ministry of Health to communicate vaccine coverage, aiming to improve not only national but regional coverage (Ministerio de Salud 2022b).

No doses of the vaccines were sold by private pharmacies, and people could receive doses through private health insurance companies, Instituciones de Salud Previsional, or the public health insurance, Fondo Nacional de Salud. Equity in vaccine access was not controversial, as the vac-

cination policy strategy affected individuals with coverage provided by the private and public sectors equally. Priority groups for vaccination were not controversial at the political or policy levels, allowing the Ministry of Health to maintain its strategy.

One of the most surprising actions taken by the government was deciding to increase the speed of the vaccine policy strategy's implementation, trusting in the capacity of the health systems the country had built over several decades. Once the first shipment of vaccines arrived, the coordination of different state actors allowed the country's 16 regions to prepare their infrastructure and health-care workers for the vaccination rollout. Despite the government being questioned about its preparedness and pandemic response, especially regarding the number of deaths from COVID-19, the vaccine rollout began. The main challenges for the vaccine policy strategy were building enough trust regarding the referendum in the population and ensuring adequate logistics and transport to implement the vaccine rollout across various regions. However, neither challenge prevented the successful initial implementation of the vaccination strategy.

Despite the initial success, the government faced both political and technical challenges in the vaccine rollout. The 2019 social crisis affected the trust of the population in the executive and legislative powers in Chile. With the executive power debilitated by riots and rallies and the need for curfews to restore public order, the Ministry of Health's announcement about a new virus was seen as a political maneuver to attack the new constitution process signed by most political representatives at the National Congress (RadioUchile 2020a). Nonetheless, despite the initial caveats with the College of Physicians and local government associations, once the vaccine rollout started, the executive power gained better control of the public agenda, changing the date of the referendum, which was initially scheduled for April 2020 (Quiroga 2021), to October 2020 (Morales 2021). Despite concern about the referendum, which focused on approving whether a constitutional process should be initiated, the government called different actors in advance to avoid spreading the virus at the time of voting. In the first referendum, the result was in favor of working in a Constitutional Convention with elected representatives.

Although the country was still immersed in a political crisis, the referendum was celebrated in a timely manner. From February, the country's efforts focused on the policy strategy for the vaccination campaign, and although the efforts of the political forces focused on obtaining majority representation for the Constitutional Convention, the elections were not an obstacle to moving forward with vaccine coverage in the weekly target groups. Moreover, having the elections alongside the vaccine rollout was advantageous for those who voted in the referendum.

The second challenge the government faced in the vaccine rollout was transporting the vaccines. Similar to the implementation of the advance

purchased agreements, the government anticipated the transportation requirements for the vaccine rollout. For example, the Pfizer-BioNTech vaccine needed to be transported at −70 to −80 degrees Celsius. Once the vaccines arrived, the government was highly coordinated in transporting the vaccines at the right temperature to the various regions and put pressure on primary health-care centers to start the vaccination rollout as soon as possible. In this way, the cold chain for vaccine transport was meticulously controlled.

This low-temperature transport was a challenge for the government, but the problem was solved using freezers suitable for the vaccine (Ministerio de Salud 2022b). Additionally, because of Chile's size and the centralization of the distribution from the Región Metropolitana (Metropolitan Region), the main region of the country, to other regions (Ministerio de Salud 2022b), airborne transportation was also used. Furthermore, the Alerta Sanitaria (Sanitary Emergency Decree), which was in effect before the country had its first case of COVID-19, enabled the country to respond to the pandemic by increasing the number of health-care workers at family health centers and other health organizations for the vaccination rollout.

The importance of primary health-care in the vaccination rollout was well-known not only by the government but also by the primary health workforce. Well-organized primary health-care with family health-care centers distributed across the country facilitated the implementation of the vaccine strategy in every region of the country (Aguilera et al. 2021). Although the health system was under pressure during the first waves of the pandemic, a rapid vaccination program was expected to reduce the need for intensive care in hospitals and clinics. The state capacity was critical in ensuring a resilient health system and a health workforce that could accomplish the vaccination campaign despite a high level of fatigue due to the overwhelming health-care demands. The family health centers deployed their teams to various vaccine centers, mainly schools and crowded areas.

A key aspect of the vaccine rollout was the *pase de movilidad* (mobility card), which was implemented in May 2021 and allowed people with the vaccine to participate freely in some daily activities (Subsecretaría de Prevención del Delito 2021). Benefits for those who had received the vaccine included travel between cities with the same epidemiological characteristics and free movement on the weekends (Gobierno de Chile 2021). These measures encouraged those who were hesitant about the vaccine to engage in the vaccination campaign, as the mobility card was only available to the vaccinated population. Moreover, a web page was designed to register with the vaccination scheme and obtain the mobility card (Ministerio de Salud 2022b). Although the College of Physicians argued that the mobility card delivered the wrong message to the public, the government, supported by experts, proceeded with its implementation (La Tercera

2021). The College of Physicians argued that the mobility card delivered a false message of security to the people, as efforts were still required to reduce the number of new COVID-19 cases.

The policy strategy sought universal vaccine coverage while prioritizing target population groups; therefore, equity in vaccine access was not an issue for the vaccination policy strategy and was not contested by experts and policy actors. Similarly, through the advance purchase agreements, all citizens had access to vaccines and could complete their dosage schemes, meaning universal coverage was achieved. Therefore, most policy actors did not contest the vaccination policy strategy, and equity in the policy strategy planning and implementation was not debated among policy actors and experts. Overall, Chile was able to coordinate its vaccination policy strategy faster than other countries. The success of this campaign involved coordination between policy actors, the private sector, the health system, and the health workforce. Furthermore, guaranteed access to vaccines for the entire population made the Chilean policy strategy unique in Latin America and the Caribbean. Working from the universal health coverage approach, the country sought to reach herd immunity and thus allow businesses to open, enable people to return to their lives, and start to recover the economy.

Institutional Matters

The success of Chile's policy strategy was attributable to the state capacity, the health system, and institutions across the country. Regarding state capacity, it is important to highlight that the political crisis was unresolved before the first case of COVID-19 was confirmed in the country. The policy strategy for the vaccine rollout was conceived amid social unrest and during a referendum for a new constitution. Notwithstanding, the phrase "in Chile, the institutions work" (*en Chile, las instituciones funcionan*) seems to apply to the state capacity involved in the vaccine rollout. One of the main drivers of the successful vaccine rollout in Chile was its state capacity; the first milestone the state achieved in the vaccination policy strategy was signing advance purchase agreements for vaccines. The success of the vaccine rollout relied in part on the vaccine's availability and the capacity for national deployment through the health sector. Additionally, for such a campaign, a high level of coordination was required between the central government and local centralized and decentralized institutions.

Nonetheless, these agreements required a strategy to raise the millions of dollars needed to pay the vaccine producers. In this context, the government proposed funding for the COVID-19 vaccines in the discussion for the 2021 national budget at the National Congress. Specifically, the Fund for COVID-19 Vaccines was created to finance the vaccines that could be produced in 2021, and this fund reached USD 200 million (Biblioteca del Congreso Nacional 2021).

Regarding public attitudes, anti-vaccination movements were not very active, and they were not able to undermine the efforts of the Ministry of Health. The Ministry of Health organized the policy strategy and its implementation, coordinating with primary health-care services, health services, and health authorities in every region of the country. In the media, TV shows and the news covered the vaccination process and invited experts to discuss the vaccines when news arose about potential side effects. Daily televised reports by the Ministry of Health contributed to public trust in the government, especially for populations who were more hesitant to receive the vaccines.

Unlike many other countries, the state capacity of Chile was tested less than one year after one of the largest political crises the country has encountered since the military coup led by Augusto Pinochet. The Chilean institution responded even though the government still had low legitimacy among the population. Chile exemplifies why the state is important; the country had a right-wing former president who may have been responsible for the political crisis, but the state explains Chile's success in addressing the pandemic compared with other better-prepared countries. The central governance has been the foundation of Chile as a unified country, but the institutions at the regional level have their own governance. Therefore, despite the regional levels being subject to oversight and technical guidance by the central government, they could adapt the policy strategy to their social and political landscape and were able to coordinate and organize their vaccine rollout.

The second key factor that explains the government decisions in Chile during the pandemic is the health system. Chile is part of a group of countries that were reformed in the 1970s and 1980s. Nonetheless, in the same decades, primary health-care centers were developed in Chile to improve health-care access across the country. Currently, primary health-care centers are crucial to the performance of the Chilean health system. For example, the National Immunization Program has been run by primary health-care centers for decades, and thus they have significant experience in implementing vaccination campaigns (Ministerio de Salud n.d.). The Ministry of Health and the government gave the main responsibility for the vaccine rollout to family health-care centers. In addition, the workforce of family health centers used schools and stadiums to safely provide vaccinations to people of different prioritized groups. The mandatory use of masks and social distancing are several key measures that were included in the vaccination strategy to reduce exposure to the virus and incentivize the population to attend the vaccine centers.

Complementing the role of primary health-care centers, other health system organizations played an important role in Chile's vaccination strategy. In every region, the health authorities were responsible for providing freezers for the vaccines for the entire region. The health services administration collaborated with the health-care workforce, vaccine centers, and regional health authorities. The vaccination policy strategy was

implemented by a strong and resilient health system, which supported the provision of health-care for people with COVID-19 and the effective design and implementation of the vaccine rollout.

Unlike its role in the preparation and response stages of the pandemic, the role of the health system in addressing the pandemic in Chile was not criticized, and its performance was widely recognized by politicians and the public. Moreover, the political opposition did not have any space to criticize the government's policy strategy. The only controversy was related to a congressman who decided not to be vaccinated (Infinita 2021; La Tercera 2020). The general population was also confident in the vaccine's safety (de Figueiredo et al. 2020), despite messages in social networks from anti-vaccine movements and populist politicians (Villegas et al. 2022).

Furthermore, media coverage was also useful in helping the public engage with the vaccination strategy; for example, experts were invited to discuss potential adverse effects of the vaccines and address anti-vaccination messages in social networks. Even anti-vaccination rallies were not effective at changing public opinion regarding the policy strategy adopted by the government (Euronews 2021).

In 2022, President Gabriel Boric took office. The new health authorities changed the policy strategy governance by creating a National Commission for Pandemic Response, which was responsible for decision-making processes. The commission received reports from thematic working groups (Ministerio de Salud 2022a). The vaccine rollout continued following the same strategy, but from October 2022, rules for quarantine changed, and mobility cards were no longer required (Ministerio de Relaciones Exteriores 2022).

Conclusions

Chile implemented more aggressive political and policy strategies than other Latin American and European countries, such as seeking advance purchase agreements for vaccines. Moreover, despite a political landscape featuring a delegitimized executive power and institutional crisis, the government achieved a successful vaccine rollout. The Ministry of Health, led by the third minister of health appointed to respond to the COVID-19 pandemic during the first two years, endured pressures from other actors regarding the implementation of the vaccination policy strategy. The vaccine rollout was successful because the health authorities recovered some level of public trust that was lost because of the social unrest of 2019.

The other key aspect of Chile's policy strategy that received global recognition was the performance of the Chilean health system. In general, the Chilean health system has been under scrutiny for inequity in access to health care, which is considered to have been caused by the Augusto

Pinochet regime; therefore, at the beginning of the pandemic, trust in the health system was a key issue. Nonetheless, the performance of the primary health-care system once the vaccine rollout started made Chile one of the fastest countries to vaccinate not only priority groups but also the general population. While the World Health Organization encouraged member countries to move toward health systems based on primary health care, Chile demonstrated—even before the Alma Ata conference—that comprehensive and nationwide coverage of primary health-care centers can enhance a health system's performance. For other countries aiming to strengthen their health systems, strong primary health-care accompanied by a well-developed national immunization program is crucial for rapid responses to issues such as the COVID-19 pandemic.

For Chile, the first key lesson from the pandemic relates to its primary health care. Despite democratic governments persisting with rhetoric on the importance of primary health care in Chile, efforts have historically been directed toward improving hospitals. As a result, the achievements of primary health care during the pandemic should move from rhetoric on the importance of primary health care to further action. Furthermore, strong policies from executive power and primary health-care providers were crucial for deploying a straightforward vaccine rollout process. These outcomes demonstrate that with the necessary resources and strong technical and political commitment to vaccine rollout, Chilean primary health care was able to overcome barriers to access and guarantee equity for the entire Chilean population.

A second lesson for Chile from the pandemic response was the state capacity to manage a health crisis of the magnitude of the COVID-19 pandemic. State capacity was exhibited by the bold policy and political strategies used. First, using its economic international relations, Chile secured vaccines through advance purchase agreements, which allowed the country to obtain vaccines in the early stages of development or phase 2 of the clinical trials. As a result, the country secured diversification and future vaccine doses. Moreover, Chile was able to prepare the cold chain for the storage and transport of the Pfizer-BioNTech vaccine. The same state capacity was replicated in the regional and local coordination among the 16 regions of the country, specifically regarding the regional freezers used to distribute vaccines to each city and primary care center.

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Part IV
Vaccination Politics in Australasia

18 | COVID-19 Vaccination in China

Shaped by the Zero COVID Policy

Deborah Seligsohn

The Chinese vaccination program is unusual, relying as it did entirely on indigenous vaccines, but even more critical to understanding the Chinese experience are two facets that made the Chinese experience different from that of other countries. The first, which is obvious but often overlooked, is that the disease originated in China. The second is the success of the Zero COVID policies, at least through March 2022, and the very low number of COVID-19 cases prior to the rapid ending of those policies in December 2022. After early fear of contracting COVID-19, the risk dropped to negligible by mid-spring 2020, and the general public acclimated to a new normal of a closed society with little risk of contracting the disease. While public health officials could anticipate that opening up society would ultimately require vaccination, they operated within a context where they were not rushing to vaccinate the most vulnerable but instead were considering the populations that would be most likely to spread the disease when mapping out their vaccine strategy.

The major Chinese vaccine manufacturers, Sinovac and Sinopharm, were among the earliest vaccine producers to develop vaccines, and the Chinese government was able to begin its vaccination campaign in December 2020. The campaign grew rapidly in March and April 2021 and peaked in June 2021, when over 20 million doses were being administered each day (see fig. 18.1). The vaccine campaign saw a second peak late in 2021 (coinciding with concern about the Delta wave and then the start of the Omicron wave), but then fell off considerably in 2022, and despite efforts to provide more vaccine options (there are now at least 11 licensed vaccines), vaccination has mostly fallen off the radar in the period since the end of Zero COVID.

In the wake of what experts with close knowledge of the Chinese situation estimated was perhaps 80% of the population contracting COVID-19 in the weeks after the end of Zero COVID, most Chinese appear to have moved on.[1] Local standards that require a waiting period of six months after contracting COVID-19 to receive a vaccination have meant that most people would have been ineligible for a vaccination in the first half of 2023 and would only have become eligible after the second significant COVID-

19 wave in May–June of that year, which again made many ineligible. Thus, most Chinese have simply gotten out of the habit of expecting a COVID-19 vaccination.

The Chinese vaccine environment is characterized both by large and ambitious companies and by significant public skepticism. Public trust in government has historically been high, though recent advances in list experiments suggest it is more in the 50–70% approval range rather than the 90+% approval found through standard polling questions (Carter et al. 2024; Nicholson and Huang 2023). Public skepticism of vaccines has historic roots that will be discussed later in the chapter. The public questioned the motivations of both the government and, especially, companies, a skepticism that was compounded by complex and conflicting messaging from the government. Judging from studies administered in Hong Kong, the local Chinese vaccines, while not necessarily as effective as mRNA vaccines, probably helped significantly with the experience that many Chinese had of a mild COVID-19 infection in December 2022 and probably reduced the still unclear death rate. But the combination of the type of vaccines used, the fact that most Chinese were exposed to the Omicron variant and not the original strain, and the year and a half since most Chinese were vaccinated meant that most experienced illness. Thus, they were unable to judge for themselves whether the vaccine was effective.

Vaccines

China's companies, universities, and research institutes began developing vaccines as soon as the virus was identified. In contrast to the main players in Western countries, China's two leading vaccine companies, SinoPharm and SinoVac, chose a conservative strategy of using inactivated virus, a very traditional technology. While in theory part of the attraction of new technologies, like mRNA, is that they can be rolled out faster, in practice the first Chinese vaccine, SinoPharm's Covilo, entered the market in December 2020, about the same time as the main Western entrants were available. Part of the reason for the comparable rollout is that the Chinese National Medical Products Administration did not require phase 3 clinical trials (efficacy) before allowing emergency use authorization (EUA). They simply required phase 2 safety trials, which can be more quickly administered, since they don't depend on the quantity of disease in the environment. Thus, the Chinese vaccines had been determined to be safe, but it took some additional time before accurate measures of their efficacy were available.

The Chinese government at both the national and the provincial levels, Chinese universities and research institutes, state-owned enterprises and private companies all invested in vaccine development. The widely used

CoronaVac vaccine, for example, received funding in development from seven different funds, five at the national level and two at the provincial level (Beijing and Zhejiang) (Gao et al. 2020). These efforts were loosely coordinated by the Ministry of Science and Technology (Hu and Chen 2021), but a key aspect of this development approach was that multiple groups competed with each other.

Vaccine delivery was financed by the Chinese government through the state health insurance fund. The Chinese government reported in March 2023 that it had spent approximately 150 billion yuan (US$21.5 billion) on its vaccination efforts, paying approximately $2 per dose (Zhao 2023). Given that the Chinese had administered approximately three and half billion doses by that date, this suggests that about one-third of expenditures went to the vaccines themselves and the remainder to distribution, delivery, and other administrative costs.

Even after the Chinese government had rolled out its original vaccines, Chinese companies continued to develop alternatives. New technologies began to be approved in September 2022 (see table 18.1). There was a great deal of optimism that several nasal options would improve the ability of the vaccines to prevent infection rather than just severe disease and death, but while the data is unclear, anecdotally that does not appear to be the case. One of the major focuses of international attention was whether the Chinese government would import an mRNA vaccine. The Chinese government had been in active discussion with Pfizer's partner BioNTech in 2021 (Tiezzi 2021), but those discussions appeared to break down (Gan and George 2021). By mid-2021 there were virtually no new cases within China's Zero COVID firewall, and it appears that the Chinese government preferred to wait until homegrown mRNA vaccines were available. Regardless, domestic Chinese mRNA was not approved before the abrupt end to Zero COVID. At that time there was considerable concern and interest among the public in purchasing imported mRNA vaccine, but that period passed, and while an mRNA vaccine has now been offered, the vaccination campaign, as detailed below, has not been effectively resumed.

Developing new technologies was very much part of the Chinese government's strategy. While the early vaccines used very traditional technologies, and thus caused less concern to public health officials about a rapid rollout (as can be seen in table 18.1), the Chinese government very much encouraged the development of novel strategies. These newer technologies took longer to be approved, but by the end of 2022, the results started to roll out. China developed two different non-injectable options for vaccines. In May 2023, it hailed the launch of its first recombinant vaccine for the XBB variant (Westvac BioPharma 2023). And it also formed an agreement with Moderna to develop new mRNA vaccines, not limited to COVID-19, in China (Constantino 2023). The Moderna deal has been moving ahead, and in fact in 2024 there was a turn away from the focus on only China-originated mRNA vaccines. Three companies developed mRNA

TABLE 18.1. Vaccines Approved for Use in China (December 2020–March 2023)

Vaccine Name	Company	Type	Approximate EUA Approval Date	Use	Source[a]
Covilo	SinoPharm	Inactivated	December 2020	Primary and boosters	https://www.reuters.com/article/us-health-coronavirus-vaccine-china-idUSKBN29505P
CoronaVac	SinoVac	Inactivated	February 2021	Primary and boosters	https://www.reuters.com/article/us-health-coronavirus-vaccine-sinovac-idUSKBN2A60AY
Inactivated (Vero Cells)	SinoPharm	Inactivated	February 2021	Primary and boosters	https://www.reuters.com/article/us-health-coronavirus-china-vaccine/china-approves-two-more-domestic-covid-19-vaccines-for-public-use-idUKKBN2AP1MW?edition-redirect=uk
Convidecia	CanSino Biologics	Non-replicating viral vector	February 2021	Primary and boosters	https://www.reuters.com/article/us-health-coronavirus-china-vaccine/china-approves-two-more-domestic-covid-19-vaccines-for-public-use-idUKKBN2AP1MW?edition-redirect=uk
Zifivax	Institute of Microbiology of Chinese Academy of Sciences (IMCAS) and Chongqing Zhifei Biological Products	Protein subunit	March 2021	Primary and boosters	https://www.reuters.com/article/health-coronavirus-china-vaccine/china-imcass-covid-19-vaccine-obtained-emergency-use-approval-in-china-idUSL4N2LD3BZ
KConvac	Shenzhen Kangtai Biological Products	Inactivated	May 2021	Primary and boosters	https://www.reuters.com/article/us-health-coronavirus-vaccine-kangtai/kangtai-biologicals-covid-19-vaccine-gets-emergency-use-approval-in-china-idUSKBN2CV1F6
V-01	Livzon Pharmaceutical Group	Protein subunit	September 2022	Booster only	https://www.reuters.com/business/healthcare-pharmaceuticals/livzon-pharmas-covid-19-vaccine-gets-emergency-use-approval-china-2022-09-02/

Convidecia Air	CanSino Biologics	Non-replicating viral vector inhaled	September 2022	Booster only	https://www.reuters.com/world/china/cansinos-inhaled-covid-19-vaccine-gets-emergency-use-approval-china-2022-09-04/
SCTV01C	SinoCellTech	Recombinant protein-based	December 2022		https://www.globaltimes.cn/page/202212/1281267.shtml; https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9672836/
	Clover Biophamaceuticals	Recombinant protein-based	December 2022	Boosters only	https://www.globaltimes.cn/page/202212/1281267.shtml; https://ir.cloverbiopharma.com/news-releases/news-release-details/clover-launches-covid-19-booster-vaccine-peoples-republic-china
VectorFlu ONE	Wantai BioPharm, Hong Kong Univ., Xiamen Univ.	Nasal spray influenza virus vector vaccine	December 2022		https://www.globaltimes.cn/page/202212/1281267.shtml; https://www.globaltimes.cn/page/202212/1281201.shtml
Coviccine	WestVac Biopharma, West China Medical Center, Sichuan University	Recombinant protein-based	December 2022; updated May 2023		https://www.globaltimes.cn/page/202212/1281267.shtml; https://www.newswire.ca/news-releases/the-first-of-its-kind-in-the-world-the-recombinant-multivalent-covid-19-protein-vaccine-against-xbb-variants-by-westvac-biopharma-west-china-medical-center-sichuan-university-has-been-approved-for-clinical-trials-by-the-national-medical-pro-823872277.html
SYS6006	CSPC Pharmaceutical Group	mRNA	March 2023	Booster only	https://doc.irasia.com/listco/hk/cspc/announcement/a230322.pdf

[a] Preliminary information gathered is from https://covid19.trackvaccines.org/country/china/, which stopped updating in December 2022.

COVID-19 vaccines—CSPC, Walvax, and Stemirna—but only CSPC was licensed in China, and none received WHO approval. Walvax and Stemirna had deals in Indonesia and Laos, but no sales. Moderna is building a facility in Shanghai (Silver 2024).

A key aspect of Chinese vaccine development was the need to work with other countries. Because COVID-19 levels were so low in China, phase 3 efficacy trials needed to be conducted in countries with much greater disease prevalence in late 2020. Phase 3 trials came with promises to the countries to then supply vaccine and also created commercial partnerships that then produced these vaccines. China both sold and donated millions of doses internationally, moving much faster than most Western countries, and did most of its donating bilaterally rather than through the World Health Organization's COVAX program (Suzuki and Yang 2023).

Vaccinations

The Chinese government approved six vaccines during its major vaccination campaign in 2021, though the first two, SinoVac and SinoPharm, were the most widely used. The vaccine campaign began slowly but then increased rapidly in March through August 2020, when most Chinese received their two-dose primary series, and then saw a second peak in late 2021 (see fig. 18.1), when a third dose, defined as a booster, was also authorized. The Chinese government also approved vaccines for children ages 3–17 in June 2021. Some provinces began to require vaccination for school attendance in October 2021 (Dyer 2021). The booster and the school requirement correspond with the second peak in vaccination delivery.

After the mass vaccination effort in 2021, vaccination rates fell off rapidly and have not increased markedly since. The initial effort relied on local government health authorities to conduct outreach and provide vaccinations. The vaccination campaign was shaped by the concurrent Zero COVID policies both in the approach to initial outreach and in later diminished capacity to continue vaccination.

The Chinese vaccine campaign began after COVID-19 had been largely eradicated within China. As can be seen in figure 18.2, the period when the vaccination campaign was in full swing, March 2021–January 2022, was a time of very few infections in mainland China. The original Wuhan wave, December 2019–March 2020, was long since under control, and the original Zero COVID precautions were keeping the virus largely in check. These measures included a COVID-19 app on everyone's phone that indicated whether people were COVID-19 positive or negative or whether they were at risk due to proximity to someone who had tested positive. What is critical, as will be discussed further below, is that in 2020 and 2021, Zero COVID did not involve national testing. When there was a COVID-19 case, testing was initiated in that specific area, at most one city and for a limited

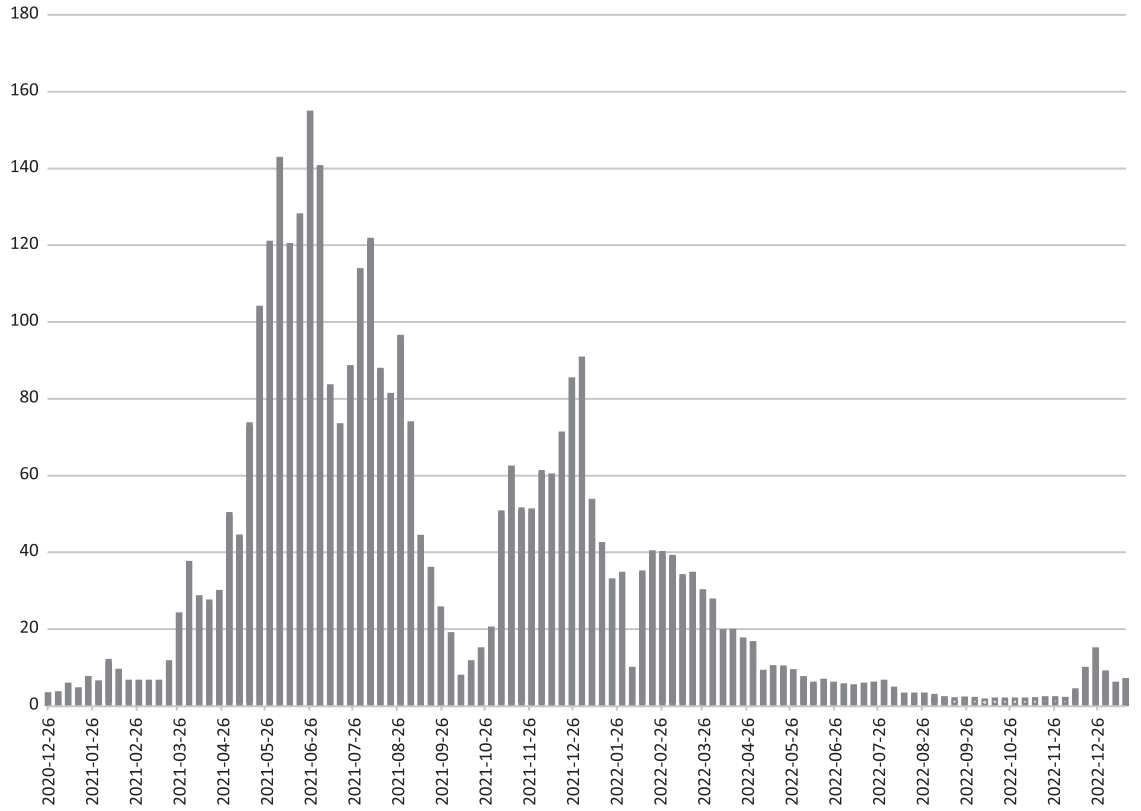

Fig. 18.1. Vaccine doses administered each week by millions

period of time. For example, following an outbreak in Qingdao, Shandong Province, in October 2020, the entire population of 10.9 million had been tested within five days and all cases were documented within two weeks (China CDC 2020; Xing et al. 2020). With these measures focused largely on identifying cases and managing contact tracing, as well as strict national border controls, China largely avoided both the Alpha and the Delta waves. Local officials thus had time in 2021 to focus on this vaccination campaign. By 2022, they would be much more focused on enforcing Zero COVID through expensive PCR testing and quarantine hospitals.

Without the immediate threat of large numbers of infections and thus the urgent need to rapidly protect the most vulnerable that most other countries faced, national Chinese public health officials chose a different approach. They were focused not on immediate risk but on the risk of reintroduction from the rest of the world. Thus, their strategy was on vaccinating those with more contacts, those most likely to be disease vectors, rather than the most high-risk population. The logic was that the working-age population had more daily contacts, went out more, traveled more, and generally mixed more than the elderly or those confined by illness or infirmity. Thus, the original vaccine campaign focused on adults up to age

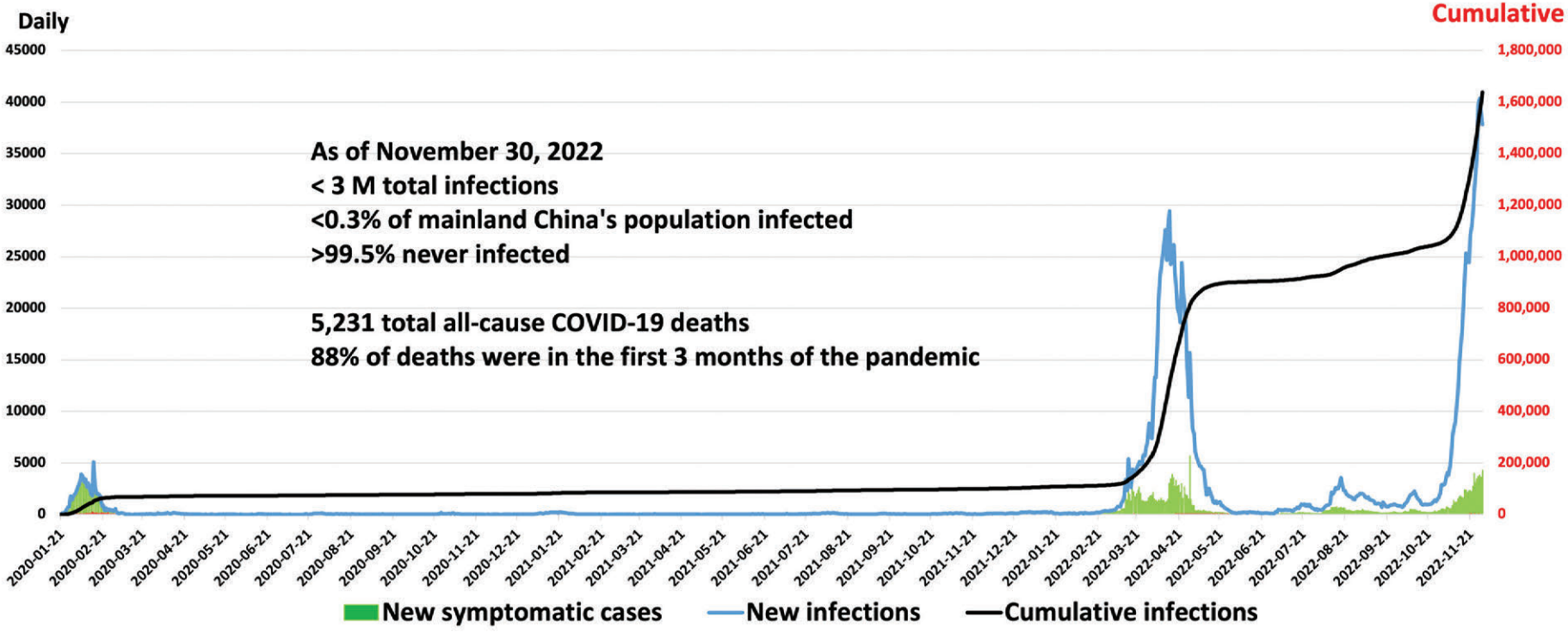

Fig. 18.2. COVID-19 infections in China through November 30, 2002. (Data from China CDC Weekly, http://weekly.chinacdc.cn/news/TrackingtheEpidemic.htm)

60, the upper-limit retirement age for the vast majority of the Chinese population (OECD 2021).

While older adults technically became eligible for vaccinations a few months after the 2021 vaccination campaign began, as described by Gewei Wang et al., many older people were actively discouraged to receive or refused the vaccine: "Anyone older than 60 would first receive a blood pressure test and be disqualified if the diastolic pressure went above 160. Vaccinators also refused those with preexisting conditions such as diabetes, heart disease, stroke, kidney disease and cancer" (Wang et al. 2023). The result was that while the overall vaccination rate in China was quite high, the lowest vaccination rate was for older adults, and the older they were, the less likely they were to be vaccinated. While the China Center for Disease Control and Prevention did not regularly publish age breakdowns, Wang's group, using a survey, estimated figures for the summer of 2022: the overall two-dose vaccination rate for those over 60 was 92.3%, with those receiving the third-dose booster at 72.7%. But the rate was considerably lower for those over 80, with 72% having received the two-dose primary series and only 47.1% receiving the booster (Wang et al. 2023). The lack of boosting among the elderly was particularly troubling, as studies from Hong Kong found that three doses of the Chinese CoronaVac vaccine were similar in effectiveness to three doses of the Pfizer mRNA, while two doses of the CoronaVac offered far less protection than two mRNA doses (McMenamin et al. 2022).

The failure to fully vaccinate the elderly was not mainly a question of access per se, as Wang et al. (2023) reported that the urban elderly were less likely to be vaccinated than rural older residents. The difference between urban and rural elder vaccination rates has not been thoroughly studied but was likely due in part to the amount of anti-vaccine information available to educated urban residents and the structure of Chinese health campaigns, which generally have an expected percentage of services delivered, in this case a percentage of the population vaccinated (though that actual target was never made public). Most people in China, with the exception of some schoolchildren, were not under vaccine mandates. However, local governments, during the height of the campaign in 2021, would have been under pressure to show they were effectively immunizing their population. While urban areas have large adult, working-age populations, due to domestic migration for employment, many rural areas do not. Thus, rural health authorities would have had to conduct considerably more outreach to older adults and children to be vaccinated in order to meet either actual quotas or expectations.

A real effort to vaccinate the urban elderly did not emerge until late November 2022, when it had become obvious, in the wake of the continuing growth of cases under Omicron, that the Zero COVID policy was unsustainable. However, by that time there was sufficient COVID-19 spread in China that most healthy people were reluctant to seek additional vaccina-

tions for fear of being exposed to the disease while visiting the local health facility.[2]

The second factor that limited vaccinations was the shift in local government attention in 2022. Through 2021, as mentioned earlier, the primary means of case detection was a track and trace system managed by an app on each resident's phone. The local government also managed isolation centers for those who tested positive and quarantine for those potentially exposed. However, the numbers in such centers were quite low, since the disease was basically kept in check. This situation changed in 2022, when the Omicron variant overwhelmed China's track and trace system. This first became clear both nationally and internationally during the Shanghai lockdown from late March through the beginning of June 2022. During this period, COVID-19 cases in the city peaked at almost 30,000 a day, and a draconian lockdown similar to that of Wuhan in 2020 was executed before case numbers were brought down (Wang 2022; Goh and Woo 2022).

As a result of outbreaks not just in Shanghai but in cities throughout China, localities were told to begin mass testing. These mass testing sites were required to be within a 15-minute walk of all urban residents. They consisted of small booths where saliva samples were taken and sent to city labs for PCR testing. Initially testing was required every three days, as I experienced myself and observed directly; if there was an outbreak or exposure, or in some cases even the remotest hint of exposure, the frequency would increase to every two days or even daily. The system was enormously cumbersome, as local authorities then needed to track down not just those who tested positive but all who had come in contact with them. Since the public was increasingly frustrated with the system, tracking people down and ensuring compliance was challenging. At the same time, localities were faced with growing requirements for isolation hospital space as case numbers increased and with the increased costs of hospitalizing COVID-19 patients. As a result, local health authorities' attention and resources were diverted from any further attempts to vaccinate the public. Throughout most of 2022 there simply were no outreach efforts to reach those who had not chosen to vaccinate during the earlier campaign. Other than the few people who had traveled abroad on official business, almost no one had received a booster shot in the year leading up to the end of Zero COVID on December 7, 2022 (see fig. 18.1).

Drivers of Government Decisions and Public Behavior

The initial motivation for the national vaccination campaign was clearly to reduce the risk of a dangerous future outbreak. It was focused on those most likely to spread COVID-19 through quantity of contacts—first targeting adults in the workforce and then adding in schoolchildren. Because of the low levels of disease in China throughout 2021, there was little plan-

ning for immunizing the vulnerable, and the choice to limit the vaccine initially to those under the age of 60 inadvertently planted the idea that the vaccine was actually dangerous for the elderly. As Zero COVID became entrenched, the focus on general prevention was oriented toward inadvertent introduction from outside rather than the likely outcome of a lifting of Zero COVID.

The second motivation, in terms of vaccine choices, was clearly to develop the Chinese vaccine industry (Yang et al. 2024). The industry's own choice to begin with the most tried-and-true technology—inactivated virus—was clearly driven by the urgency and desire to identify a low-risk route to a successful vaccine. But the central government's decision to slow-walk any deals for vaccine imports, and ultimately its failure to make any such deals, appears to have been driven by the likely ability of the Chinese vaccine industry to have sufficient time to produce vaccines using a variety of more modern technologies. As seen from the list in table 18.1 above, Chinese companies have now adopted a wide variety of technologies, including mRNA. The mRNA vaccine development in China took more than two years longer than that of Pfizer and Moderna but was ultimately successful. As Moderna has now signed an agreement to develop additional mRNA-based treatments in China, this goal of furthering domestic medical technology development appears to have been successful. Most of these more modern vaccines have not been deployed at scale, given that the vaccine campaign was most active in 2021, before they had been developed and approved.

The major challenge that the program faced turned out to be reluctance among the elderly to be vaccinated. Vaccination rates were higher among the rural elderly. Thus, the surprising major challenge was the prevalence of unvaccinated status among educated urbanites (Wang et al. 2023; Robles et al. 2023). The reasons for the failure to fully vaccinate the elderly are overdetermined. So many factors point in the same direction. But from my extensive interviews over my time in China during the last two months of Zero COVID and then its abolition in December 2022, and again in the summer of 2023, a number of factors emerge, some of which are also cited in Wang et al.'s (2023) survey data:

1. *Doctors recommended against the vaccine.* As noted above, virtually any comorbidity led many doctors to recommend against the vaccine. Elderly parents of interviewees were told they were "too weak" or "should wait till after cancer treatment was completed." These recommendations were so pervasive that even when the Chinese government tried to combat them in late November 2022, many elderly feared they were "too sick" to be vaccinated (Stanway and Jiang 2022).
2. *People felt safe.* From the end of the Wuhan lockdown through all of 2021, people did not feel much risk of contracting COVID-19. Even after the Shanghai lockdown and the general rise of small-

er lockdowns in 2022, the risk for most people of contracting the disease was relatively low. Moreover, the testing regime gave people what may have amounted to a false sense of security. Testing proved unable to keep up with the rapid rate of Omicron transmission—after all, the tests had to be processed and the infected person notified, by which time they might have exposed others. But the ever-increasing stringency of the testing regime gave people the sense that the government was protecting them from exposure.

3. *A mix of anti-vax information was available, especially to educated urbanites.* The official Chinese media tended to repeat Western news reports critical of the Western vaccines, including the mRNAs, while at the same time Chinese citizens with international internet access (using a VPN) found plenty of Western media articles stating that the Chinese vaccines were inferior—without the additional information that with three doses they work quite well. The net result for many was skepticism about all vaccines.
4. *People were skeptical that the vaccines worked.* Oddly, one of the most positive aspects of the Chinese inactivated vaccines—that they were nonreactogenic—proved to be a problem for people's faith in their efficacy. I asked one interviewee if his parents had been vaccinated, and he said his father had had three shots but his mother only one. Since she'd had a shot that didn't sound like hesitancy per se, I asked why she hadn't continued. "She said it didn't work," he said. His father had had some reaction to his shots but she hadn't. So they assumed they were ineffective. Other interviewees, when I asked if they'd been vaccinated, said, "Yes, but who knows if it was vaccine or saline." Again, their skepticism was because they hadn't had a reaction.
5. *Some people were vaccine hesitant.* As in other countries, multiple studies have found vaccine hesitancy among the general population in China, though the numbers vary (Wu et al. 2021; Huang et al. 2022; Zhang et al. 2021). Most surveys find hesitancy higher among parents concerned about their children and among younger rather than older people. Thus, while vaccine hesitancy undoubtedly drove some of the response among the elderly, it was more likely a relatively low-level baseline in that group, and the other factors discussed here were responsible for the specific choice not to vaccinate in that age cohort.
6. *Previous vaccine scandals led to distrust specifically of vaccines and pharmaceutical companies.* China has experienced several vaccine scandals in which companies were caught selling illegal or substandard vaccines. Two recent scandals in 2016 and 2018 were still in public consciousness when COVID-19 arose. While

the Chinese government responded to those scandals with a new Vaccine Administration Law in 2019, streamlining and increasing the central government's ability to regulate vaccines (Feng and Li 2021), it is unlikely that the general public knew that the regulatory regime in place for the COVID-19 vaccine campaign was considerably more robust than in prior years.

7. *People had concern about the speed of introduction.* Interviewees mentioned unease with how rapidly the vaccines had been brought to market. In fact, Chinese vaccines were launched with phase 2 and not phase 3 trials supporting their EUAs. This meant they were determined to be safe, but had not been fully tested for efficacy. The general public was unaware of this phase 2/phase 3 distinction, but as in other countries, the speed made some people concerned.
8. *Lack of vaccine supply or difficulties in vaccine access was a concern.* While none of the interviewees I spoke to mentioned access issues, they were raised as a concern by 18% of Wang et al.'s (2023) survey respondents. While travel would be more of an issue in rural areas, this issue seems to have been largely (although perhaps not completely) overcome, given that rural vaccination rates were higher than urban rates. However, there may well have been some remote areas or some elderly with difficult access to transport. Supply issues would have been more of an issue early on in the vaccine campaign, but of course some people, once turned away, might have chosen not to return.

When the Chinese government resumed the vaccine campaign in December 2022, the biggest reason many chose not to get vaccinated despite the sudden awareness of the risk of contracting COVID-19 was fear of getting the disease from standing in line or entering a health facility. Moreover, among those who even then wanted a vaccine booster, the Chinese government was still not willing to give a second booster (fourth shot) except in very rare circumstances.

After the enormous wave of COVID-19 cases in December 2022, where health professionals I interviewed estimate as much as 80% of the population contracted the disease, vaccine skepticism if anything increased. In interviewees' anecdotal experience, there did not seem to have been a major difference in outcomes for those who had been vaccinated and those who hadn't. While many elderly died, most people were unaware of the vaccine status of those they knew who had died. Many younger people told me they had similar symptoms to those who had had more or fewer vaccinations than them.

Moreover, the waves of COVID-19, combined with a standard in China of not vaccinating within six months of contracting the disease, meant that virtually no one was actually eligible for the booster shots that have

since been rolled out. A study in February 2023 found that only 12.8% of the population had received a second booster, with rural people more likely to have received the booster than urban people (Dong et al. 2024). China experienced a second large COVID-19 wave in May–June 2023. If waves occur every six months or so, it will be difficult for public health officials to find those who have not been vaccinated and are eligible, with the exception of children.

Conclusion

In many ways, the Chinese vaccine and vaccination program was a striking success. The country succeeded in vaccinating more than 91% of its population and developed and launched 13 domestically produced vaccines. The major gap in the program was clearly its outreach to the elderly, especially the urban elderly. This was likely as much a surprise to public health officials as to outside observers. Multiple surveys in the 2020–21 period suggested that vaccine hesitancy would be most pronounced among the young and the least educated, and yet the opposite turned out to be true.

The context in which the Chinese vaccine campaign was conducted turned out to be unusual, not just in the context of comparison to other countries but also in the context of the history of Chinese vaccination and public health. The Zero COVID campaign both gave the general public what turned out in the end to be a false sense of security and diverted critical local government resources in 2022 from completing the vaccine efforts to administering tests and running isolation hospitals, costly and time-consuming endeavors. The emphasis on domestically produced vaccines, while spreading skepticism about other producers' efforts, led some to general skepticism, especially among those with a higher news diet.

China's abrupt end to its Zero COVID strategy, leading to widespread infection in the entire population, leaves the future of COVID-19 vaccination very much in question. When traveling around China in the summer of 2023, I found few who wanted to dwell on the years of Zero COVID, much less consider whether there was still a risk of contracting the disease. The general sentiment seemed to be that COVID-19 was over and among most people a great desire to move on.

The other key question that has yet to be answered is how the COVID-19 vaccine experience will affect other vaccination efforts going forward. In the years leading up to COVID-19, China had made great strides in childhood vaccination coverage (Pan et al. 2021). One positive of the COVID-19 vaccine experience was that while many raised questions about the effectiveness of the COVID-19 vaccines, few raised issues about their safety. When I spoke to experts in Beijing, they had not observed any falloff in other vaccine uptake. If so, that would be positive.

NOTES

1. I was in China both during the end of Zero COVID in the fall and winter of 2022/23 and again in the summer of 2023. This observation and many others in this chapter are based on both personal observation and discussions with many experts and ordinary people on the ground (the idea of moving on, for instance, is based on conversations with people in a variety of fields in multiple cities); the sensitive nature of the topics require that I not specify locations and maintain complete confidentiality. Most of my time was spent in Beijing, but in the summer of 2023 I traveled to several other cities in different regions of the country.

2. This is based on personal observation at the time, since I was living in China, and discussions with numerous individuals. The campaign began after the well-known "white paper protests" of late November 2022 and only seven days before the end of Zero COVID. It was widely known that COVID-19 was spreading fast. Numerous phone apps showed the spread of cases. Given that vaccines were offered at local clinics, the public was aware that there were likely to be both healthy and ill patients in the facility. One elderly person who needed treatment for a different condition told me her doctor told her to get out of the building as fast as possible.

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19 | COVID-19 Vaccination in Hong Kong, China

The Impact of Trust, Communication, and Crisis Management Capacity

John P. Burns

Paradoxically, Hong Kong's COVID-19 vaccination program and vaccination outcomes were both "well done" and a "disaster" at the same time. From February 2021 authorities successfully mobilized tens of thousands of workers to vaccinate residents, eventually achieving a third dose rate of nearly 80% by mid-2023. However, inconsistent messaging, low trust fueling vaccination hesitancy, and crisis management failures combined to produce the highest death rate from COVID-19 in the world. How can this paradox be explained?

Hong Kong (pop. 7.3 million) provides medical care for all at a nominal rate via a network of 43 public hospitals and 117 public outpatient clinics (Hospital Authority, n.d.). Hong Kong's public health infrastructure produces outstanding outcomes (the longest lived in the world, very low rates of infant mortality, and high efficiency, measured in terms of health spending as a percent of gross domestic product). Still, public hospitals, which bore the brunt of COVID-19, are stretched, not sustainably funded, understaffed, and slow for nonemergencies, like the National Health Service.

The vaccination program was embedded in a context of deep political division and widespread distrust of government, a legacy of six months of increasingly violent anti-government protest in 2019 (Hartley and Jarvis 2020). From 2020 authorities in Beijing centralized control over Hong Kong, imposed a new national security regime, and hollowed out civil society, ridding it of opposition. Distrust of government and of the warp-speed development of emergency-use COVID-19 vaccines was initially widespread.

From January 2020 until May 29, 2021, Hong Kong experienced four waves of COVID-19 infection without overwhelming the public health system on which most Hong Kong people depend. During these 17 months, 210 people died from or with COVID-19 (Centre for Health Protection 2021e). From June through December 2021, for nearly seven months, Hong Kong reported virtually no local infections. Vaccination complacency ruled (Silver 2022). Then on December 31, 2021, came a fifth wave,

anticipated by authorities, they said. This wave was unlike the others: Omicron, with milder symptoms, was much more infectious and deadly, especially for the unvaccinated. The virus raced through Hong Kong's densely packed high-rise communities. The fifth wave overwhelmed Hong Kong's fragile public health system, and 13,120 people died of or with COVID-19 (Centre for Health Protection 2023).

On February 16, 2022, the media flashed pictures of hundreds of sick elderly patients on gurneys on the street outside public hospitals waiting overnight and longer for admission. Alarmed and fearing the spread of Omicron from Hong Kong to mainland China, President Xi Jinping in Beijing, speaking directly and bluntly to Hong Kong, demanded action: that the Hong Kong government shoulder "the main responsibility" for stamping out the virus, "mobilize all mobilizable resources," and ramp up testing, tracing, and isolation of COVID-19 patients to save lives, features of the mainland's "dynamic zero" approach (Ta Kung Pao 2022). As Omicron raced through the Hong Kong community, infection hit particularly hard the unvaccinated elderly, paradoxically a high priority group for vaccination, identified on January 7, 2021 (Centre for Health Protection 2021a). What went wrong? Why were the vulnerable elderly so unprotected? Why was Hong Kong so unprepared?

On January 25, 2020, when Hong Kong's pandemic response level was raised to "emergency," authorities set up the interdepartmental Steering Committee cum Command Center to provide overall leadership of the government's fight against COVID-19, chaired by the Hong Kong Special Administrative Region (HKSAR) chief executive (CE), Carrie Lam Cheng Yuet-ngor. The steering committee included the 13 policy bureau secretaries (all political appointees, mostly retired civil servants) and others, such as representatives of the Hospital Authority (HA), Department of Health (DH), and Centre for Health Protection (CHP) and expert advisers; from January 2020 to March 2022 they met 120 times (HKSARG 2022b). By the fifth wave, Carrie Lam had assigned specific anti-pandemic tasks to each of the 13 policy bureau secretaries. Lam also appointed a four-person Expert Advisory Panel (EAP), which met with her 27 times over the same period.

Despite these arrangements, bureaucratic silos and ineffective communication hampered the vaccination program. Only in the fifth wave emergency did officials address the lack of coordination between the social work bureaucracy that managed residential care homes for the elderly and those providing COVID-19 vaccinations. Authorities further amended public messaging about the possible dangers of vaccination and limited the role of families of the elderly to refuse vaccination, measures that came too late.

Hong Kong's relative success in 2020–21 focused on isolation (Burns 2021; A. Cheung and He 2023; Cullen 2023). Authorities mostly closed the border with the mainland and limited traffic at the airport; imposed social

distancing and mask mandates; and closed residential care homes for the elderly to outside visitors (Lum et al. 2020). These measures failed when Omicron struck. The community squandered the seven months of near-zero local infections to dramatically ramp up the vaccination rate. "No infection, why vaccinate?" thought many in Hong Kong apparently. Vaccination complacency was strong.

This account of Hong Kong's COVID-19 vaccination experience is based on government sources (online dashboards, official reports, press releases, Legislative Council papers, etc.), media reports, academic papers, and interviews with key players.[1]

Vaccines

From January 2020, soon after the genome of the disease was made public, infectious disease experts in Hong Kong knew that laboratories and companies in China, the United States, and Europe were working at high speed on COVID-19 vaccines. They urged the government to buy vaccines for Hong Kong (K.-Y. Yuen 2022; G. Leung 2020).

Anticipating high demand ("everyone was chasing vaccines") and limited supply, the Hong Kong government's strategy was to try to acquire them by both joining the World Health Organization's (WHO) COVAX Facility, which it did on October 9, 2020, for the 35% of the population judged to be the most vulnerable (Legislative Council Panel on Health Services 2020), and purchasing from private companies, a strategy of "walking on two legs" (K.-Y. Yuen 2022; HKSARG 2020a). If the private purchases fell through, at least Hong Kong could use COVAX. Officials were aware that the COVAX Facility, designed for developing countries, would not supply sufficient vaccine for developed Hong Kong (So and Woo 2020).

Hedging, the government initially planned to buy vaccines from four different platforms: inactivated whole virus (Sinovac), messenger ribonucleic acid, or mRNA (Pfizer-BioNTech), adenoviral vectored (AstraZeneca), and recombinant protein (Novavax) (K.-Y. Yuen 2022). On December 12, 2020, authorities announced that they had or would soon have advance purchase agreements for three of the four vaccines (Sinovac, Pfizer-BioNTech, and AstraZeneca) to supply 7.5 million doses each of these vaccines, enough to cover two doses of the vaccine for the entire Hong Kong population 1.5 times (Legislative Council 2021b). Lam said on December 23 that "for the sake of prudence" authorities would pursue a further 7.5 million doses from a fourth platform, enough to provide two doses for the entire population two times over (HKSARG 2020b, "Chief Executive"). Officials scheduled the arrival of the vaccine in batches based on anticipated demand. Critics pointed out that Hong Kong had violated WHO's Fair Allocation Framework, which recommended that "initial allocation be pro-

portional to vaccinating 20% of a country's population," given the perceived global shortage of vaccines. Hong Kong was, they said, engaging in "vaccine nationalism" (Tran et al. 2022).

In October 2021, with more than enough vaccine and slowing demand for it (HKSARG 2021f), the government donated the advance purchase of 7.5 million doses of the AstraZeneca vaccine, not yet arrived, to COVAX (Patrick Nip, email, July 17, 2023; Tran et al. 2022). Authorities also perceived that Hong Kong people would not welcome AstraZeneca due to various reputational issues (K.-Y. Yuen 2022; Patrick Nip, email, July 17, 2023). In the end residents could choose from either inactivated Sinovac, manufactured on the mainland, or mRN Pfizer-BioNTech, manufactured in Germany.

Hong Kong projected that it would spend HK$8.4 billion on its vaccination program, including $5 billion for the vaccines purchased from Sinovac Biotech and Fosun Pharma/Pfizer-BioNTech and $2.9 billion for manpower and operational costs for their distribution (Ting et al. 2021). Authorities refused to reveal how much they paid per dose.

Hong Kong's Department of Health led the sourcing, evaluation (for safety, efficacy, and quality), and recommendation of vaccines for COVID-19. Tucked inside the department and its Emergency Response and Program Management Branch, the Vaccines Procurement and Support Team is staffed by pharmacists and executive officers. They were experienced in evaluating and procuring vaccines (Hong Kong requires and/or makes available 72 different vaccinations for its population). Two committees of experts advise the Department of Health on vaccines: the Scientific Committee on Emerging and Zoonotic Diseases (SCEZD) and the Scientific Committee on Vaccine Preventable Diseases (SCVPD). On August 13, 2020, a joint committee of the SCEZD, the SCVPD, and the EAP (abbreviated JSC-EAP) met to review the scientific development of COVID-19 vaccines and prioritization of target groups for the vaccines (Centre for Health Protection 2021a). On December 11, 2020, authorities announced that they had entered into an agreement to purchase the three vaccines identified above. Officials also set up an Advisory Panel on COVID-19 Vaccines (AP) to advise Secretary for Food and Health Sophia Chan Siu-chee on authorization of COVID-19 vaccines for emergency use "based on the available data concerning safety, efficacy, quality and scientific evidence, and on matters related to the administration of the vaccines" (Centre for Health Protection 2021a). On January 7, 2021, the JSC-EAP met prior to the AP's review of emergency approval applications. The AP then recommended to the government (Lam and the steering committee) that the Pfizer-BioNTech and AstraZeneca vaccines be approved for emergency use (they were expected to arrive in Hong Kong during the first and third quarter of 2021, respectively). Secretary Chan authorized the use of Pfizer-BioNTech on January 25 based on the recommendation of experts (Lam 2021a).

The government pointed out that a recommendation on Sinovac,

expected to arrive even earlier in January 2021, "will be updated should more clinical information become available" (Centre for Health Protection 2021a). On February 19, authorities announced that the JSC-EAP had reviewed the Advisory Panel on COVID-19 Vaccines report on the emergency use of Sinovac in Hong Kong (Centre for Health Protection 2021d). The experts recommended the emergency use of Sinovac, although they pointed out that phase 3 clinical studies had not been published in peer-reviewed journals, nor was it available in preprint. Experts reviewed the available information (limited phase 3 clinical studies especially for those aged 60 or over due to small sample size) supplied by the manufacturer Sinovac Biotech (Hong Kong). They pointed out that data showed that the vaccine was safe and immunogenic for those over the age of 18 and that "the benefit of using [Sinovac] generally exceeds the risk of not using any vaccines for persons aged 60 or above," a relatively weak endorsement (Centre for Health Protection 2021c). Secretary for Food and Health Sophia Chan then authorized the vaccine for emergency use on February 18 (Lam 2021a), and the first batch of one million doses arrived on February 19. Each recommendation came with a long list of contraindications and possible side effects, supplied by the manufacturer.

For inactivated vaccine the government chose Sinovac, manufactured on the mainland by a private company (Sinovac Biotech Ltd., based in Beijing), rather than Sinopharm, also available but manufactured by China National Pharmaceutical Group Company, a state-owned enterprise. Experts perceived that dealing with a private firm was easier than with a state-owned enterprise (K.-Y. Yuen 2022). For Sinovac, the only issue was price and availability. Shanghai Fosun Pharmaceutical Group Co. Ltd., a private company, set up a joint venture with BioNTech in Germany to produce and distribute BioNTech in China, including Hong Kong. However, China has so far refused to approve mRNA vaccines for use on the mainland. Fosun has manufactured BioNTech in Germany mostly for Hong Kong's small population (K.-Y. Yuen 2022).

All the vaccines needed refrigeration, but BioNTech needed cold chain storage of at least –70 degrees Celsius and had a shelf life of six months (Centre for Health Protection 2021a). In Hong Kong, DCH Auriga Hong Kong Ltd., experienced in cold chain logistics, provided ultracold storage in a warehouse in Kowloon (DCH Auriga 2021).

Vaccinations

A little over two months before the planned rollout of Hong Kong's vaccination program on February 26, 2021, the government selected Secretary for the Civil Service Patrick Nip Tak-kuen to lead it. On December 23, 2020, the chief executive appointed Nip and Secretary Chan to co-chair the interdepartmental 2019 Coronavirus Vaccination Program Task Force with

responsibility to implement the program. The task force brought together representatives of a dozen government policy bureaus, departments, and agencies and individuals—including the politically appointed secretaries of food and health, civil service, labor and welfare, education, innovation and technology and home affairs; heads of relevant departments including health, social welfare, home affairs, leisure and cultural services, electrical and mechanical services, information, and the office of the government chief information officer; the Hospital Authority; and three medical doctors, one a retired controller of the Centre for Health Protection, another a retired controller of CHP and retired CE of the Hospital Authority, and the third the current head of the elderly commission, a recognition of the importance of vaccinating the elderly (Nip 2022; email, June 18, 2023). The task force was responsible for identifying the priority groups for vaccination; determining the process of vaccine delivery, including setting up and supervising the operation of the vaccination dashboard through which vaccination bookings were made; determining the process and specific arrangements for vaccination, for example, in 29 community vaccination centers and other venues; overseeing recordkeeping for vaccination, for example ensuring e-health records recorded and displayed vaccination histories; and providing publicity, promotion, and education for vaccination (Nip 2022; email, June 18, 2023; HKSARG 2020c, "Secretary for the Civil Service"). The task force, a large body, met approximately every two weeks during the first three months of the vaccination program (January–March 2022) and less often after that. On December 30 Lam also set up an Advisory Panel on COVID-19 Vaccines, staffed with experts.

By February 26, 2021, the vaccination command center was fully operational, set up inside the Hong Kong central government offices conference center and staffed by about 30 people, including retired civil servants. The command center linked and monitored all the government vaccination venues, monitoring them during their operating hours (8:00 a.m.–8:00 p.m.). A deputy secretary for the civil service, in charge of general grades, set up a team deployed from across the civil service (including retired civil servants) to manage the day-to-day operations of the vaccination program (Nip 2022).

The steering committee, chaired by Lam, determined "high level" principles, such as that COVID-19 vaccination would be a government program, free of charge, using vaccines authorized for emergency use that must be procured centrally by the government and could not be procured by the private sector (Nip 2022). The task force then established implementation principles, such as that vaccination was not compulsory, that residents would have a choice of vaccines, that they needed to give informed consent to be vaccinated, and that vaccinations should be easily accessible and the priority coverage for vaccination. The task force also discussed the need for the Food and Health Bureau to set up a monitoring system for serious adverse events and for the government to establish a

HK$1 billion indemnity fund to compensate those who suffered "unexpected serious adverse events" as a result of vaccination (HKSARG Vaccination Dashboard, n.d.-a; Food and Health Bureau 2021; Nip 2022).

When it met on August 13, 2020, the JSC-EAP committee of experts had recommended vaccination priority: health-care workers, residents of residential care homes, government frontline staff involved in health-related work, persons aged 60 years or above, and persons with chronic medical problems (Centre for Health Protection 2021a). By February 22, 2021, just a few days before the program's launch, the chief executive provided more details on vaccination priority: (1) health-care workers; (2) those aged 60 or above; (3) residents and staff of residential care homes for the elderly; (4) those who provide essential services (workers in container terminals, workers in slaughterhouses, and frontline staff of the disciplined services); and (5) those working in cross-border transportation and at border crossings (HKSARG 2021a). In all, authorities prioritized 2.4 million Hong Kongers for the jabs (Ting et al. 2021).

At the outset, authorities planned to distribute the vaccine through four channels: 29 community vaccination centers (CVCs); 18 Hospital Authority outpatient clinics; over 1,000 (later 2,000) private clinics; and outreach teams of health-care workers to vaccinate those in residential care homes (HKSARG 2021a). To run the CVCs, the HA partnered with various health-care professional bodies, medical associations, and private hospitals. The government subsidized the partner organizations at a rate of HK$72 per dose. The government was the sole provider of vaccines to private clinics (mostly Sinovac at the early stages of the program), subsidizing them at a rate of HK$80 per dose for the first dose, HK$40 per dose for the second dose, and forbade them from charging any additional fee (HKSARG 2021b).

Beyond this, authorities reached out to companies (May 18, 2021), schools (July 26, 2021), and shopping malls (August 5, 2021), deployed mobile vaccination units (December 3, 2021, and launched a home vaccination program for the elderly (April 26, 2022) (Nip 2022). The government gradually set up walk-in vaccination stations in public hospitals, from September 28, 2021, expanding to 13 hospitals by January 2022. The government provided an online vaccination booking service as well as information about the booking processes, types of vaccine, risks, and so forth on a dedicated vaccination dashboard. Authorities also set up an e-health electronic platform to allow for the sharing of vaccination histories and other medical data. From May 1, 2021, authorities hired 2,000 employees from the tourism industry, hard-hit by the border closures, to help staff 20 CVCs, 50 to 60 working in two shifts in each center (D. Tsang and Low 2021; HKSARG 2021d).

From February 2021 to July 2023, Hong Kong vaccinated approximately 94% of the population with two doses of vaccine. Authorities initially restricted COVID-19 vaccines to Hong Kong residents, extending coverage

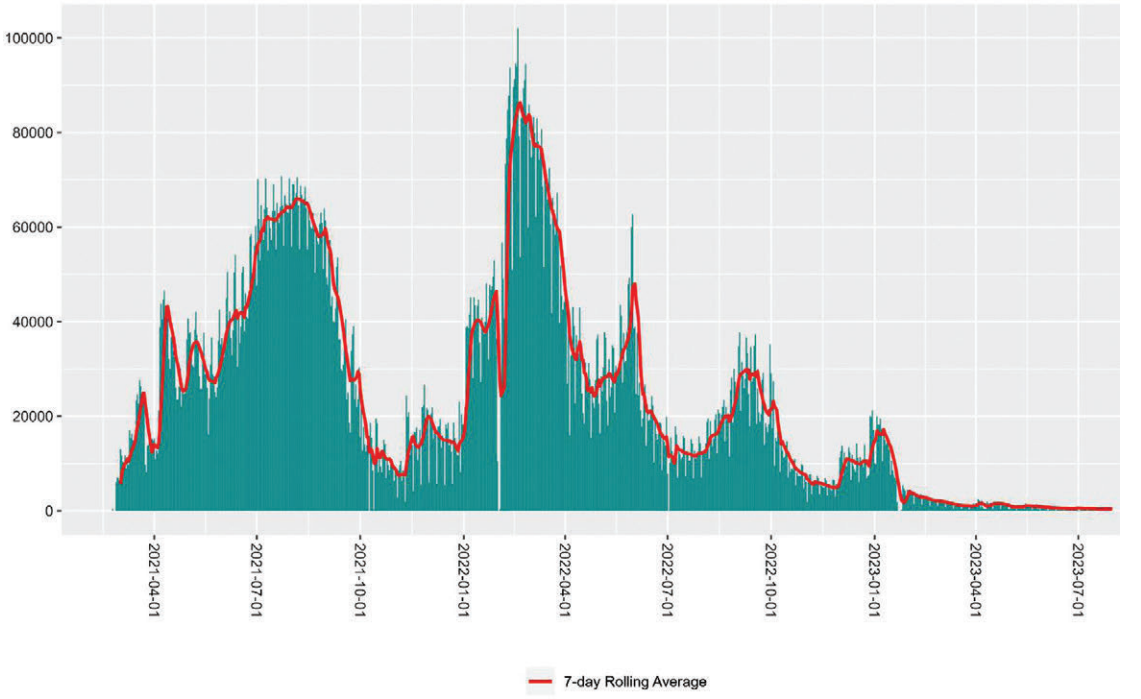

Fig. 19.1. Total doses of COVID-19 vaccine administered by day, February 2021–April 2023

to mainland Chinese visiting Hong Kong from May 28, 2021, and to approximately 14,000 refugees in July 2021 (Lau 2021). Distribution varied by gender (more women than men took the first dose) and age. During the period virtually the entire population of those aged 12–59 received two doses. Less vaccinated even by July 2023 were the very young and the elderly. For example, 82% of those aged 3–11 received two doses. Among the elderly, rates varied: 60–69 years, 85%; 70–79, 77%; and over 80, 71% (HKSARG Vaccination Dashboard, n.d.-b). The government gradually expanded coverage from the priority groups to those aged 30–59 (March 26, 2021); 16–29 (April 23, 2021); 12–16 (June 11, September 15); 3–11 (December 2); and 6 months (August 4 [Sinovac], November 9 [BioNTech]). Authorities set goals for themselves: one dose for 70% of the population by September 2021 (achieved); one dose for 90% by March 2022 (achieved); and 90% for those aged 12 and above (two doses) and for first doses for those aged 3–11, 70 or older, and the elderly in residential care homes by April 2022.

From June 15 to September 20, 2021, the daily number of doses administered rose. But from September to January 2022 daily numbers fell (7,000 doses in November compared to 60,000 doses in July). Beginning in January 2022, demand for vaccines picked up, spurred by the fear of Omicron, on the one hand, and the anticipation of a mandate-like vaccine pass or threats to their employment, on the other (see fig. 19.1).

Authorities used a mix of incentives to drive up the vaccination rate. Throughout the vaccination program, Hong Kong's leaders led by example (photos showed them being vaccinated) and exhorted the public to take the vaccine in public statements, press releases, news conferences, social media, and online messages (May 3, 2021). From July to September 2021 businesses provided lucky draws, a luxury flat, cash, iPhones, staycations, dining coupons, cruises, "all you can eat" deals, free subway rides, business-class airline tickets, movie tickets, free health care, a Tesla car, TVs, free tours, overseas holidays, and so forth, worth millions of Hong Kong dollars (Kwan 2021). These measures during summer 2021 likely boosted vaccinations somewhat.

Officials also used a more coercive measure—a vaccine mandate—and prosecuted those who flouted it. A vaccine mandate, although not strictly compulsory, entails "direct or indirect threats of imposing restrictions in cases of non-compliance," that could entail "gross personal or financial consequences" (Gravagna et al. 2020; K. Cheung, n.d.; Law et al. 2022). Hong Kong had used vaccine mandates before (see Centre for Health Protection, 2017). The mandate rewarded those who were vaccinated. Authorities introduced it gradually.

The government first required all its employees, HA staff, and schoolteachers and staff to get vaccinated or undergo weekly testing at their own expense (August 27, 2021). On September 1, this was expanded to include staff of residential care homes. On November 1, officials required all those entering government offices to use a locally developed "Leave Home Safe" app for contact tracing. Authorities extended the app's use to other premises, including all restaurants on December 9, but indicated that the government was considering a "vaccine pass." On December 28, authorities began to require government employees who had not been vaccinated to test every three days rather than weekly. By mid-February, the government planned that civil servants would need to show their vaccination record to access government offices.

On February 24, 2022, with Hong Kong awash with Omicron and a staggering increase in deaths from COVID-19, came the vaccine pass, which required visitors to establishments to show they had been vaccinated or had a valid exemption. Authorities ratcheted up in stages the number of doses required to enter (February 24–April 29, one dose; April 30–June 29, amended to May 30, two doses; end of May, three doses). The pass applied to all restaurants (including bars or pubs), amusement game centers, bathhouses, fitness centers, places of amusement, places of public entertainment, party rooms, beauty parlors and massage establishments, clubs or nightclubs, karaoke establishments, mahjong-tin kau premises, clubhouses, sports premises, swimming pools, cruise ships, event premises, religious premises, barber shops or hair salons, shopping malls, department stores, supermarkets, markets, and hotels or guesthouses, where it only applied to staff members (HKSARG 2022a).

Authorities required managers of these establishments to check the vaccine status of each potential customer. The community mostly complied. Authorities monitored and prosecuted violations. Some in Hong Kong resisted, however. In September 2022, authorities arrested seven medical doctors accused of issuing more than 20,000 fake vaccination exemption certificates among them between February and September 2022 (Lo and Mok 2022). In other cases, employees of mostly smaller establishments helped customers evade the requirement.

On February 25, 2022, the government also changed the employment law to allow employers to dismiss employees who refused vaccination without a medical certificate. Employers used the threat of dismissal to insist that their staff be vaccinated. Anecdotal evidence indicates it worked. More than 20 civil servants were removed from office for failing to produce either evidence of vaccination or a valid exemption (Patrick Nip, email, July 30, 2023).

On February 26, having run out of quarantine facilities, the government relaxed quarantine requirements for the vaccinated. On June 13, the vaccine pass was extended to all public health facilities and by September applied to anyone over the age of five years old (HKSARG 2022e). The pass remained in force in Hong Kong until December 28, 2022.

The statistics conceal the very low rates of vaccination among the elderly when the Omicron fifth wave hit Hong Kong in late December 2021. Among Hong Kong's population aged 70 or older, vaccine hesitancy was widespread. In September 2021, only 40% of 70–79-year-olds and 15% of those over 80 (a population of 400,000) had received one dose of vaccine (Lam 2021b). On December 28, 2021, now focused on two doses, authorities reported they had vaccinated less than half of 70–79-year-olds and only 20% of those over 80. This was the stark situation as Omicron swept through Hong Kong. On January 28, 2022, one month into the fifth wave, the CE noted that authorities had been unable to vaccinate 500,000 people over the age of 70 with even one dose (Lam 2022).

During Hong Kong's Omicron fifth wave, 13,115 Hong Kong residents died of or with COVID-19. Authorities relaxed pandemic restrictions during the February Lunar New Year with lethal consequences (Xie et al. 2023). COVID-19 deaths increased rapidly from February 16, 2022, reaching nearly 300 fatalities per day during March 8–17, falling to single digits only in early May. Another spike in deaths occurred from August 2022 to January 2023, reaching 75 per day in late December 2022 and early January 2023 (University of Hong Kong 2023) (see fig. 19.2). COVID-19 hit the unvaccinated elderly very hard: over 95% of fatalities involved people over the age of 60. Of all fifth-wave fatalities, 60% were unvaccinated and nearly half lived in residential care homes (HKSARG Vaccination Dashboard, n.d.-c). These were the highest death rates in the world from COVID-19 at the time (Taylor 2022; Smith et al. 2022). In August 2022 the government observed that 30% of those over 80 continued to be unvaccinated, "a dangerous situation, which is alarming" (HKSARG 2022d).

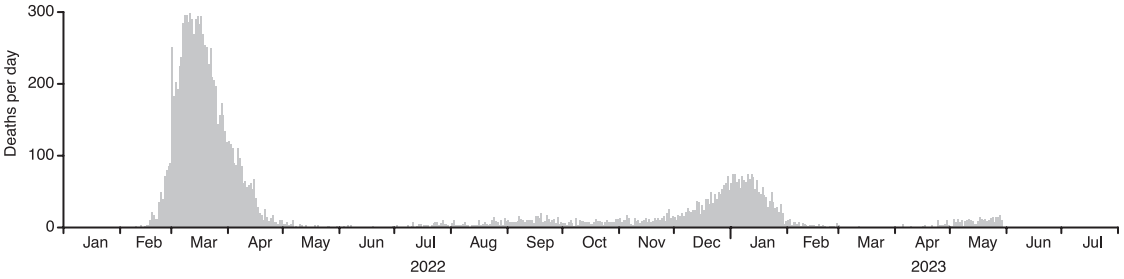

Fig. 19.2. Hong Kong COVID-19 deaths per day, January 2022–July 2023

Major challenges facing Hong Kong's vaccination program included inconsistent messaging, vaccine hesitancy, and crisis management failures among government departments. Authorities met other possible challenges, such as obtaining sufficient and timely supply of the vaccines and mobilizing resources (manpower and finance) to design and implement the vaccination program.

Explanation

Hong Kong coproduced its COVID-19 vaccination outcomes with government departments and authorities, private medical clinics, health management organizations, nongovernmental organizations like the Hong Kong Jockey Club, the media, owners and managers of residential care homes, families, friends, and individuals. In other words, the state, business, and civil society coproduced Hong Kong's vaccination outcomes (Hattke and Kalucza 2019; A. Cheung and He 2023; W. Wong and Wu 2021). Low trust in government dominated the exercise. In January 2021, when the vaccination program kicked in, only 18.2% of the population trusted the government while 54.1% distrusted it, a legacy of the 2019 anti-government protests (Chinese University of Hong Kong 2023).

For effective coproduction, key stakeholders, such as Hong Kong residents, must have the knowledge and skills of how to coproduce. Authorities attempted to provide the necessary information with inconsistent results. The medical profession, the media, residential care home managers and staff, and family all filtered and interpreted the official messages. Knowledge and skills are mediated by perceptions of self-efficacy (Thomsen 2015). Many in Hong Kong's elderly community lacked high self-efficacy, felt powerless, and hesitated.

Inconsistent Messaging

In Hong Kong's low trust environment, authorities mounted their program to manage and tame COVID-19 using, in the words of one inter-

viewee, "hyper transparency." Transparency was needed, the chief executive said, to rebuild trust in the government. Through transparency the government can "restore and build trust in our community. It is through such trust and professionalism that we will overcome this challenge together" (HKSARG 2021e).

Authorities communicated directly with the public through live streamed press conferences (daily during the various COVID-19 waves), traditional and social media, and online resources via dashboards. Both COVID-19 and the vaccination program had their own dashboards in the languages of Hong Kong (Chinese, English, Hindi, Nepali, Urdu, Thai, Bahasa Indonesia, and Tagalog plus Sinhala, Bengali, and Vietnamese for the vaccination program). These communication channels provided a wealth of information on policies, regulations, advice, offers, statistics, and so forth with links to many other resources in Hong Kong and overseas.

In Hong Kong, hyper transparency meant elaborating at length on the risks of COVID-19 vaccines. Long lists of manufacturer-supplied possible side effects or complications were included on every consent form that residents formally acknowledge before being vaccinated. Authorities advised anyone with a chronic illness to consult their doctor in advance. The elderly usually had many "chronic illnesses" (e.g., hypertension, diabetes, and heart disease). Misunderstanding the risks characterized the early vaccination rollout.

First, the DH adopted a very cautious approach, urging anyone with a medical condition to consult their doctor before being vaccinated. Quoting the product information provided by the manufacturer, DH advised that those with uncontrolled severe chronic diseases should not receive the vaccine. Those with severe chronic illness should use the vaccine with caution; if necessary, delay vaccination after doctor's assessment (HKSARG 2021c). For "frail elderly," those bedridden in residential care homes, usually over the age of 85, authorities were initially very cautious. Of BioNTech, officials initially warned that "a mild adverse event from vaccination might worsen their original disease course or condition" and that the benefits and risks of taking the vaccine should be evaluated by their doctors and "such assessments should be exercised with greater caution" (Centre for Health Protection 2021b).

The advice was not wrong, but it put the onus on the medical profession to advise on vaccination, as the DH usually did with other vaccination programs. Risk-averse doctors took note. The vaccine was for emergency use, and clinical trial data for Sinovac especially was thin. Doctors were cautious, families of the elderly were cautious, and, as it turned out, both mostly urged against vaccinating the elderly (Kwan 2022). Better safe than sorry, they reasoned. As one media analyst noted: "You've basically created this idea that, if there's something wrong with you, then you should not get vaccinated—otherwise why would you go to see your doctor?"

(Kwan 2022). Six months later, in June 2021, the CHP recommended that the elderly be vaccinated with either vaccine but pointed out that inactivated vaccines (such as Sinovac) had been used with effective results in Hong Kong for years (Centre for Health Protection 2021f).

Second, the way the government and media reported deaths up to 14 days after vaccination sometimes gave the impression that the two events were linked, even when there was no evidence that they were (Kwan 2022). In the critical first month of the vaccination program, although the DH observed that "there is no particular safety concern," hospitals' simple announcements reported both deaths and the deceased's vaccination status. The DH sometimes did the same and at other times put the cause of death in the context of general mortality statistics, based on age and disease. After several deaths following vaccination in March 2021, the DH repeated the message that there was no particular safety concern with the vaccinations. One public health expert said: "The explanation was that this person had heart disease, so it was no surprise that they had a heart attack after vaccination. That way of phrasing it wasn't exactly saying the vaccine didn't cause it, it was saying that the event might have occurred anyway even without vaccination" (Kwan 2022).

The public read the headlines and drew their own conclusions. Mixed messaging undoubtedly allowed the media, doctors, and local residents, including families of the elderly and the elderly themselves, to make up their own mind about the risk of vaccination. The city's politicians expressed concerns about the side effects of the vaccines, urging the government to explain clearly which groups of people should not be vaccinated and explain clearly the adverse events that could occur after vaccination "to allay the public's worries" (Legislative Council 2021a). Inconsistent messaging "created a lot of concern about the safety and effectiveness of the vaccine, really early on" (Kwan 2022).

The vaccination program dropped into Hong Kong's toxic politics. With the community deeply divided into supporters of the government and opposition, the origin of vaccines became an issue. It didn't help that while the government's advisers were touting BioNTech as the more effective vaccine (Li et al. 2022; Khong et al. 2022),[2] Hong Kong's political class very publicly choose Sinovac for itself (Kwan 2022). This created more confusion. The media, split into pro-government and opposition outlets, took sides. For example, the popular opposition broadsheet *Apple Daily* repeatedly referred to COVID-19 as the "Wuhan pneumonia" and claimed that the mainland companies supplying vaccine to Hong Kong were collecting personal information on vaccine recipients, damning the mainland vaccine, Sinovac, in particular. Slander, grossly inaccurate and extremely regrettable, the government shouted back (*Bastille Post* 2021; Voice of America 2021). Public security police closed *Apple Daily* in June 2021, but politicized messaging about COVID-19 and the vaccines continued, especially on social media.

Health-care workers were also involved. Speaking at the 20th anniversary of the establishment of the Hospital Authority in May 2021, the chief executive said: "It is . . . very disappointing that . . . some healthcare staff had chosen to politicize anti-epidemic measures and engage in spreading inaccurate information. . . . Despite that public safety is at stake, a small group of people have repeatedly sought to undermine our anti-epidemic efforts, including . . . slandering mainland vaccines" (HKSARG 2021e). "The way in which vaccines were made available to people was very politicized. . . . This created a bit of confusion amongst many about who do you trust about issues related to safety and effectiveness" (Kwan 2022). Mixed messaging took a toll on people's willingness to take the vaccine.

Vaccination Hesitancy

In Hong Kong, as elsewhere, trust in government and in experts and vaccines matters (Baumgaertner et al. 2018; Wynen et al. 2022). Lack of trust in government and in the safety and efficacy of COVID-19 vaccines best explains Hong Kong's widespread vaccine hesitancy, especially in 2021.

In January 2021, as the vaccination program kicked off, less than 50.2% of the population intended to take the shots, low by Organization for Economic Cooperation and Development standards (University of Hong Kong 2021). Early 2021 surveys identified vaccination refusal and hesitancy connected to both low confidence in vaccine safety and efficacy, and worry about possible side effects (Chu et al. 2022; University of Hong Kong 2021; K. Wang et al. 2021; S. Tsang 2022). Less significant but still present was low trust in government (Lau BHP et al 2022). In one January 2021 survey, about 15% of respondents gave "don't trust the government" as a reason for refusing to be vaccinated (University of Hong Kong 2021). "Under the low-incident [many months of zero local infections in 2021] and low-trust environment such as Hong Kong, vaccination decisions are heavily influenced by family's decision and the perception of vaccination as socially and politically desirable" (Lau BHP et al. 2022). That is, trust in government and satisfaction with government were associated with vaccination acceptance (Yu et al. 2021). Trust of vaccine manufacturers and in the health-care system also correlated with vaccine acceptance (M. Wong et al. 2021). Beyond trust, health literacy and high self-efficacy were associated with vaccine acceptance. Those who were less knowledgeable and feeling less self-efficacious were more likely to hesitate (Yuan et al. 2023).

Initially the young, those aged 18 to 34, were the most vaccination-hesitant population. By mid-2021, those over 65 were most hesitant (Xiao et al. 2022; see also K. Wang 2021). Appealing to collective interests moved the young to be vaccinated, while those over the age of 65 tended to free ride (K. Wang et al. 2021). Mixed messaging, cautious doctors, and media reports of deaths and other adverse reactions to vaccination took their toll.

The elderly, especially the frail elderly living in residential care homes, heavily dependent on doctors, care home staff, and their own families, refused or hesitated in large numbers.

Crisis Management Failures

To implement the vaccination program, authorities brought together relevant government organizations in a steering committee and a vaccination task force. This design failed to deliver timely vaccinations into the arms of Hong Kong's elderly. Crises like COVID-19 require cross-sectoral horizontal and vertical coordination.

In 2021 those aged 65 and older numbered 1.3 million. Many lived with their families, but 50,000 elderly or people with mobility issues lived alone (J. Tsang 2022). Many others lived in residential care homes for the elderly and the disabled. In 2020 there were more than 76,000 residential care beds for the elderly spread over 1,230 residential care homes for the elderly (median age 86) and disabled (median age 50) (Lum et al. 2020). Companies and nongovernment organizations sign contracts with the Social Welfare Department (SWD) to manage the homes, mostly characterized by poor infection control. Officials heading the vaccination program perceived that vaccinating the elderly, especially in residential care homes, was the responsibility of the SWD (Chan 2022; Nip 2022; K.-Y. Yuen 2022). The SWD treated the COVID-19 vaccination program as any other (e.g., seasonal flu) and implemented it through a visiting medical practitioner service for residential care homes (Social Welfare Department n.d.).

In 2021 the SWD organized two vaccination outreach programs for the homes. In an April 2021 exercise, 20% of care home residents agreed to be vaccinated, but cautious doctors decided that only 10% of this number of residents (that is, 2%) were "suitable." First-dose vaccinations in the homes crept up from 2.4% in April to 22% by December 2021, during the period of near-zero local infections. The Secretary for Labor and Welfare called the results "pathetic" (Labor and Welfare Bureau 2022). An insider said: "The subsidized homes are more bureaucratic than the SWD. They have to be very careful . . . [and are] very cautious . . . their action in every dimension is very conservative . . . risk averse . . . because the vaccine is something new. . . . The DH initial instructions put the responsibility on the doctor, doctors don't want to take the responsibility, family doesn't want to take responsibility, managers of subsidized homes are not enthusiastic, sometimes not cooperative." Another interviewee said: "Care home operators were 'unenthusiastic, not keen' about COVID-19 vaccinations: if there were complications who would care for the elderly after vaccination?" (Nip 2022).

In late 2021 the vaccination task force (Nip) replaced the SWD's visiting doctors with health management organization (HMO) doctors (e.g.,

CUHK, Quality Health Care, and Town Health), who were also paid. This cut the screen-out rate, but serious coordination problems persisted. The HMO doctors had no information on the elderly in the homes, their medical condition, the care home infection situation, and so forth. Family members continued to object to their elderly relatives being vaccinated; some care homes refused to allow the doctors in because the homes had confirmed cases of COVID-19 inside; some doctors refused to enter the homes because of the confirmed cases; and doctors arrived and found that the consent forms were incomplete or missing (Labor and Welfare Bureau 2022; Nip 2022).

In January 2022 the task force acted again. Authorities established a new dedicated care home vaccination command center inside central government offices to sort out the problems real-time on the ground as they happened and required SWD to set up a new platform collating all relevant information for each care home and identify an on-call SWD liaison officer for each home to solve problems on the spot (Nip 2022). Authorities also imposed limits on families to object to vaccination (requiring them to be legal guardians, e.g.). These measures came much too late.

Many expressed disappointment with the SWD's lack of urgency. Of the SWD, one interviewee said: "SWD didn't resist [the vaccination drive]. . . . The responsible directorate officers inside the SWD were hardworking, but not smart, lacking the urge [to solve problems] . . . had a bureaucratic mindset. We would usually hear from the SWD that the cause of a problem [in the vaccination of the elderly in care homes] was a restriction or requirement from the DH." (SWD usually just waited for advice from the DH, another interviewee said.) "Instead, you should sort things out with the DH. You can't just say the problem; you have to sort it out! SWD lacked leadership."

By May 2022, well after the peak of the fifth wave, authorities had reported 55,000 cases of COVID-19 in these homes, mostly in the care homes for the elderly. Vaccination coverage was lower in care homes for the elderly than for the disabled and lower in privately run care homes than in those subsidized by the government. The most vulnerable were the elderly living in privately run care homes, where the facilities were poorer and isolation virtually impossible (M. Leung et al. 2023). The new arrangements eventually paid off. By mid-2023 the vaccination rates for the first and second doses among residential care home residents were about 93% and 87%, respectively, while that for the third dose was about 40% (HKSARG 2022c). Beyond the residential care homes, authorities only launched a home vaccination program for non-care home elderly in April 2022.

Conclusion

Hong Kong's COVID-19 vaccination outcomes were coproduced by the government, the media, the medical profession, nongovernmental orga-

nizations, families, and individuals. The vaccination program had many successes, including a relatively high third-dose vaccination rate by mid-2023. But the same institutions also coproduced a high COVID-19 death toll among the elderly. The elderly, more dependent on their families and others than before, needed support. Cautious doctors often withheld explicit recommendations to vaccinate. Lacking such support, the elderly hesitated. Low health literacy, low self-perceptions about aging, lacking support from doctors and family, and bombarded with negative vaccine stories in the media and from peers, Hong Kong's elderly hesitated (Yuan et al. 2023). Many died.

Mixed messaging and widespread vaccination hesitancy contributed to the result. Political authorities tried to overcome low trust by calling on experts. Still, doctors were cautious and worried about liability; families, observing no local infections in 2021, didn't see the need; worried about safety and side effects, they refused consent for their loved ones. (If even one family member objected, no vaccination of an elderly family member could take place.) Of information about seasonal flu vaccine programs, experts advise: "Health professionals and mass media should reduce the complexity when delivering the health messages and make it easier for older adults to access and comprehend, thus increasing the inclination to take vaccine and preventing the spread of communicable diseases" (Zhang et al. 2020). The advice also applies to COVID-19 vaccinations.

Although officials in Hong Kong assert that Hong Kong had the autonomy to manage COVID-19 on its own, given its position as a part of China, its dependence on China for food and water and much else, its need to reopen and maintain an open border with the mainland, deviating from China's "dynamic zero COVID-19" policy was impossible. China's COVID-19 policy was to suppress the virus, not to "live with it" through vaccination and infection, acquiring a kind of "herd immunity." To reopen the border with the mainland, on which Hong Kong's economy and society depended, authorities aligned Hong Kong's COVID-19 policy with the mainland. Accordingly, until China changed its policy on the mainland, which it only did in December 2022, Hong Kong authorities could not credibly commit to "living with the virus" if the vaccination rate reached a certain level.

Hong Kong managed COVID-19 relatively effectively from January 2020 for two years until the Omicron wave. Informed by lessons learned from SARS-1 in 2003, authorities in Hong Kong were reasonably well prepared, pre-Omicron. In 2003–4, experts and the Legislative Council reviewed Hong Kong's experience of SARS-1. Based on the reviews, officials set up the Centre for Health Protection, improved coordination between the HA and the DH, set up the steering committee system, improved communications with mainland health agencies, and enacted many other reforms. We've seen that Hong Kong's COVID-19 performance was decidedly mixed. Unfortunately, in 2023 the Hong Kong CE (John Lee Ka-chiu, who

took over on July 1, 2022) announced that authorities would undertake no independent reviews of how Hong Kong managed and mismanaged COVID-19 (Cheng et al. 2023). From Hong Kong's new-look Legislative Council: silence. Many expressed disbelief (H. Leung 2023; Burns 2023). Learning from past experience is critical for preparing for future pandemics. To forgo an independent review is a short-sighted, high-risk decision that could have disastrous consequences going forward.

NOTES

1. Interviewees included Sophia Chan Siu-chee, the secretary for food and health (2017–22) (in charge of the Hospital Authority, the Department of Health, and its Centre for Health Protection), August 11, 2022; Patrick Nip Tak-kuen, secretary for the civil service (2020–22) (in charge of the COVID Vaccination Program), August 17, 2022; Professor Yuen Kwok-yung, HKU epidemiologist, an expert adviser to the Hong Kong chief executive on COVID, August 4, 2022; Professor Gabriel M. Leung, HKU epidemiologist, an expert advisor to the Hong Kong chief executive on COVID, June 12, 2020; Professor Terry Lum Yat Sang, HKU expert on social welfare and residential care homes, August 8, 2022; and other senior officials.

2. See later research, e.g., McMenamini et al. 2022, showing that three doses of either is very effective at about the same rate.

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20 | COVID-19 Vaccination in Japan

Before Vaccines, Limiting Viral Spread, and After, Reducing Vaccine Hesitancy Through Effective Public Health Messaging

Kathryn Ibata-Arens

The key lessons from Japan's experience with the coronavirus and vaccine rollout in 2021–22 reflect three characteristics of Japan's economy and society: institutional features of its health-care system, cultural norms and demographics, and vaccine capacity and hesitancy. First, Japan has universal health coverage administered by a meritocratic government bureaucracy, but health care is provided in private hospitals, which complicated the initial public health response and vaccine provision. Second, cultural norms of mask wearing and a sense of individual responsibility for the collective care of society were key features in Japan's ability to minimize mortality despite the significant delays in its population receiving COVID-19 vaccinations. This is especially impressive considering that Japan's economy continued apace—albeit within the context of prolonged border closings—with fewer interruptions to business activity and limited school shutdowns compared to elsewhere in the world, responding to socioeconomic concerns that there should be business as usual (Oshitani 2022). Third, a combination of lack of domestic capacity to develop and produce vaccines in Japan's pharmaceutical industry and vaccine hesitancy once they were made available was dealt with by a major government-led public health communication campaign with the help of the Japan Medical Association (JMA).

The first documented case in Japan of the coronavirus disease emerging in 2019 (COVID-19) was January 15, 2020 (Incerti and Yamagishi 2022). On February 3, 2020, a Carnival Cruise Line ship, the *Diamond Princess*, docked in Yokohama, just south of Tokyo. It soon became apparent that hundreds of passengers were sickened with this mysterious respiratory disease, while others were asymptomatic but later found to be positive after they had disembarked and spread COVID-19 (Kurahashi et al. 2021; Nakazawa et al. 2020; Nomura et al. 2022). Japan had its first coronavirus cluster. Japan was well equipped and trained for natural disaster response, but less so for disease threats, particularly respiratory ones. Disaster-focused hospitals with medical assistant teams were dispatched to assess

the situation on the cruise ship. Unfortunately, it was later found that these teams had mishandled triage and quarantine of the infected passengers, accelerating the spread of COVID-19 to the Japanese mainland (An and Tang 2020). An and Tang (2020) argue that Japan's unpreparedness stemmed from its limited exposure to previous respiratory epidemics that hit other Asian countries, including SARS and MERS. This lack of national capacity explains in part Japan's decision to close its borders at length to limit the spread of COVID-19 (March 21, 2020–October 11, 2022). Many, including long-term residents who were prohibited from returning to Japan from overseas trips and thus separated from their families for many months, have criticized this action as excessive. Japan was also criticized for its slowness to act and, once it did, for its mishandling of the immediate health crisis response. This slowness is often attributed to its consensus-based decision-making, requiring consultations within and across ministries that delay critical decisions thus affecting human lives when faced with crisis. Japan is like a large tanker ship: it takes a long time to turn, but once it does, it is committed to that new course.

Japan was slow to obtain and deploy vaccines, its population only beginning to receive immunizations in mid-2021, nearly a year after most people in the industrialized world had already had their first jab. Nevertheless, by the end of 2021, Japan's vaccination program had reduced mortality by 97%. In fact, Japan overall had among the lowest COVID-19-related mortality rates worldwide. By the end of 2021, 75% of Japan's population had at least one jab, and by the start of 2022, 80% had been vaccinated at least once (Kayano et al. 2023; Tsukimori 2022).[1] Even so, Kayano et al. (2023) argue that the initial vaccine rollout, which was focused in Japan first on its elderly population and health-care workforce, should have included younger adults, especially adolescents, a population known to engage in higher transmission behavior. This would have made vaccinations even more effective in reducing the overall COVID-19 burden to the state in terms of the cost of medical treatment, hospitalizations, loss of economic activity, and so forth.

Vaccines: What Did Japan Do?

Chronology

Aware of its weakness in domestic vaccine capacity, Japan committed early on to purchasing vaccines from all the anticipated top Western producers. Between July and December 2020, the Japanese government signed purchase agreements with three major vaccine makers: Pfizer-BioNTech (US/Germany), AstraZeneca (UK), and Moderna/Takeda (US/Japan). The government imported the Pfizer and AstraZeneca vaccines, while Japan's Takeda Pharmaceutical partnered with Moderna and

Novavax (US) to produce 150 million COVID-19 vaccine doses domestically (Takeda 2021). Kurihara and Saio (2023) find that Japan eventually purchased a huge surplus of COVID-19 vaccines, enough to inoculate the entire population seven times.

On February 14, 2021, the first COVID-19 vaccination was approved for use in Japan (Fukuda et al. 2023). That month, the government initiated a phased vaccine rollout, prioritizing health-care workers, the elderly (aged 65 and older), and then finally younger individuals (Kayano et al. 2023; Kaneda et al. 2024). But by May 2021, while populations in most of the industrialized world had received at least one jab, fewer than 5% of Japan's population had received a dose (Kosaka et al. 2021). In the last half of 2021, however, Japan successfully vaccinated more than a million people daily for months (Kayano et al. 2023).

On December 6, 2021, Prime Minister Fumio Kishida announced in a speech to the Diet (Japan's parliament) that to ameliorate Japan's vaccine dependency, the government would invest JPY 500 billion to fund the domestic production of vaccines and related research and development infrastructure (Sagara 2022). Relatedly, like other countries, Japan depends on China and India—mostly China—for the raw materials and active pharmaceutical ingredients (API) needed for medicines. For example, up to 95% of the API for Japan's *kampo* pharmacopeia is sourced from China (Ibata-Arens 2021).

Vaccinations

Even while Japan struggled to obtain vaccines for its own population, its support for international health diplomacy did not waiver. The COVAX initiative aimed at ensuring equitable global access to COVID-19 vaccines and was led by UNICEF, the World Health Organization, Gavi (backed by the Gates Foundation), and others. Consideration for joining COVAX began in Japan on August 18, 2020, at the request of Komeito, governing coalition partner of the Liberal Democratic Party. On September 15, 2020, the Japanese government took a cabinet decision that committed JPY 17.2 billion to spend on Japan's entry into COVAX. It is important to note that Japan was one of the early adopters of COVAX, ahead of the United States and Russia, for example. On June 2, 2021, Japan pledged an additional $800 million (87.68 billion yen) to COVAX. By May 2022, Japan was reported to have donated $1 billion to the COVAX Facility (Akimoto 2022; *Asahi Shimbun* 2021).

In 2021, Japan donated 9.7 million vaccines to Southeast Asian countries (Satrio 2022). By 2022, Japan had donated around 24.65 million vaccine doses as direct donations, with such Southeast Asian countries as Vietnam (7.35 million), Indonesia (6.88 million), the Philippines (3.08 million), and Thailand (2.04 million) receiving a majority of these donations. Total donations through direct and indirect (financial) means numbered about 44 million doses (MOFA 2023).

Challenges

Once Japan had signed purchase agreements with international vaccine producers, challenges to successfully vaccinating its domestic population in a timely manner were fourfold. First, the slower adoption of international vaccines in Japan was due to regulatory requirements for domestic clinical trials of vaccines, even if clinical trials have been completed elsewhere outside of Japan (Kosaka et al. 2021). Second, global supply chain interruptions meant that as late as spring 2021 fewer than 30 million doses had been imported. Third, under Japanese law, only medical doctors and nurses are permitted to administer vaccines, severely limiting mass vaccination capacity, even though the vaccines were available for free to the public. As a stopgap measure, medical personnel from the Self-Defense Forces were engaged to assist in the vaccination rollout. Fourth, municipalities lacked adequate refrigeration facilities for safe storage of the vaccines. So, paradoxically, though Japan was slow to obtain vaccines, once they arrived, wastage was significant. It is estimated that 80 million doses had been wasted by spring 2023 (Kaneda et al. 2024). On April 16, 2024, the Ministry of Health, Labour, and Welfare (MHLW) announced that an additional 240 million doses would be discarded, having inoculated Japan's population with 436 million shots of the 928 million contracted (Mainichi Shimbun 2024).

A subsequent challenge in the course of the pandemic was Japan's planned hosting of the 2020 Olympics and Paralympic Games, which was delayed until summer 2021. It should be noted that the general public was against hosting the games, but due to contractual requirements and inflexibility on the part of the International Olympic Committee, the Japanese government felt compelled to host the Olympics. In July 2021, Japan opened its doors to an influx of athletes and support staff from all over the world, despite its then third COVID-19 state of emergency (Machida and Wada 2022). Not surprisingly, cases spiked during the summer of 2021 (Karako et al. 2022). No doubt this spike influenced the government's decision to keep the borders closed, for the most part, into autumn 2022—a year after most other countries had fully opened.

Equity

Contagious disease such as the coronavirus "disproportionately affects senior populations," and Japan is one of the oldest societies in the world (Inoue 2022). Nearly a third of its population is aged 65 or older (CIA 2024). Similar to the COVID-19 response in the United States and other countries, Japan prioritized its elderly population before younger people could obtain a vaccination.

Why?

Trust and Vaccine Hesitancy

Surveys in Japan in 2021 indicated that 40–58% of respondents, particularly younger adults aged 20 to 40, were "unsure" about getting or "unwilling" to accept a COVID-19 vaccination even though COVID-19 vaccinations remained free for the general public (Uehara et al. 2022; Yoneoka 2022). In other words, much of the Japanese population was hesitant about obtaining the COVID-19 vaccine, with women more hesitant than men (Machida et al. 2021; Yoda and Katsuyama 2021). Vaccine hesitancy is a psychological state reflecting individuals' reluctance to be vaccinated; that is, they do not intend to get or are unsure about receiving an immunization (Nomura et al. 2022). Even before the COVID-19 pandemic, Japan experienced vaccine hesitancy, in part a result of the political mobilization of "vaccine injured victims."[2] This lack of trust in the safety of vaccines resulted from previous vaccine controversies. For example, in the 1948 Kyoto diphtheria vaccination scandal, immunization was mandated by the United States occupying force, insisting that infants must be vaccinated against diphtheria. Contaminated and poorly administered vaccines led to the death of 84 infants and permanently disabled hundreds more (Gorden and Reich 2021). In the initial rollout of the COVID-19 Pfizer vaccine, reported adverse reactions, including embolisms, led to a temporary halt in vaccinations (Yoshinaga et al. 2024). Further, Japan has not been immune to misinformation fomented by social media, further undermining public trust in the COVID-19 vaccines (Machida et al. 2021).

Cao et al. (2024) find that trust in government and in public health institutions broadly was strongly and positively correlated with vaccine uptake (individuals receiving COVID-19 vaccinations). Conversely, they find that trust in the internet, including social media (in the study, this was measured by Instagram, Facebook, YouTube, Twitter, and TikTok), was significantly and inversely associated with COVID-19 vaccine uptake. In a national two-stage survey of individuals in Japan who were initially hesitant to receive a COVID-19 vaccination (due mainly to concerns about vaccine safety and adverse reactions) but were no longer hesitant, respondents indicated four main reasons for the reversal in attitude. First, they became aware of the benefits of vaccination. Second, they had awareness of the vaccination status of those close to them, for example, people who indicated no adverse reaction. Third, they recognized the social significance of COVID-19 vaccination in limiting the spread of infection. Fourth, their concerns about adverse reactions had been dispelled. Further, only by those respondents who initially had not intended to be vaccinated, work and personal relationship reasons were cited for their change of mind (Nomura et al. 2022).

State Public Health Capacity

Under the Infectious Diseases Act, medical expenses including hospitalization from COVID-19 would be covered by public funds (Karako et al. 2022). In Japan, administered by the MHLW, measures to protect the population from contagious illness originate in the 1897 Communicable Disease Prevention Law (MHLW, n.d.). Japan achieved universal health care in the 1960s, ensuring fair and equitable access to preventative health care and essential medicines, although the system has been under significant strain as Japan's population continues to age (Katori 2024).

Government Vaccination Deployment and Communications Strategies

To encourage people to get vaccinated, the Japanese government maintained a campaign of transparency and frequent communication with the public. Throughout the COVID-19 pandemic, the MHLW and the JMA worked closely together to develop and maintain scientific- and evidence-based communications for Japanese citizens and residents via its regional offices and local representatives through regular press releases, announcements, and online platform–based guidelines available on the MHLW and JMA websites (Kamayashi 2022). Meanwhile, the 2020 top buzzword for Japan was *sanmitsu* (三密, "three densities"), or in English the "three Cs": closed spaces, crowded spaces, close-contact settings. The notion was credited to Tokyo's Governor Yuriko Koike, who had been urging Tokyo residents to avoid high-transmission spaces through announcing at every opportunity, "No!" to the "*mitsu desu*" (Asahi 2020). The Japan Prime Minister's Office in partnership with MHLW created clear and consistent public health messaging, seizing on Governor Koike's turn of phrase, warning people *sakemashō* 避けましょう "let's avoid" the *sannomitsu* 三の密 (密閉 (*mippei*) closed spaces with poor ventilation, 密集 (*misshu*) crowded places where many people gather, 密接 (*missetsu*) close physical proximity conversations. Figure 20.1 reflects the clear messaging of the *sanmitsu* public health communication campaign.

To counteract misinformation, which is typically consumed on social media, medical professionals and celebrities were deputized to help with the public health messaging, including about vaccinations (Nomura et al. 2024). At the same time, local municipalities are responsible for vaccine administration in their communities, and outreach tends to rely on postal mailings, pamphlets, and flyers, which are a preferred mode of official communication for Japanese, relative to digital media.[3] Japan also implemented a tailored vaccine targeting campaign, adjusting the message across age groups, as well as providing multilingual information for its small but growing foreign language–speaking population. Above all, the government focused on scientific evidence-based communications. The

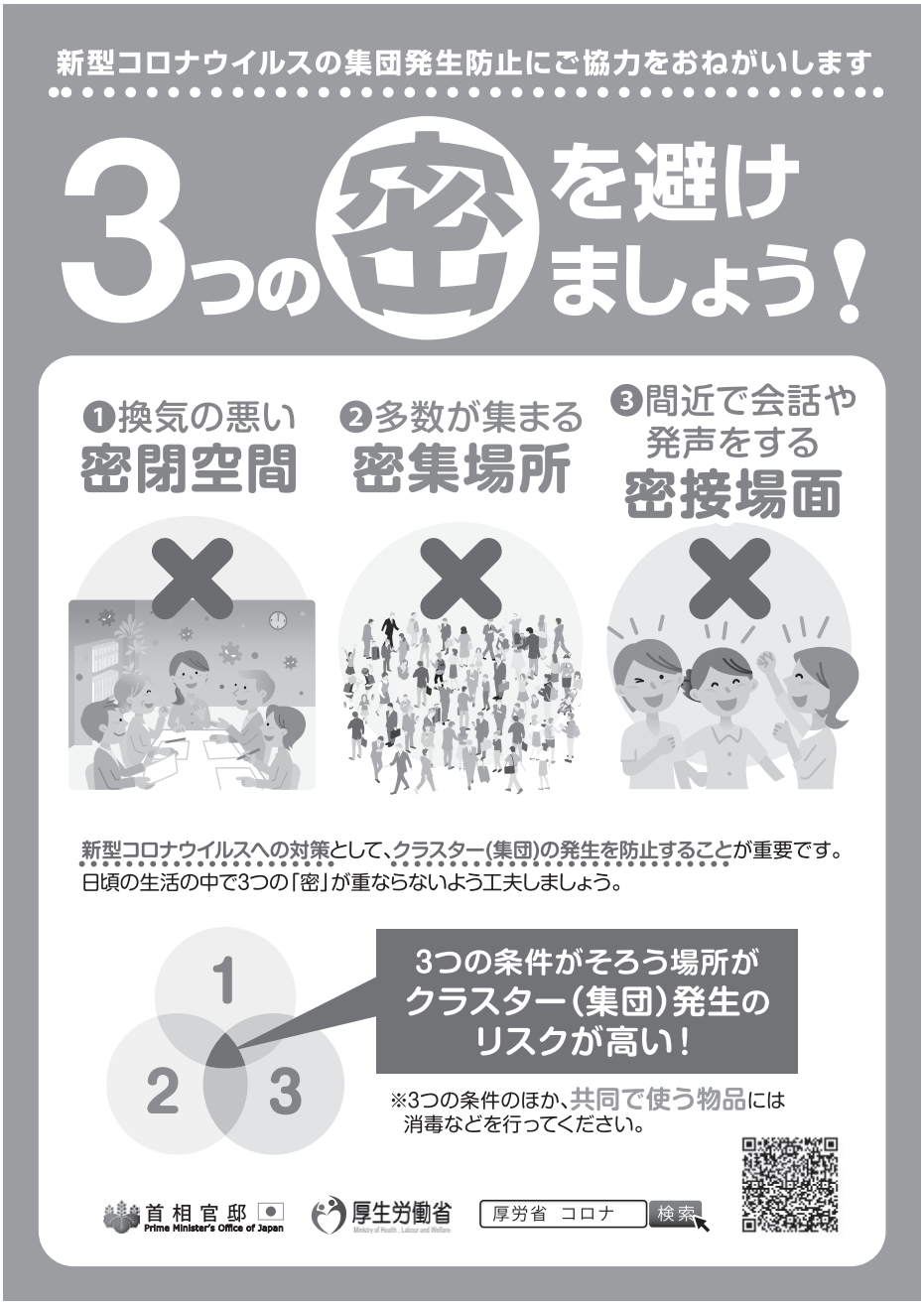

Fig. 20.1. Sanmitsu flyer 三密 チラシ (Japanese version)

fact that Japan went from less than 5% vaccinated in early 2021 to 80% by the new year is a testament to the efficacy of the government's public health messaging, which encompassed, on the one hand, a sensitive and culturally informed approach to public health communication (Cao et al. 2024). On the other hand, a former MHLW official who led Japan's COVID-19 response noted when asked what lessons he learned from the experience, "We did not regulate. We did not shut down. Even so, COVID [transmission] was low because it was our people who regulated themselves. I am deeply grateful to Japanese citizens for this" (anonymous interview, 2025).

Role of the Health Care System and Professions

As mentioned previously, Japan has a universal health care system administered by the MHLW in collaboration with the JMA, but care is provided within private hospitals. This bifurcation interfered with the ability of the government to dictate equitable care. News reports lamented emergency medical service personnel driving around Tokyo for many hours trying to find a hospital that would accept the patient in their vehicle (Hamada 2023). In some cases, patients died en route, lacking a hospital willing to accept them. While most Japanese citizens are covered by some kind of national health-care scheme, its growing migrant worker population bears a higher premium burden (Shibata 2022).

Opposition

Aside from the vaccine hesitancy, which itself was primarily concerned with adverse safety events, Japan's COVID-19 vaccination experience was not politicized as it was in such other countries as the United States. There are, in my opinion, three possible explanations for this level-headedness. First, Japanese culture is studious, meaning individuals and organizations take a lot of time before making any major decision (as in the tanker ship example at the beginning of the chapter) by studying the issue and collecting data. Then, after weighing copious evidence and perspectives, as well as vetting ideas across a wide range of stakeholders, a decision is made. Second, Japanese society and by extension its governmental leadership can be described as pragmatic. That is, rather than follow ideological dictate, stakeholders are focused on the practicality of policy measures. This pragmatism imbues much public policy in Japan. Finally, as mentioned previously, there is a strong sense of an individual's responsibility to the collective. Nobody wants to be the one to bring a nasty illness to Grandma's house or be the friend in the group to infect others. Overall, in response to crisis, Japanese tend to act with

studious prudence, with pragmatism by weighing the response options, and with a sense of communitarianism.

Conclusions

Lessons

Pardo et al. (2020), citing Japan's MHLW review of its response to the 2009 H1N1 "swine flu" influenza outbreak, noted policy lessons in the midst of the COVID-19 pandemic. These lessons include recommendations for building better government and health care capacity, especially at the local municipality level, and improving health surveillance practices, for example cluster identification and contact tracing. The authors also recommend improved integration of decision-making between central and local governments, while encouraging flexibility in their "action plans." Recommendations include establishing "robust and flexible" "legal frameworks" presumably to maintain the legality of government interventions and state of emergency impositions, while balancing individual liberties and rights to health information privacy. While this was not mentioned in the report, some returning to Japan at the end of the pandemic border closure complained about the intrusive mobile phone tracking apps. These mandatory mobile applications were used by Japan to confirm that individuals entering Japan—once the borders were cracked open—remained in self-quarantine (e.g., in their hotel rooms) (Yang 2022). This mobile app–based surveillance system called individuals' phones at random times using geolocation, during which the call recipient was required to answer within five minutes and to be visible on the call's video camera.

A key facet of the success of Japan's COVID-19 response was the cooperation of the citizens of Japan with the health professionals and their government. Cultural norms such as collective responsibility and respect for authority led to better self-regulation of social distancing and mask wearing, with the latter a long-standing common practice, viewed as proper etiquette whenever one has a sniffle or cough. Within Japan's tradition of close collaboration between government bureaucrats, the legislature, and the private sector, especially large corporations and trade associations, the MHLW and the JMA partnered during the COVID-19 pandemic to establish guidelines for scientific-based clear communication to the public about COVID-19 vaccinations and the state of the spread of the virus among the domestic population (Ministry of Health, Labour, and Welfare 2022). A group of public health experts from the United States who visited Japan in the summer of 2022 noted the effectiveness of the country's pandemic response, particularly its impactful public health communication during the crisis, which helped to minimize morbidity and mortality from COVID-19 (Desai and Merski 2022).

One policy suggestion to come out of Japan's experience with COVID-19 is to shift from an *opt-in* vaccination system, where the onus is on the individual to obtain immunization appointments and locations, to an *opt-out* system, whereby the local municipality schedules vaccination appointments for residents at convenient locations. Japanese municipalities that piloted the opt-out system for COVID-19 found vaccine uptake to be substantially higher than opt-in areas (Kaneda et al. 2024). While analyzing the success or failure in vaccine rollout in comparative context is beyond the scope of this chapter, perhaps one of the lessons Japan can offer the world is that its COVID-19 vaccine communications were focused on making things easy and convenient for its population in terms of accessing information and receiving vaccines—as opposed to "mandating" people to do something (Nan et al. 2022).

Japan, like other countries during the COVID-19 pandemic, was faced with tough national health decisions, with the commendable aim of minimizing mortality but at the cost of closing itself off from its international people-to-people connections for an extended period of time. Further, considering the global supply chain shutdown limiting access to basic medical supplies but also lifesaving vaccines, Japan would be prudent in expanding domestic vaccine development and production capacities in public research institutions and domestic biopharmaceutical companies.

NOTES

1. See NHK (n.d.) for a prefectural breakdown of vaccinations, with high vaccine compliance in major urban centers and less in outer regions, for example, Okinawa.

2. Gordon and Reich (2021, 414) trace vaccine hesitancy in Japan back to domestic opposition, especially on the part of traditional Chinese medicine and Japanese *kampo* doctors to the introduction of Western, particularly Dutch, medicine in the 19th century. This related to the reluctance to inject imported, foreign, and "unnatural" substances into their patients' bodies, a practice antithetical to the tenets of healing in traditional Asian medicine. See Ibata-Arens (2021) for a discussion of the history of Japan's traditional medicine industry and its relation to modern pharmaceutical drugs. For example, Japan is unique in that all medical schools that train pharmacy students are required to have an herbal medicinal garden that grows all plants listed in Japan's *kampo* pharmacopeia.

3. Japan still has a vibrant book and phonograph record market, a testament to a societal commitment to tangible artifacts.

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21 | COVID-19 Vaccination in South Korea

Bilateral Contracts, Licensed Production, and Indigenous Development

June Park

While South Korea's early response to the pandemic, including testing, tracing, and treatment (3Ts), yielded positive results, the country's path toward vaccine procurement and vaccination drive involved several trial and errors. From the second year of the COVID-19 pandemic (2021) to the post-pandemic (2023), South Korea went from applying for vaccines through COVAX, though it is no longer a developing country, to securing bilateral contracts for purchasing agreements late due to mounting public pressures, to launching licensed production through memorandum of understandings based on industrial capacity and eventually coming up with an indigenously developed COVID-19 vaccine that is now approved by the World Health Organization (WHO) via the procedure for emergency use listing (EUL).

While the South Korean case manifests quite an improvement, it also provides three key lessons in a country's attempt to procure and produce vaccines: (1) it is a prime example of a country response to failed global vaccine provision, as countries have resorted to helping themselves within their capacities; (2) given the critical nature of vaccines in biotechnology, its role in industrial capacity and global supply chains has allowed for the tech transfer and conditions for licensed production, while providing for seed funding for indigenous vaccine development; and (3) the role of state and business relationships with other countries and global companies, in addition to diplomatic and bureaucratic maneuvering at WHO, was critical in the country's experience toward EUL.

At the domestic level, South Korea's case shows that public opinion on vaccines—with overall positive attitudes toward vaccines except protests on side effects and deaths—and participation in the vaccination drive were critical elements in reaching herd immunity. Additionally, the push toward indigenous development of vaccines for future pandemics suggests that the public desire to have such capability weighs heavily upon the country, especially at a time of geopolitical unrest and instability. Given the technical nature of vaccines: (1) upon the failure of multilateralism in vaccine provision and being late in the game for bilateral

contracts, the country went through trial and error via the COVAX Facility when it should have been yielding that supply to the developing world (the public was humiliated that the government did not seek bilateral contracts early on and resorted to COVAX); (2) recognizing that bilateral contracts are difficult to obtain due to contest, the country sought to produce under license based on its smart factories and industrial capacity with the intent to become a vaccine hub in global supply chains (the public demanded licensed production and indigenous development); and (3) the catapulting toward indigenous innovation would not have been possible without the country's economic and political connections with vaccine-producing countries (the public wanted such outreach for global cooperation if it promised better vaccine procurement situations in the longer run).

Overall, South Korea's navigation through vaccine procurement and vaccination drive shows that a country may catapult itself given its own conditions. The geopolitical tensions and constraints generated pressure to exert its independent capability to acquire and produce vaccines to prepare for the next pandemic.

Vaccines

South Korea's case toward vaccine procurement and vaccination drive embodies one that combined several methods toward reaching herd immunity. Despite the positive results from South Korea's early and proactive response to COVID-19 utilizing the 3Ts during the first year of the pandemic, the country was faced with the question of whether it could continue to overcome the pandemic without access to vaccines.

Licensed Production of AstraZeneca by SK Bioscience

In the first year of the pandemic, nothing was clearly set on vaccine procurement or development, and the South Korean public only looked toward the licensed projection of AstraZeneca (AZ) vaccines by SK Bioscience of the South Korean conglomerate SK Group. AstraZeneca vaccines were the first to be deployed to South Korea in February 2021 and were produced under a license by SK Bioscience but only used for the South Korean vaccination drive until December 2021.[1] The ceasing of deployment was largely attributed to the lack of usage by choice as the government moved toward procurement of other vaccines from abroad, and the decreased usage was in large part due to the mixed reviews on AZ vaccines, particularly from Europe, and the public unrest regarding the safety of AZ vaccines. The public began to wonder why the government was not readily procuring vaccines if prerelease bilateral contracts could be struck.

The Setup of the Vaccine Procurement Task Force and Initial Procurement via the COVAX Facility (Pfizer)

As countries in the West with vaccine production capability laid out plans to launch COVID-19 vaccine development, the South Korean public was dissatisfied that while the country had succeeded in producing PCR kits for COVID-19 testing through public-private partnerships (J. Park and Chung 2021), the South Korean government did not announce early plans to procure vaccines through bilateral contracts and South Korean pharmaceutical companies in South Korea did not present concrete plans for its indigenous COVID-19 vaccine development. As the lion's share of the vaccines were secured for other countries by bilateral contracts, South Korea was only left with the option to apply for vaccines through the COVAX Facility, though it is not a developing or low-income country. Domestic criticism of the government's lackluster efforts in proactively procuring vaccines through bilateral contracts were abundant upon receiving the initial Pfizer vaccines through COVAX in March 2021. Having experienced that first and final vaccine delivery through COVAX, public health authorities and policymakers in South Korea starkly realized that the limitations of the COVAX Facility hindered sufficient procurement of vaccines, and the South Korean public remained humiliated that the government had to beg for vaccines through a channel for low-income countries of gross domestic product per capita lower than $10,000 when that of South Korea was nearing $35,000 as of 2021 (J. Park 2023). These developments led to the setup of the Vaccine Procurement Task Force (VPTF) at the pan-bureaucratic level under the Moon Jae-in administration on April 1, 2021.

Chips for Jabs

The VPTF busily signed bilateral contracts with global vaccine manufacturers through public-private partnerships. The contracts for vaccines secured by the VPTF via the COVAX Facility and bilateral contracts with global vaccine manufacturers and public-private partnerships allowed for breakthroughs in the procurement process.[2] In the process, South Korean conglomerates were stepping up with interest to produce at scale under license, and the government worked toward establishing ties with US pharmaceutical manufacturers to bring licensed production to South Korea and to procure additional vaccines. The US–Republic of Korea summit between US President Joe Biden and South Korean President Moon Jae-in in Washington, DC, in May 2021 led to arrangements. The summit led to Samsung Biologics bringing licensed production of Moderna vaccines to South Korea's production site in Songdo, while also pledging to make an investment of $17 billion for a second semiconductor foundry in

Taylor, Texas, adjacent to the Samsung Austin Semiconductor, which has been in operation since 1996.[3] US automakers, which were hit by the lack of automobile chips amid the global chip shortage since early 2021, had pressured the Biden administration for help, and due to the lack of chip manufacturing capacity in the United States, Biden pressured the Taiwan Semiconductor Manufacturing Company and Samsung Electronics of South Korea to build foundries in the United States. In all, the summit led to partnerships with Moderna for mass production utilizing smart factories for distribution in South Korea and abroad and to engagement in international collaboration for R&D.

Indigenous Development and Approvals by Jurisdictions: SkyCovione by SK Bioscience

In May 2020, the Global Health Division of SK Bioscience in Seongnam, South Korea, received a committed amount of $3.6 million in grant funding for vaccine development for 16 months by the Bill and Melinda Gates Foundation.[4] On June 29, 2022, approximately two years after the grant commitment, the SkyCovione COVID-19 vaccine developed by SK Bioscience—the first computationally designed nanoparticle vaccine for COVID-19[5] (Heidary et al. 2022; Bayani et al. 2023; Hossaini Alhashemi et al. 2023; North and Hsu 2023; Wang et al. 2023)—was approved in South Korea as the first indigenous vaccine to be approved for use by the Korea Disease Control and Prevention Agency (KDCA) and Ministry of Food and Drug Safety. Subsequently, SK Bioscience submitted applications for conditional marketing authorization at the European Medicines Agency (EMA) and the Medicines and Healthcare Products Regulatory Agency in the UK, as well as an EUL at WHO, which were approved in the second quarter of 2023. However, the SkyCovione vaccine suffered from the lack of domestic demand in South Korea and was discarded by the KDCA's decision at the end of 2022.[6] At the end of 2023, SK Bioscience withdrew its application to EMA for SkyCovione that was submitted for approval via SK Chemicals Co. Ltd.[7]

Vaccine Swaps and Global Donations

In the early phase of the pandemic, amid the shortage of vaccines, South Korea's diplomatic channels were activated to swap vaccines with Israel and Romania (the latter an EU member state with low vaccination rates) for procurement, while donating vaccines in a trickle-down effect to Vietnam, Thailand, and Iran. Due to the US departure from the Joint Comprehensive Plan of Action, or the Iran Nuclear Deal,[8] during the Trump administration, it became difficult for South Korea to pay Iran for oil and gas transactions, and the revenue was held in South Korean banks. Iran

demanded that South Korea purchase vaccines with the withheld funds and send them to Iran, and South Korea donated one million doses of AstraZeneca vaccines to Iran.[9]

In sum, South Korea strove to reach herd immunity through its vaccination drive, procuring various COVID-19 vaccines through bilateral contracts, licensed production, and indigenous development. The vaccines that were approved by South Korea were (1) two kinds of virus vector vaccines (AstraZeneca, Janssen), (2) two kinds of mRNA vaccines (Pfizer, Moderna), and two kinds of synthetic antigen vaccines (Novavax, SkyCovione). To counter the Omicron variant, two kinds of bivalent vaccines (Pfizer, Moderna) were also deployed. Table 21.1 shows the list of approved vaccines in South Korea and dates of approval dates, and figure 21.1 the different platforms used.

Vaccinations

On December 18, 2020, the pan-government task force in South Korea laid out a plan to procure COVID-19 vaccines alongside its plan for the nationwide vaccination drive.[10] By then, the government had come under severe pressure by the South Korean public to announce a vaccination procurement and inoculation plan. On January 28, 2021, the KDCA laid out a plan for vaccination for the period February 26, 2021–December 2021. The initial plan was to vaccinate throughout the country for the entire population based on age range (18–49, 50–64, and 65 and older). This excluded frontline essential workers and patients in critical condition (about 793,000 people) and those at high risk of death upon being diagnosed with COVID-19. These latter populations—which included those aged 65 and over, those working in highly infectious facilities, those with low levels of immunity, and those with preexisting conditions—were prioritized above all others in the order of vaccination (Y. Choi et al. 2021).[11]

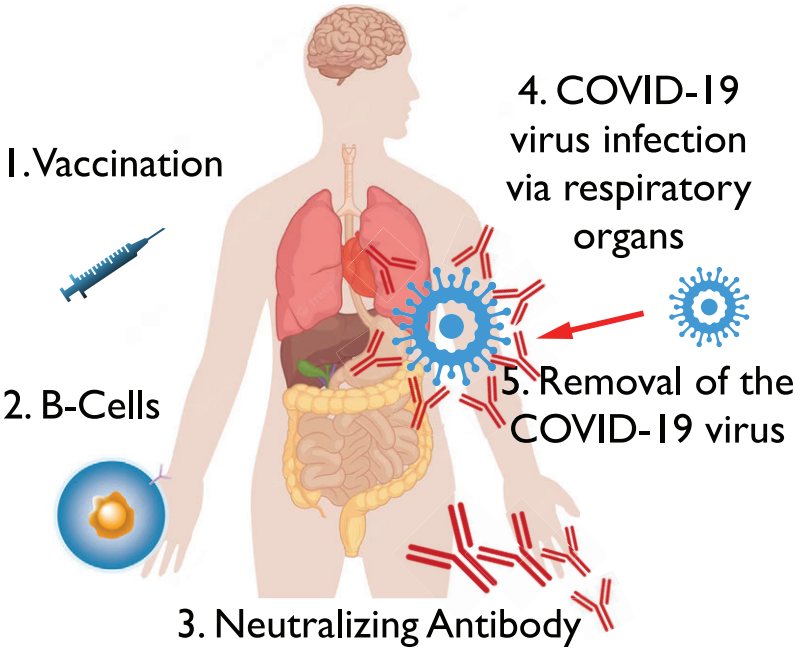
The three main principles guiding the KDCA's national vaccination drive were (1) to prevent critical conditions or hospitalization and death of citizens due to COVID-19, (2) to maintain social safety through medical and quarantine systems, and (3) to halt the spread of the COVID-19 virus. Their mandate was to minimize the injury to public health. Vaccinations for those aged 18 and younger were introduced upon the results of trials in a gradual manner. As of August 2023, those aged 6 months and older are eligible for vaccination in South Korea.

On March 15, 2021, the KDCA announced an updated and detailed agenda for the national vaccination drive for the second quarter of 2021 (table 21.2).[12] It involved five main tasks: *first*, to prioritize vaccination at institutions with populations at higher risk of cluster infection and critical conditions if exposed to COVID-19, such as nursing hospitals, elderly homes, facilities for the handicapped, facilities for patients with tubercu-

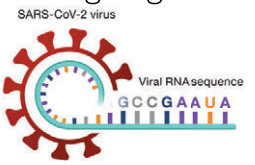
TABLE 21.1. Status of COVID-19 Vaccine Approvals in South Korea

Vaccine name	Company	Approval date
AstraZenecaKorea Vaxzevria (SARS-CoV-2 Virus Vector Vaccine)	Astrazeneca Korea Co., Ltd.	2021-02-10
Corminaty (Tozinameran) (SARS-CoV-2 Virus mRNA Vaccine)	Pfizer Korea Co., Ltd.	2021-03-05
COVID-19 Vaccine Janssen (SARS-CoV-2 Virus Vector Vaccine)	Janssen Korea Co., Ltd.	2021-04-07
Vaxzevria (SARS-CoV-2 Virus Vector Vaccine)	Astrazeneca Korea Co., Ltd.	2021-05-21
Moderna Spikevax (SARS-CoV-2 Virus mRNA Vaccine)	Moderna Korea Co., Ltd.	2021-05-21
Spikevax (SARS-CoV-2 Virus mRNA Vaccine)	Moderna Korea Co., Ltd.	2021-12-13
Nuvaxovid prefilled syringe (SARS-CoV-2 Virus Surface Antigen Vaccine [Genetic Recombination])	SK Bioscience Co., Ltd.	2022-01-12
Corminaty 0.1mg/mL (Tozinameran) (SARS-CoV-2 Virus mRNA 백신)	Pfizer Korea Co., Ltd.	2022-01-28
Corminaty 0.1mg/mL (for 5–11 year-olds) (Tozinameran) (SARS-CoV-2 Virus mRNA Vaccine)	Pfizer Korea Co., Ltd.	2022-02-23
SkyCovione Multi (SARS-CoV-2 Virus Surface Antigen Vaccine [Genetic Recombination])	SK Bioscience Co., Ltd.	2022-06-29
Moderna Spikevax 2 (Elasomeran, Imelasomeran) (SARS-CoV-2 Virus mRNA Vaccine)	Moderna Korea Co., Ltd.	2022-09-08
Corminaty 2 0.1mg/mL (Tozinameran, Riltozinameran) (SARS-CoV-2 Virus mRNA Vaccine)	Pfizer Korea Co., Ltd.	2022-10-07
Spikevax 2 (Elasomeran, Imelasomeran) (SARS-CoV-2 Virus mRNA Vaccine)	Moderna Korea Co., Ltd.	2022-10-07
Corminaty 0.1mg/mL (for 6 months–4 years old) (Tozinameran) (SARS-CoV-2 Virus mRNA Vaccine)	Pfizer Korea Co., Ltd.	2022-11-25

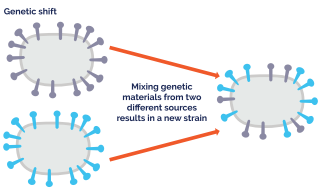
Source: COVID-19 Vaccine Approval Status, Ministry of Food and Drug Safety, South Korea (accessed July 8, 2023); Heidary et al. 2022.



- **Virus Vector Vaccine** (AstraZeneca, Janssen):
  Insert viral antigen genes into other viruses
- **Inactivated Vaccine:**
  Kill the virus and use it as an antigen 
- **DNA Vaccine:**
  Insert DNA capable of expressing viral antigens
- **RNA Vaccine** (Moderna, Pfizer/BioNTech):
  Insert viral antigen genes in the form of RNA



- **Recombinant Vaccine** (Novavax):
  Create viral antigen protein and insert via genetic recombination technology



- **Virus-like Particle Vaccine:**
  Formulate viral antigen protein into virus-like particles and insert

Fig. 21.1. Vaccine platforms introduced to South Korea for the vaccination drive

losis and Hansen's disease, facilities for the homeless, and correctional facilities; *second*, to begin the vaccination drive starting with the age group 65 and over while working in particular with local governments to vaccinate those above age 75 for a seamless vaccination support system (for identity verification and transport to vaccination site and for post-vaccination checkups); *third*, to implement a step-by-step vaccination plan for schools of special education and handicapped children (as well as teachers for K-12 and nursery schools) to protect education facilities from infection; *fourth*, to prioritize patients of dialysis and chronic diseases; and *fifth*, to broaden the scope of vaccination among health-care and frontline workers as well as flight attendants to prevent the inflow of COVID-19 variants. Table 21.2 reveals that there was a limited choice of vaccine options and that priority for vaccination was placed on the elderly as well as on essential and frontline workers at high risk of infection.

South Korea's vaccination drive went on relatively smoothly, without huge public protests on vaccination and with an overwhelming participation rate even when compared to other developed economies, despite the controversies regarding the validity of AstraZeneca vaccines and mRNA vaccines by Pfizer-BioNTech and Moderna. Vaccine hesitancy among the South Korean population appeared to be significantly associated with younger age, no religious affiliation, political conservatism, and lower family income (S. E. Hwang et al. 2022). In the beginning, the main challenges to the government's goals toward reaching herd immunity involved the difficulty of vaccine procurement. But once the vaccination drive began, the social divide would emanate from side effects from vaccination and discrimination claims from the introduction of vaccine certificates, as unvaccinated persons would be denied access to certain venues or activities.

The Vaccine Procurement Task Force, put together as a pan-government and public-private partnership effort on April 1, 2021, set to work on securing bilateral contracts with various vaccine producers (J. Park 2023). In the beginning stage of vaccinations, the Korean government acquired two different kinds of COVID-19 vaccines—Pfizer-BioNTech (1,170,000 doses, through the COVAX Facility on February 26, 2021) and AstraZeneca (1,574,000 doses on February 24, 2021)—and procurement for Moderna, Johnson & Johnson, and Novavax was underway through a bilateral contract negotiation, for an estimated 79 million people (approximately 152.5% of the total population of roughly 50 million people). Given the scarcity of the vaccines in the initial stages, choice of vaccine was not given, but as bilateral contracts were signed and more vaccines were procured, people were able to choose their preferred vaccine. Vaccination would be given free of charge and would be conducted upon consent of the individual, although the government implemented a nationwide campaign (via social media, leaflets, and posters) to bolster vaccination rates (Hong 2023) based on the notion that vaccination would halt major infec-

TABLE 21.2. Vaccination Plan (Q2 2021) by KDCA by Priority Groups

Group	Method	Vaccine	Group size (tens of thousands)	Start date
1. Nursing hospitals and homes			**37.7**	
Aged 65 and over, patients and workers	voluntary / visitation	AZ	37.7	March (Week 4)
2. Facility workers at high risk			**66.94**	
Facilities for the elderly	Vaccination center	Pfizer	15.8	April (Week 1)
Facilities for the handicapped	Visit (delegated)	AZ	6.3	April (Week 2)
Shared facilities for elderly	Visit (delegated)	AZ	2.7	April (Week 3)
Tuberculosis and Hansen facilities	Visit (health center)	AZ	0.04	April (Week 3)
Facilities for the homeless	Visit (health center)	AZ	1.8	April (Week 4)
Correctional facilities	Voluntary/health center	AZ	2.0	April (Week 2)
Caretakers for the handicapped	Delegated medical org	AZ	10.5	June
Caretakers for the elderly	Delegated medical org	AZ	27.8	June
3. Elderly aged 65 and over			**858.3**	
Elderly aged 75 and over	Vaccination center	Pfizer	364.0	April (Week 1)
Elderly aged 65–74	Delegated medical org	AZ	494.3	May–June
4. School and nurseries			**55.5**	
Special education/K-12 health workers	Public health center	AZ	4.9	April (Week 1)
Nursery/handicapped teachers/nurses	Public health center	AZ	1.5	April (Week 1)
Nursery/primary school teachers	Delegated medical org	AZ	49.1	June
5. Chronic disease patients (below 64)			**10.4**	
Chronic kidney patients (dialysis)	Delegated medical org	AZ	9.2	June
Chronic severe respiratory disease	Delegated medical org	AZ	1.2	June
6. Public health / Essential workers			**121.4**	
Health workers (hospitals/ pharmacies)	Delegated medical org	AZ	38.5	June
Essential workforce (police, fire)	Delegated medical org	AZ	80.2	June
Flight attendants	Public health center	AZ	2.7	May
Total			**1,150.24**	

Source: 코로나19 예방접종 2분기 시행계획, KDCA, March 15, 2021.

tions and would put an end to the pandemic. For pregnant women, updated information on vaccines provided by OB-GYN doctors helped increase vaccine acceptance (Yoon et al. 2022). In the early phase, there was also an overwhelming response by the public to vaccinate themselves.[13] For South Korea, the issues regarding shipment and dissemination of vaccines—cold storage and transportation—were not hurdles to the vaccination drive, as the country was equipped with the necessary vaccine platforms (Hossaini Alhashemi et al. 2023).

In the early phase of the vaccination drive, the question of vaccine equity was focused on prioritization, with special attention to the adherence to the human rights of the disadvantaged,[14] but gradually as vaccine certificates were introduced and public venues would ban the unvaccinated, the point of debate moved on to the validity of discrimination against the unvaccinated (K. Lee 2021). Given the socioeconomic and public health impact of COVID-19, the broader movement toward vaccination to halt the spread of the virus led to widespread participation; by the end of August 2021, more than 11.4 million in South Korea had been vaccinated against COVID-19.[15]

Into the latter part of 2021 and 2022, the rise of variants such as Delta and Omicron, which led to infections despite people being vaccinated beyond first doses, raised questions regarding the validity of vaccines that are not updated (Shim 2021a, 2021b; H. Hwang et al. 2022; Song et al. 2022). The government continued recommending some degree of social distancing, as that strategy was also considered a vital part of fighting the pandemic along with the vaccination drive (Nham et al. 2022).

Why?

At the onset of the vaccination drive, the inoculation rates were quite low, and only 5% of the South Korean population had been vaccinated by February 28, 2021. In the early phase, when AZ and Pfizer were the only vaccines available, negative perceptions of the two vaccines impacted the vaccination rate (H. Lee et al. 2021). Vaccine hesitancy appears to have been strongly correlated with trust in government. Self-rated political ideologies and government trust were found to be associated with COVID-19 vaccine hesitancy, and those with liberal or apolitical views at younger ages were found to have a lower level of trust in government (H. K. Park et al. 2021)—this is in line with global surveys that have found trust in information provided by the government correlated with vaccine acceptance (Lazarus et al. 2021, 2023). Interpersonal trust also played a role in vaccine hesitancy (Jang 2022). A study on big data analytics (Y. Choi et al. 2023) shows that in South Korea, public awareness and sentiment toward COVID-19 vaccination turned from negative to positive over time during the vaccination drive, given the expectations on vaccines and the high

vaccination rate that led to reaching herd immunity (Y.-J. Choi et al. 2022). Once the people saw that vaccines were not providing the protection against infection that they had anticipated, their views of vaccination turned more negative.

South Korea is known for its efficient public health insurance system and capacity in public health. Despite having experienced the Middle East Respiratory Syndrome (MERS) outbreak in 2015,[16] and thus having responded early to the COVID-19 pandemic with the 3Ts, the procurement of vaccines and the vaccination drive were unprecedented, and the country did not have capacity to produce indigenous vaccines (J. Park 2021). The government's plan was to build the capacity to produce vaccines—and ultimately succeeded in having its first ever indigenous vaccine, SkyCovione, approved by WHO in June 2023—but during 2021 and 2022, the country sought bilateral contracts for vaccines via the VPTF. COVID-19 has lingered into 2023, and the South Korean government plans to purchase more vaccines. According to the KDCA, South Korea spent KRW 222.3 billion (2020), KRW 4,516.1 billion (2021), and KRW 2,216.3 billion (2022)—a total of KRW 6,954.7 billion—for vaccine procurement. Criticisms have arisen as various vaccines were procured via bilateral contracts with time, as the choice of vaccines became optional and some were preferred over others; in addition, upon the transition of the pandemic into endemic status, the KDCA has had to dispose of or give away some 22,002,000 doses of leftover vaccines (worth approximately KRW 580 billion), which totaled about 8.4% of the vaccines purchased.[17] It is roughly estimated that South Korea paid 24% more in price compared to the global average purchasing price for COVID-19 vaccines. A late start in procurement for bilateral negotiations in 2020 may have led to increased prices for South Korea, as major economies had completed their negotiations by March 2020 but South Korea did not begin negotiating until July 2020. For 2023, the KDCA has set a budget of KRW 215.1 billion for COVID-19 vaccine purchases of 15 million doses, but given the anticipated price increase by Pfizer-BioNTech and Moderna, the set budget may need to be increased. Tables 21.3 and 21.4 summarize the eventual acquisitions and administrations.

Another government agenda related to vaccine procurement and vaccination is the COVID-19 Big Data Project by the KDCA and the National Health Insurance Service (NHIS).[18] South Korea has been pushing for national projects driven by big data collection, evidenced by its smart city projects, and is poised to bolster the use of data in the next decades for digitization. In public health, the South Korean government has the intent to collect and utilize anonymized data for scientific research in preparation for the next pandemic. For this endeavor, the two public health entities signed a memorandum of understanding on April 30, 2021, only a few months into the vaccination drive. The KDCA would share data on COVID-19 vaccination and side effects as well as patient data, while the NHIS would share treatment records and medication data for research on the

TABLE 21.3. South Korea's Vaccine Procurement, 2020–22 (Unit in doses)

PRODUCER:	Pfizer-BioNTech	Moderna	AstraZeneca	Janssen	Novavax	SK Bioscience	COVAX
DOSES:	127,490,000	54,450,000	20,000,000	3,410,000	40,000,000	10,000,000	7,350,000
Total doses = 262,700,000							

Source: Data from KDCA.
Note: As of December 12, 2022, South Korea had reached 250.21 doses per 100 people in vaccination for COVID-19, https://tradingeconomics.com/south-korea/coronavirus-vaccination-rate

TABLE 21.4. South Korea's Vaccine Disposal (Unit in doses)

Vaccine type	Vaccine producer	2021	2022
MONOVALENT VACCINES	***Sum***	**1,698,000**	**9,770,000**
	Pfizer	120,000	4,911,000
	Pfizer (children)	NA	105,000
	Moderna	1,288,000	3,220,000
	Novavax	NA	1,515,000
	Janssen	46,000	NA
	AstraZeneca	244,000	15,000
	SkyCovione	NA	1,000
BIVALENT VACCINES	***Sum***	**NA**	**294,000**
	Moderna BA.1	NA	290,000
	Moderna BA.4, 5	NA	NA
	Pfizer BA.1	NA	2,000
	Pfizer BA.4, 5	NA	2,000
Total		1,698,000	10,064,000

Source: Data from KDCA.

efficacy and safety of COVID-19 vaccines. The intent behind the creation of a big data system was that it would enable the analysis of the effects of vaccination based on the kind and timing of vaccination, the side effects and symptoms, and the relevance to preexisting health conditions, and further it would analyze different vaccine platforms and eventually contribute to developing an indigenous vaccine that is best fit for the South Korean populace.

Side effects from COVID-19 vaccines have been a crucial issue in South Korea (Bae et al. 2021). The city hall area in the heart of Seoul has been the site of ongoing silent demonstrations in tents set up by families of those who passed away from side effects of COVID-19 vaccines. The KDCA had prepared for the National Vaccine Injury Compensation Program, which would enable petitions by the vaccinated patient and/or guardian (within five years of side effects) by filing paperwork at public health centers or municipalities, followed by research by the vaccine injury investigation team of the KDCA that would lead to a final decision by the vaccine injury

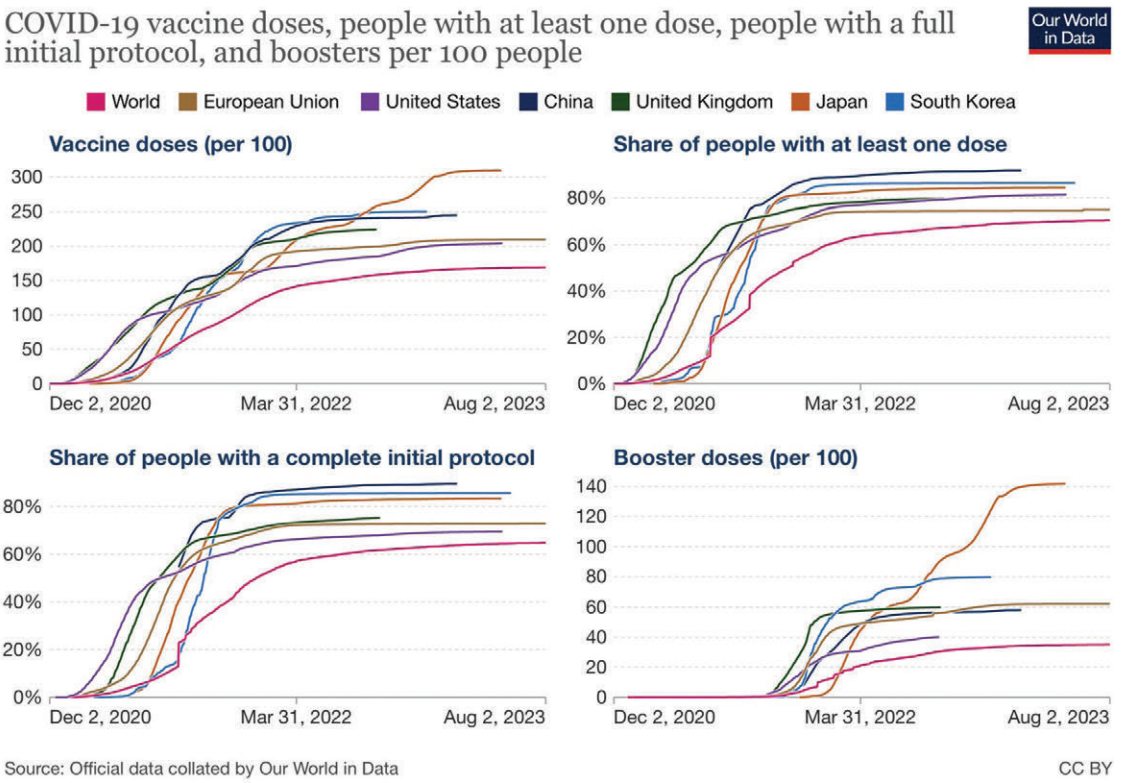


Fig. 21.2. COVID-19 vaccine doses, people with one dose, people with a full initial protocol, and boosters per 100 people

compensation professional committee on whether compensation would be required.[19] The procedure would take no more than 120 days upon petition, and the compensation would cover treatment and nursing of the patient if hospitalized, with compensation for handicaps and death.

Conclusions

South Korea's vaccine procurement and national vaccination drive experiences portray the difficulties of overcoming a public health crisis when the multilateral efforts are limited and countries are left to self-sufficiency. Its vaccine procurement process embodies a case of trial and error in which the government failed to secure vaccines early on but caught up by licensed production based on its industrial capacity, to become an industrial vaccine hub in the region, ultimately succeeding in coming up with an indigenous vaccine—through international collaboration on new technologies—toward the transition from pandemic to endemic status. The vaccination drive, which led to further participation rates, was in large part owing to the public's anticipation of quality vaccines and the

willingness to move forward toward post-pandemic, but it was not without trust issues regarding the government or without hurdles related to side effects and deaths that were actually caused by vaccination. South Korea has accumulated a huge amount of COVID-19-related data in the process for big data analysis.

Lessons for South Korea are threefold: First, in future pandemics, it is more likely that countries would be left to their own struggles, without sufficient international backing based on multilateralism, given the supply chain issues that arise from the current geopolitical climate of war in the Ukraine and US-China tensions. South Korea should be prepared for bilateral negotiations at an early stage if its capacity does not address the delivery of indigenous vaccines at the right time. Second, based on the experience of indigenous vaccine development, the country should look toward developing a detection mechanism for various viruses in the future that would help develop vaccines. Third, South Korea's vaccination experience ended with high participation rates, but it was not unmet with challenges, and improving the vaccine injury compensation system with clarity and transparency would be beneficial to maintain social cohesion in the next pandemic.

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22 | COVID-19 Vaccination in India

Ambitions, Challenges, and Lessons from a Global Pandemic

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India's experience with COVID-19 vaccinations is marked by two competing themes. First, India was severely impacted by the COVID-19 pandemic, with more than 28 million reported cases over the first six months of the pandemic (Raj 2021). The country battled a devastating second wave, reaching a global record of more than 400,000 reported cases in a single day at its peak (Pandey et al. 2021). Second, India was the world's biggest developers of the COVID-19 vaccine, with the Serum Institute of India being the largest vaccine manufacturer in the world (Frayer 2021a), producing vaccines *before* clinical trials evaluating vaccine effectiveness were completed.

The volume of vaccines manufactured did not translate to domestic uptake and amelioration of cases, at least in the short term. In June 2021, six months after approval of several vaccines for the public, only 4% of the population had received a single dose. One year later, India had made great strides, with 90% of adults having received the full COVID-19 vaccine schedule (BBC News 2022), and by March 2023, 75% of India's entire population had been fully vaccinated (Holder 2023).

India's story of COVID-19 vaccination is an amalgamation of ambition, misinformation, and fragmented government and public health infrastructures yielding inefficiencies in vaccine registration, procurement, and dissemination. As our chapter describes, variation in capacity across Indian states resulted in substantial differences in the rollout of the vaccine. Ultimately, for India, with a population of over 1.408 billion people, the vaccination campaign faced structural challenges. Yet, the institutional arrangements, in combination with mistrust and misinformation, further challenged Indian public health officials.

Vaccine Development and Procurement

India initially authorized the use of two vaccines, each requiring two doses: Covishield, developed by Oxford-AstraZeneca, and Covaxin, devel-

oped by Bharat Biotech[1] in collaboration with the Indian Council for Medical Research (ICMR) and the National Institute of Virology (Pandey et al. 2021). The vaccination campaign in India began on January 16, 2021, with the goal of vaccinating 300 million people by August 20, 2021.

The first phase of vaccine distribution targeted 30 million health-care workers and frontline workers. However, vaccine rollout was slower than expected, and the country faced shortages of vaccine material due to insufficient scale-up of vaccine production and global supply chain challenges (Pandey et al. 2021). The Serum Institute of India, the largest vaccine manufacturer globally, had mass-produced the Oxford-AstraZeneca vaccine, given that it does not require ultra-cold refrigeration, which was key in achieving vaccinations in rural areas of the country (Frayer 2021a). And yet, India initially only ordered 11 million doses for a country of over 1.4 billion people. The Serum Institute was further hamstrung by a factory fire and shortage of raw materials and was unable to produce its promised, and modest, number of vaccines (Frayer 2021a).

Ultimately, India's targeted vaccination campaign of 30 million doses fell well short of that goal. Eighteen million people registered for the vaccine, and of those registered, only 11.1 million received their first dose (Pandey et al. 2021). Only 2.46 million people nationwide, of the targeted 30 million, received the second dosage of the vaccination, resulting in an uptake rate of 8%. This low uptake rate among the most critical health-care and frontline workers set a pattern of underachievement in future waves of the vaccine rollout.

Indian public health administration is highly decentralized, creating barriers for vaccine uptake across the country (Kaur et al. 2012). Each state was initially given responsibility for three key actions as part of the rollout campaign: (1) registration of eligible individuals, (2) procurement of vaccines, and (3) vaccine distribution. Each of these actions were patterned by capacity and funding differences across the states, leading to an uneven vaccine campaign.

As we highlight below, Indian states varied substantially in their ability to register the public. In Nagaland, Punjab, Goa, Mizoram, and Tamil Nadu, less than 40% of eligible populations were registered by public health officials, while in Andhra Pradesh and West Bengal, more than 80% of the population was registered. Only four states (Gujarat, Rajasthan, Chhattisgarh, and Uttarakhand) were able to vaccinate at least half of the public who were eligible with the first dosage before the end of February 2021. In contrast, the vaccination rate in the states of Nagaland, Punjab, Tamil Nadu, Mizoram, Goa, and Manipur was less than 20% of those who were eligible (Pandey et al. 2021).

Registration, procurement, and administration was impacted by variation in spending, capacity, and expertise across states, further contributing to the challenges in registration. In the year prior to the pandemic, total health expenditures varied substantially across states, with a low of

₹40,420,000,000 in Jammu and Kashmir to ₹848,410,000,000 in Uttar Pradesh. Per capita health expenditure similarly varied substantially, from ₹1,588 in Bihar to a high of ₹10,607 in Kerala (Parliament of India, n.d.).

The struggles of the vaccine campaign were further impacted by vaccine hesitancy, false information disseminated on social media, and technical glitches with the online registration portal (Pandey et al. 2021). Fears about vaccine safety and concerns about the effectiveness of the Covaxin vaccine, which was approved before the end of the phase 3 clinical trial, contributed to vaccine hesitancy in India. Covishield's subsequent suspension owing to safety concerns in several European and African nations, along with the escalating anti-COVID-19 vaccination attitudes, may have increased mistrust (Thiagarajan 2021).

When India expanded eligibility for the vaccine, including those in the 18–45 age bracket, the daily vaccination rate fell from an average of 3.6 million in April to 1.6 million in May (Sood et al. 2021). This decline is largely attributed to the mismatch between supply and demand. Even as India was one of the largest producers of vaccines globally, those vaccines were largely earmarked for export to other countries, leaving Indian states with limited supplies. Similar to the patterns of registering and procuring vaccines, the distribution of vaccines were marked by regional budgetary restrictions and inequities in the health-care system (Pandey et al. 2021).

Vaccination Uptake, Challenges, and Disparities

The COVID-19 vaccination campaign began in January 2021, and over the first year 1,567,615,454 doses were administered (Government of India, n.d.). Like other countries, India adopted a gradual phased expansion of eligibility. During January 2021, the first pool of eligible Indians to receive the vaccination were health workers. Starting in February, eligibility expanded to include essential government workers, including the police, military, and civil servants. Again, once month later, in March 2021, India expanded eligibility, but this was the first instance of expansion based on demographics rather than employment; individuals over the age of 60 and those over the age of 45 with other comorbidities were the first demographic group targeted for COVID-19 vaccines. This was followed by the expansion of eligibility to all adults over the age of 45 in April and all adults of any age beginning in May 2021. Starting in January 2022, India began vaccinating children in the age range 15–17, and in March children ages 12–14 were eligible (see fig. 22.1).

Guiding the vaccination campaign was the National COVID-19 Vaccination Program, which established the guidelines and responsibilities of federal and state governments, as well as private hospitals (Ministry of Health and Family Welfare, n.d.). These guidelines have undergone sev-

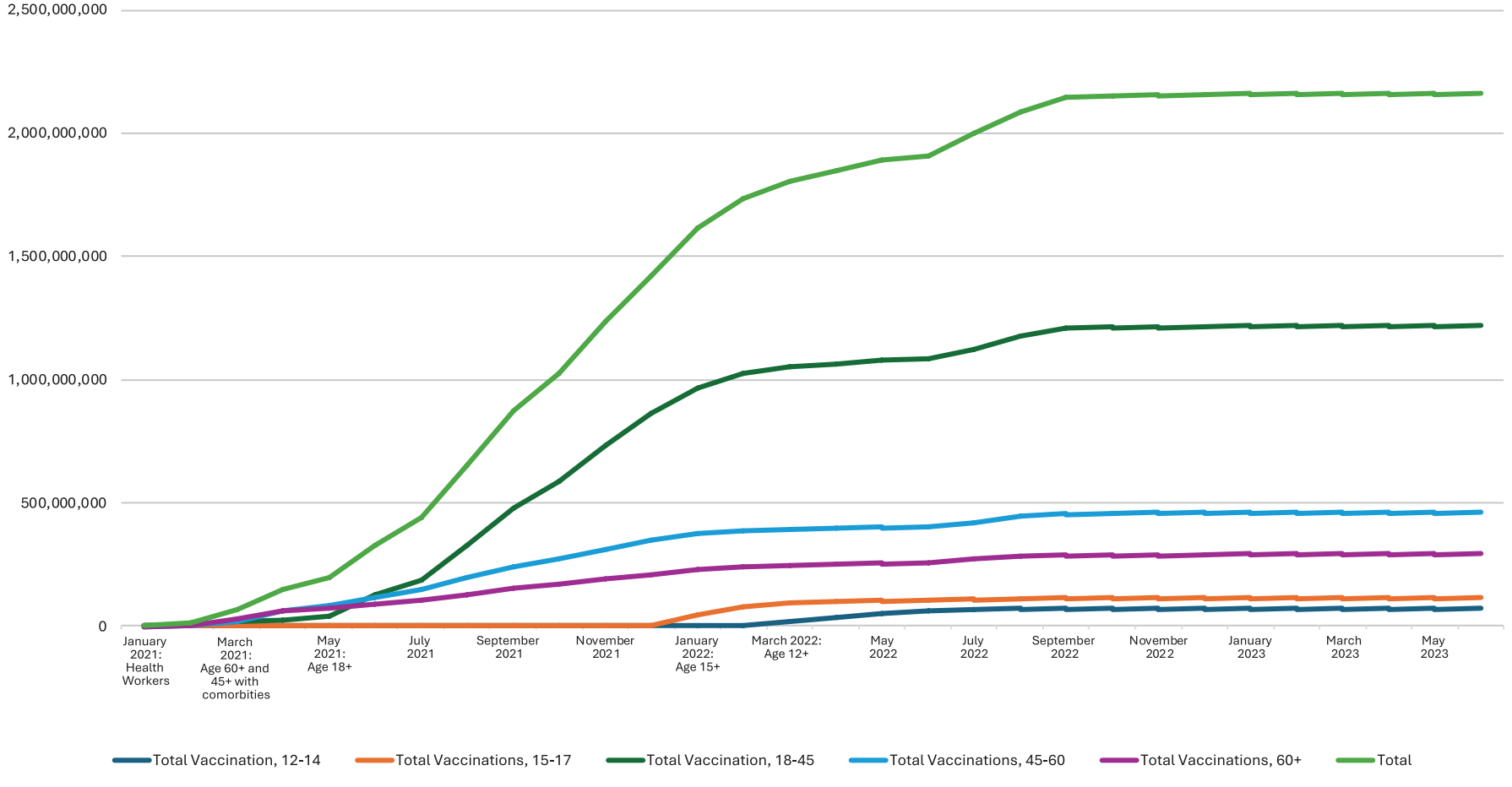

Fig. 22.1. Total vaccines administered by age and eligibility, January 2021–June 2023

eral transformations in centralization and vaccine procurement. The initial plan, in place for the first four months of 2021, was highly centralized. The federal government was responsible for procurement and distribution of vaccines, with states responsible for administering the vaccine campaign and providing shots to eligible populations selected by the federal government. These publicly distributed vaccines were free. To increase the rate of vaccinations, private hospitals were also given an allocation of vaccines from the government. Individuals could choose to receive the vaccine at these select hospitals for a standard cost.

State leaders bristled at the high level of centralization in the initial plan and pushed for more flexibility to address local challenges and prioritize populations of need who should receive the vaccination earlier. In May 2021, the federal government revised their distribution plan to reflect more independence at the state level. Under the new guidelines, the federal government was responsible for procuring half of the vaccines distributed for the state, and the state government and private hospitals were responsible for procuring the remaining half. States could then leverage the portion they had independently procured to focus resources on vulnerable groups within their state. Unsurprisingly, states reported difficulties in affording, managing the logistics of, and procuring their half of the vaccines. This was especially true for more rural and remote areas of the country. Within three weeks, the federal government revised the guidelines again, changing the distribution of procurement from 50/50 to 75/25, with the states responsible for the smaller share.

Regardless of the distribution of procurement responsibility, the point-of-contact cost remained the same. Federal guidelines established free vaccinations, regardless of income though not of age, for all vaccinations received through publicly operated vaccine centers. Initially, the Modi administration only authorized a cost-free vaccination for adults older than 45, with states responsible for the costs of vaccinations for those aged 18–44. In June 2021, Modi reversed the policy to provide cost-free vaccinations for all adults. Additionally, individuals who received vaccinations at hospital facilities were charged a standard rate, and the federal government encouraged those who could afford to pay the costs to use the private hospital facilities.

India was the second country, after China, to administer one billion vaccinations. And, as Prime Minister Modi frequently highlighted, the country had administered more vaccines than many other countries (*India Today* 2021). This assessment was true when looking at the raw numbers, but what the raw numbers of vaccinations mask is how slow India was at achieving high vaccination coverage among the public.

India's experience of managing their vaccine campaign was marked by both impressive gains in uptake, especially with the first dose, and extreme supply shortages and disparities in accessing vaccines. For example, by June 2021, India had provided nearly 200 million vaccinations, but only

4% of the population was fully vaccinated. This was occurring as India was producing the most COVID-19 vaccines of any country in the world and was serving as the largest vaccine manufacturer globally (Frayer 2021b).

In response to domestic shortages while exports boomed, the Modi administration halted their global "vaccine maitri program" for six months, so that the previously earmarked vaccines for export could be used domestically (BBC 2021). The "maitri program" was devised as a geopolitical tool, both to counter similar efforts undertaken by China and Russia and to help curry favor with neighbors and the international community. Additionally, in an effort to address lagging vaccine supplies, the National COVID-19 Vaccination Program doubled the gap between first and second doses, effectively allowing for existing supplies to reach more arms. The extended gap between doses, however, was not applied to athletes, students, and workers traveling abroad (Kaul 2021).

Additionally, shortages in supply were impacted by the Modi administration's decision to order too few doses, even from Indian manufacturers. The first order of vaccinations didn't occur until five days before the kick-off of the campaign and that order was only for 11 million doses (Rocha and Ravikumar 2021). During the initial months of the vaccine campaign, case and death counts were waning, but in May 2021, India's case and death counts surged—along with demand for the insufficient supply of vaccines. The Serum Institute in India announced that they would no longer supply vaccines to COVAX, after other countries had already placed orders and paid for vaccines (Frayer 2021a, 2021b). Those promised vaccines were redirected to domestic supplies, but as the Modi administration expanded eligibility to all adults, it quickly became insufficient to meet increased demand. The Serum Institute in India was also unable to hit their goal of producing 100 million doses a month in 2021, due to lack of material being exported by the United States and price caps set by the Modi administration. Shortages were so severe that India was a *recipient* of aid and COVID-19 medication from Bhutan and Bangladesh (LiveMint 2021; B. Singh 2021).

Connected with the challenges in accessing vaccinations and shortages in supply are the persistent regional disparities in vaccination rates across Indian states and union territories (see fig. 22.2). Across the total population of India, by June 2023, 68,542 per 100,000 people were fully vaccinated. Yet, this obscures vast differences in rates of vaccination. Andhra Pradesh, a state on the southeastern coast of India, has the highest vaccination rate of 89,771 per 100,000. Yet, in the more remote states in India, vaccine rates lagged. Three regions, Andaman and Nicobar Islands, Sikkim, and Ladakh, each have vaccinated fewer than 10,000 people per 100,000.

There are several reasons for the lagging vaccine rates across these three regions. First, each region is geographically distant from major economic and population centers of India. Andaman and Nicobar Islands are an archipelago of hundreds of islands that are nearly a thousand miles off

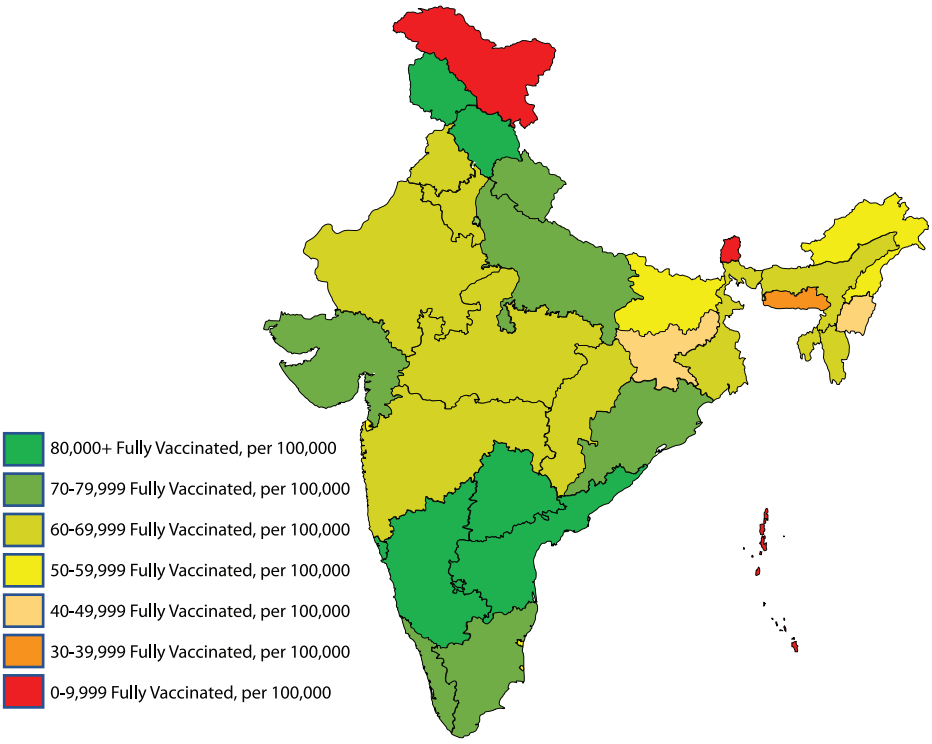

Fig. 22.2. Map showing variation in vaccinations across India

the coast of India. Second, related to the far-flung location of each region, geography introduced infrastructure and logistic challenges. For example, Sikkim only has five vaccine centers, one government-sanctioned laboratory, and one private lab (Choudhury 2021). Last, all of these regions were either politically weak or in opposition parties to Modi's Bharatiya Janata Party (BJP). For example, Andaman and Nicobar Islands is represented in Indian Parliament by a member of the Indian National Congress, and the representative from Sikkim represents the Sikkim Krantikari Morcha (SKM), a Democratic Socialist party, and is the only member of Parliament representing that party. Of those three regions, Sikkim is the only one with a Legislative Assembly, and similar to parliamentary representation, the state is dominated by SKM.

Alongside geography, political factors also play a pivotal role in vaccine distribution. For instance, BJP-ruled Himachal Pradesh and Goa fully covered their eligible population with the first dose of COVID-19 vaccine and 91.9% and 87.9% of people, respectively, with both doses. Conversely, West Bengal, which is ruled by Trinamool Congress (a political opponent to BJP), only covered the first dose of vaccine for 86.6% of people and both doses for 39.4% of the population. States that have borne the brunt of low vaccination campaign are either geographically distant or led by parties in opposition to Prime Minister Modi's BJP (*Times of India* 2021).

Disparities were observed in vaccine uptake across socioeconomic groups due in large part to a lack of appropriate and adequate information about vaccine safety and efficacy (de Figueiredo et al. 2020). Additionally, given that more than half of Indians lack internet access, the requirement that vaccine recipients register online may have contributed to the poor vaccination rates and disparities in access to the vaccine itself, particularly among rural and economically disadvantaged groups (Dani et al. 2021; Majumdar 2022). Disparities were also observed in terms of gender: as of June 2021, for every 1,000 doses given to men, only 856 doses were given to women. In one rural union territory in western India, only 30% of vaccines were administered to women; vaccines delivered to minoritized gender groups were not tracked at all (Guha 2021). The gender disparity in vaccine uptake was attributed to societal norms around men making decisions (and men giving women permission to receive the vaccine), disparities in digital literacy and access to technology, and concerns about vaccine safety in relation to menstruation and fertility (Guha 2021; Nanda and Jena 2022; Sharma 2021). Further, studies found that vaccination camps in some regions were set up closer to wealthier neighborhoods (or near higher-caste areas), which were inaccessible to people from other castes, and that in some regions, rather than incentivizing vaccination, individuals were punished (e.g., through withholding of subsidized food) for refusing to receive the vaccine (Dutta et al. 2021).

Explaining India's Approach to Vaccination

The Indian government's decisions in vaccination development and rollout were subject to influence by public trust in the central and state governments, public health capacity, campaigns and communication efforts, and health-care workers.

Trust

The COVID-19 Symptom Survey (CSS), a collaborative effort between the University of Maryland, Carnegie-Mellon University, and Facebook (Reinhart and Tibshirani 2020), was critical to the Indian government's understanding of public attitudes and perceptions about the COVID-19 vaccine. The CSS, which began in April 2020, is the largest public health survey ever, collecting data from over 100 million Facebook users globally. Data collection overlapped with vaccine trials, authorization, and rollout.

Nearly one-third of respondents (29%) reported vaccine hesitation, with the most common reason being concerns about its safety (Chowdhury et al. 2021; Prakash et al. 2022). Trust was identified as a key factor in explaining vaccine hesitancy and uptake. In their survey of 3,000 respondents across four states, Umakanthan and colleagues (2021) evaluated

trust and confidence in the government and found that those who trusted the government were more likely to receive a vaccination, demonstrating lower hesitancy and resistance. However, analyses of vaccine hesitancy and resistance in India suggest that these attitudes stemmed from a mistrust in the vaccine itself (i.e., safety and contraindications) rather than in the government as a whole (Agarwal and Naha 2023). Still, 2021 data revealed that of 28 countries, Indians had the most trust in the COVID-19 vaccine (*Times of India* 2021). Reports suggest that by July 2021, 75 million Indians were vaccinated—representing only 5% of the population. Mistrust of the safety and efficacy of vaccines spread faster than government officials were able to distribute the shots, so officials focused on communication strategies in an attempt to counter misinformation.

Government Communications Strategies

The Ministry of Health and Family Welfare (MHFW) developed a communication strategy to counter vaccine hesitancy and controversy that had been observed previously in the context of childhood immunizations (Prakash et al. 2022). The ministry's strategy aimed to identify messages and individuals to disseminate information about the safety and efficacy of COVID-19 vaccines to the general public and, in particular, to target resistant groups (Ministry of Health and Family Welfare 2021). In turn, the MHFW expected that robust communication and transparency would also build public trust in government efforts to mitigate consequences of the virus. The government also built a collectivistic and competitive spirit through communications campaigns urging Indians not to delay getting vaccinated and risk spreading COVID-19 to their family and community and encouraging them to help make India the most vaccinated country in the world (K. Singh et al. 2022).

Public Health and Public Administration

Storage of COVID-19 vaccines required an extensive strategy involving the airlifting of vaccines to each of four regional government medical supply areas, where they were stored in coolers and then distributed further to temperature-controlled facilities at the district level and eventually to distribution centers and vaccination sites (K. Singh et al. 2022). The electronic Vaccine Intelligence Network was used to monitor the temperature of over 25,000 cold chain points. A cloud-based digital platform (Co-WIN) was developed for implementation and surveillance, for instance, to ensure that individuals were given the same vaccine upon their second and subsequent doses and that sufficient time had lapsed between doses. The platform also enabled the monitoring of vaccination supply at multiple levels (local, state, region) and vaccine wastage (K. Singh et al. 2022).

Given India's experience with the Universal Immunization Program,

which administers vaccines against twelve vaccine-preventable diseases to over 25 million infants annually, the government leveraged existing infrastructure for storage, supplies, and delivery of COVID-19 vaccines (K. Singh et al. 2022). While the central government formulated guidelines and approvals for vaccines, and also financially supported vaccine manufacturers, states identified vaccination sites, managed personnel who would administer vaccine, managed education campaigns, and updated vaccination data (Purohit et al. 2022). Some wealthier regions with more advanced infrastructure and higher levels of literacy had administered the first dose to nearly half of their residents by June 2021; for example, South Delhi had administered 1.1 million vaccines by that time (Arya 2021). Other regions leveraged community health workers to raise awareness and reduce the spread of misinformation (Purohit et al. 2022). States such as Maharashtra and Karnataka additionally employed mobile vaccination vans, which were particularly valuable for deployment in remote areas (Purohit et al. 2022). Community efforts and local government structures were potentially more effective than state or central government efforts in reducing vaccine hesitancy across multiple regions. For example, in Punjab, celebrities were appointed as "vaccination ambassadors," while Chhattisgarh created folk songs with accurate information about vaccines. Administrators of one village created a task force that included health-care professionals and village members who developed advocacy videos and satellite vaccination sites upon learning that villagers were afraid of going to the hospital for their vaccine. This particular village was able to achieve a 100% vaccination rate among eligible individuals following these efforts (Purohit et al. 2022).

Role of the Health-Care System and Professions

Surprisingly, issues of vaccine hesitancy and misinformation were particularly pervasive among health-care workers themselves (Chandani et al. 2021). In one 2021 survey conducted with health-care workers ($n = 264$) in Tamil Nadu, researchers found that less than half of respondents (46.6%) believed the COVID-19 vaccine should be mandatory once available. One-fifth of pediatricians ($n = 153$) reported that they did not intend to receive the vaccine, and over half (55.3%) planned to "wait and see" how others responded to the vaccine before making a decision, with their primary concern being that vaccine development was rushed (Ashok et al. 2021). Yet in contrast, a survey of health-care professionals in a facility in the western region of India revealed excellent knowledge about COVID-19 as well as high acceptance of the vaccine (Dara et al. 2021). Among those with vaccine hesitancy, the most common reason, which was consistent with other reports, was safety; about one-third believed that being exposed to the virus itself would be more efficacious in promoting immunity than

receiving the vaccine. Other studies show similar reasons for hesitancy, with some also noting demographic variation in vaccine acceptance (e.g., lower among younger health-care workers) (Mehta et al. 2022). This notable heterogeneity in attitudes toward the vaccine and beliefs about its safety and efficacy could, in part, explain the variation in broader acceptance of the vaccine. Since health-care workers are one of the key and trusted sources of information about viruses and vaccines, it is possible that lower acceptance among health-care workers had a spillover effect of mistrust among patients and the public (Dara et al. 2021).

Vaccine Misinformation

Consistent with low vaccine acceptance among health-care workers in Tamil Nadu, reports from 2021 suspected that low vaccination rates in the state as a whole could be attributed to elections around the same time period whereby COVID-19 and the vaccine were barely mentioned (Arya 2021). The death of a popular actor following his vaccination spurred further concerns about the vaccine; yet little was done—especially by the government—to ameliorate concerns or debunk misinformation about the vaccine. Also, some reports claim that India had not had a history of vaccine hesitancy until the Indian National Congress allegedly spread misinformation and perpetuated vaccine hesitancy (Tarfe 2021). Studies find that traditional media (e.g., newspapers) generally echoed government health agencies' promotion of the vaccine and its effectiveness but that social media was particularly suspect as a channel for spreading misinformation about safety and efficacy of the vaccine, as well as about the number of doses required for protection (Basu and Sharma 2023).

Conclusions

India's vaccination story affords three key takeaways (1) the potential for communities and local government structures to implement and deploy pandemic response strategies; (2) the drawbacks of overpromising and underdelivering in terms of vaccine procurement and distribution; and (3) the heterogeneity of public and professional confidence in science and public health as influenced by societal norms and technology. Indeed, these three takeaways are interconnected. As a result of mishaps between the central government and the Serum Institute, local governments and community-level administration were compelled to take matters into their own hands. Accordingly, there was variation in how states and districts within them deployed vaccines, based on societal norms (e.g., household decision-makers, mistrust and fear of hospitals, and access to vaccination sites). Community and local personnel also had to overcome the rampant

misinformation spread by technology, especially through social media. In fact, managing the infodemic in India may have been as resource intensive as managing vaccine distribution in India (Jindal and Anand 2020).

India is a densely populated, diverse country, and accomplishing the arduous task of vaccinating everyone in the state was seemingly a challenging task. A point here is that India's vaccination policies encountered periodic shifts in terms of eligible beneficiaries, procurement, distribution plans, and import and export (Purohit et al. 2022). Although the central government's monopoly of the vaccines aided in bringing down the vaccine prices, the division of vaccine procurement among the national government, the state governments, and private enterprises led to differential pricing and delayed target achievements. This problem was further aggravated by the socioeconomic and political dynamics that were brewing, alongside a robust community belief system fueled by misinformation (Choudhary et al. 2023). All these factors crystallized mistrust among people and jeopardized the overall vaccination campaign. The spread of a contagious disease such as COVID-19 and its containment should not be perceived in isolation from other socioeconomic-political factors influencing its incidence or prevalence. Such challenges can only be tackled if policymakers focus on social determinants of health and design policy frameworks for health—capturing the sociopolitical-psychological dynamics of the country.

NOTE

1. In 1996, Dr. Krishna M. Ella and Mrs. Suchitra Ella founded Bharat Biotech, a corporation devoted to developing cutting-edge vaccines and biotherapies. The COVID-19 vaccination is the most significant of them. The virus was grown by Bharat Biotech and chemically inactivated. In preclinical tests, the manufacturer evaluated the vaccine's efficacy and safety on animals. The company advanced the preclinical study phase and entered human testing by July 2021 with the help of ICMR and the regulatory authority. Another intriguing aspect is that Bharat Biotech repurposed the largest BSL-3 high-containment facility in India that it had established to produce inactivated polio vaccine to produce COVID-19 vaccine.

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23 | COVID-19 Vaccination in Pakistan

Public Health Capacity and Trust

Hina Khalid, Izza Aftab, and Ashley M. Fox

In Pakistan, like many other countries, the COVID-19 vaccination campaign emerged as a crucial aspect of the government's strategy to protect public health and curb the spread of the virus. The introduction of COVID-19 vaccines in Pakistan began in February 2021 and has since been a critical step in mitigating the impact of the pandemic on the nation's population. By some accounts, as much as 80% of the eligible adult population had received at least one dose 13 months after vaccine rollout began (Basharat 2022). Pakistan's COVID-19 vaccination rate has rivaled India's at key junctures, even though Pakistan is not a vaccine-producing nation.

The success of Pakistan's COVID-19 vaccination campaign is remarkable given the country's long history of vaccine hesitancy, vaccine resistance, and even political violence in the face of vaccination campaigns. Despite these challenges, Pakistan managed to achieve a notable level of success in its COVID-19 vaccination campaign, defying expectations based on its history of vaccine hesitancy, limited state and health system capacity, and deeply entrenched political divisions. This accomplishment can be attributed to a combination of strategic factors that contributed to the effective distribution of vaccines and public engagement. First, perhaps one of the most influential factors behind Pakistan's vaccination success was political commitment from high-level leadership. Recognizing the gravity of the pandemic's impact on the nation's health and economy, top officials united in their support of vaccination efforts. This commitment translated into a coherent and consistent message to the public, fostering trust and encouraging greater compliance with vaccination measures (Zaidi and Hussain 2022). Second, the thoughtful application of vaccine mandates as a stick was one of the key strategies that contributed to Pakistan's relative success in its vaccination campaign. By leveraging the threat of vaccination requirements for certain activities and public services, the government effectively incentivized vaccination uptake. This approach nudged many individuals who were initially hesitant to receive the vaccine, helping to increase overall vaccination rates and subsequently reducing the potential for COVID-19 spread. Finally, strategic engagement with vaccine diplomacy and maximization of resources within capacity

constraints played a major role in aiding Pakistan's vaccination efforts. To address the pandemic's impact on health-care facilities, Pakistan allocated significant funding to tackle the crisis during the fiscal year 2020–21. The financial burden of acquiring vaccines was shared between the federal government and the provinces, with all provinces implementing progressive fiscal budgets aligned with the federal government's policies. Essentially, while the allocation changed, the size of the pie did not grow. The country received financial assistance from international organizations like the World Bank and the Asian Development Bank (ADB) to support its efforts. Pakistan's participation in the COVID-19 Vaccines Global Access (COVAX) initiative, led by the Global Alliance for Vaccines and Immunization (Gavi), the World Health Organization (WHO), and the Coalition for Epidemic Preparedness Innovations (CEPI), further aimed to ensure equitable access to vaccines regardless of the country's income level. Apart from reallocating funds across the federal and provincial governments and receiving assistance from financial organizations, the third prong was the country's bilateral efforts to procure vaccines as COVAX's response stuttered when India, who was responsible for manufacturing the majority of vaccines, got hit by the Delta variant (International Monetary Fund and World Health Organization 2022; Asian Development Bank 2020; World Bank 2020).

While Pakistan's vaccination campaign has made substantial progress, several challenges remain. First, one major concern is the lack of comprehensive data that accurately disaggregates vaccine uptake among various demographic groups and across urban and rural settings. This information gap hampers the government's ability to tailor vaccination strategies and allocate resources effectively, potentially leaving some vulnerable populations undervaccinated. Second, the initial high uptake of less effective vaccines raises the specter of prolonged vulnerability to COVID-19 surges. While any vaccine offers some level of protection, prioritizing more efficacious vaccines could have reduced the impact of the virus further, preventing potential future waves. Third, the nation's low commitment to continuing booster programs poses an additional challenge. Boosters are vital in strengthening immunity against new variants and ensuring long-term protection, and a lack of emphasis on booster doses could undermine the progress achieved in the initial vaccination drive. Fourth, the reliance on vaccine mandates, while effective in encouraging vaccination uptake, comes with the potential risk of exacerbating low-trust feedback loops. Public resistance to mandates and perceived coercion may hinder open dialogue, making it more challenging to build trust and sustain long-term compliance with vaccination recommendations.

This chapter examines the interplay between public health capacity, trust, and COVID-19 vaccinations in Pakistan, shedding light on the factors that have influenced the vaccine rollout and uptake.

TABLE 23.1. Percent of Population Receiving at Least One COVID-19 Vaccine Dose by July 2022

	Vaccinated (%)
Pakistan	75%
India	74%
Afghanistan	15%
Bangladesh	79%
Iran	77%

Source: Data of those receiving at least one dose by July 15, 2022, from Reuters.com: https://www.reuters.com/graphics/world-coronavirus-tracker-and-maps/vaccination-rollout-and-access/

Methods

We reviewed secondary data sources published online and government documents. To triangulate and enrich our understanding of the factors influencing Pakistan's vaccination strategy, we also conducted six semi-structured interviews with key informants. These informants were members of the government or members of international organizations, and were directly involved in COVID-19 vaccine policymaking.

Vaccines

The COVID-19 vaccination campaign was initiated in Pakistan in February 2021, and as of May 2023, 63.6% of Pakistanis had received the full vaccine dose, 74.9% had received at least one dose, and 23% had received a booster shot (see table 23.1) (Global COVID-19 Access Tracker 2023).

Vaccine Types and Market Authorization

Pakistan approved the use of seven vaccines between January 2021 and July 2022. These included AstraZeneca (COVAX), Sinopharm (China), Sputnik (Russia), CanSino (China), Sinovac (China), Pfizer (initially from Gavi, and then the United States donated it to Pakistan directly), PakVac (manufactured in Pakistan with assistance from China), and Moderna (received through COVAX and donated by the United States) (COVID19 Vaccine Tracker 2022). From February 2021 to December 2022, a total of 317 million vaccine doses were administered in Pakistan (Mathieu et al. 2021). The Drug Regulatory Authority of Pakistan (DRAP) was responsible for approving all COVID-19 vaccines before their rollout. DRAP, established in 2012, operates under the federal Ministry of National Health Services, Regulations, and Coordination. Its primary objective is to ensure that medicines and vaccines distributed in Pakistan comply with federal standards. It also has the authority to grant emergency use authorizations

(EUAs) for drugs or vaccines based on their quality, safety, and efficacy (Drug Regulatory Authority of Pakistan 2022). During the early stages of the pandemic, vaccines were granted EUAs.

Vaccine Financing

Pakistan received financial assistance from international organizations, such as the World Bank and the Asian Development Bank, in its efforts to combat the pandemic. The World Bank allocated $200 million through the Pandemic Response Effectiveness in Pakistan program, while the ADB provided a grant of $2.5 million for medical supplies and emergency assistance loans, totaling $300 million and $500 million, respectively, in these two areas (Asian Development Bank 2020; World Bank 2020).

To ensure fair and equal access to vaccines regardless of a country's income level, Pakistan participated in COVAX, a global initiative led by Gavi, WHO, and CEPI. Pakistan received a total of 372,701,333 vaccine doses, which included doses obtained through multiple and bilateral agreements, non-COVAX donations, COVAX deliveries, and vaccines from unidentified sources. The government authorized the private sector to administer two vaccines, CanSino and Sputnik V, with specific price limits. However, the price cap for Sputnik V was waived by Pakistani courts, resulting in a cost of $80 for a complete two-dose regimen (Siddiqui et al. 2021).

During the fiscal year 2020–21, Pakistan allocated PKR 70 billion (Government of Pakistan 2021) to address the pandemic, primarily focusing on improving existing health-care facilities. Furthermore, in June 2021, the government pledged an additional $1 billion for the procurement of COVID-19 vaccines. As health care is under the jurisdiction of the provinces in Pakistan, they bore the financial burden associated with acquiring COVID-19 vaccines. Throughout the pandemic, all four provinces implemented progressive fiscal budgets, aligning with the federal government's expansionary fiscal and monetary policies.

Overview of COVID-19 Vaccine Strategy Challenges

Pakistan encountered a number of challenges to scaling up vaccine access and uptake, especially (1) widespread vaccine hesitancy and (2) low public health capacity.

Public Health Capacity Challenges

Entering the pandemic, Pakistan faced public health capacity challenges such as a large and hard to reach population, vaccine availability, and inadequate infrastructure. However, despite these pressing challenges,

Pakistan had a degree of expertise in accessing hard-to-reach populations based on fluid policy responses like the Lady Health Worker Program (LHWP) and the Polio Eradication Initiative (PEI).

Health Infrastructure

Pakistan spends 1.2% of its GDP on health (Government of Pakistan 2021–22), which is substantially less than the Abuja Declaration's recommendation of 15% of public spending (Jowett et al. 2016). Of its population of approximately 240 million, 140 million people live in rural areas and other smaller cities (World Bank, n.d.). These numbers reflect that not only does the country have a large population but a large share of it lives in areas that are hard to access.

The national health infrastructure comprises 1,276 hospitals, 5,558 basic health units, 736 rural health centers, 5,802 dispensaries, 780 maternity and child health centers, and 416 tuberculosis centers. The total availability of beds in these health facilities has been estimated at 146,053. There are approximately 266,430 registered doctors, 30,501 registered dentists, and 121,245 registered nurses across these facilities (Government of Pakistan 2021–22). In Pakistan a large private sector has emerged to fill the gap in public health service provision due to inadequately staffed and stocked government facilities (Zaidi 2022). In addition, a number of informal health providers, "quacks," provide health services (Sudhinaraset et al. 2013; *The Economist* 2019).

There is more unequal distribution of health facilities in rural areas as compared to urban areas (S. U. Khan and Hussain 2020). Consequently, Pakistan has a cadre of mobile field workers who are trained in providing door-to-door health services, through the Expanded Program on Immunization (EPI), PEI, and LHWP in both rural and urban areas. Pakistan established its EPI in 1978. It focuses on vaccinating children against tuberculosis, poliomyelitis, diphtheria, pertussis, tetanus, and measles. Additional vaccines were introduced in subsequent years (WHO Eastern Mediterranean Regional Office, n.d.). With the passage of the 18th constitutional amendment, legislative and executive functions of health and vertical programs were devolved to the provinces (Husain and Omer 2016). The provinces, through EPI, are responsible for managing the operational cost of the immunization activities at the provincial and district levels (Primary and Secondary Healthcare Department, n.d.; Government of Sindh Health Department, n.d.). Donors and partner agencies play a substantial role in aspects of the program operations and engage the public sector machinery and not-for-profit organizations (Husain and Omer 2016). Pakistan is one of the few countries with polio, and consequently the country started its Polio Eradication Initiative in 1994. While the EPI also incorporates the polio vaccine, the PEI focuses solely on polio eradication efforts through vaccination campaigns (Haq et al. 2021). Pakistan

has an extensive polio infrastructure with rural outreach, and it is known for supporting broader public health goals and responding to humanitarian emergencies (Polio Global Eradication Initiative 2022). The Lady Health Worker Program in Pakistan was started in 1994 (Bechange et al. 2021), and it focuses on the provision of primary, preventative, promotive, and curative care services mainly in marginalized remote rural and urban slum communities, with a special focus on women and children (Durrani et al. 2019). Through almost 90,000 lady health workers (LHWs), a population of approximately 115 million, women, men, and children are provided primary health-care services (Durrani et al. 2019).

This existing infrastructure helped Pakistan in several ways: there were plenty of trained personnel who could administer the vaccine or provide medical care. For example, LHWs were trained to provide COVID-19 home-based care to people to avoid overcrowding in large hospitals so that critically ill patients can get due attention and treatment. Approximately 46,000 LHWs completed the training all over Pakistan and started visiting their catchment households to provide care to people (Shaikh et al. 2023). Similarly, the country's mobile health workers (from the EPI and PEI) who were trained in immunizations were drawn on to increase vaccination coverage (Hadid 2021). Moreover, the polio programs had in place databases and a helpline, which was later commandeered and scaled up as a COVID-19 helpline (Global Polio Eradication Initiative 2020; Hadid 2021). The existence of this type of health care and health-care professionals is one explanation of Pakistan's relative success with vaccination and curtailing the spread of the virus.

Pakistan's health infrastructure reflects its colonial legacy, with major hospitals concentrated in large cities like Karachi and Lahore, while smaller towns and villages lack adequate health-care infrastructure (Javid et al. 2020). Historically, efforts to improve Pakistan's health-care system have been impeded by cost considerations and conflicts between the federal and provincial governments. For example, in the 1950s and 1960s, attempts to enhance the health-care system faced challenges due to disagreements on cost sharing. Similarly, the People's Health Programme in the early 1970s, which aimed to expand rural health services, faced difficulties due to conflicts between the federal and provincial governments regarding cost distribution. With the passage of the 18th amendment in 2010, constitutional power was devolved to the provinces, but confusion and competition between the federal and provincial governments hindered effective devolution of responsibilities (Javid et al. 2020). Even though devolution got off to a difficult and sudden start, politicians and government officials in the provincial governments took a strong role in managing resources, making plans, and introducing new ideas. However, there were still challenges in effectively implementing these ideas due to limited institutional capability, poor coordination between the federal and provincial governments, and interference from local elites (Zaidi et al.

2019). The health workforce has a shortage, especially nurses, midwives, and LHWs (Ministry of National Health Services, Regulations, and Coordination 2018). Additionally, the skills acquired by the health workforce are inadequate and there is poor job satisfaction and out-migration. Due to unequal distribution of the health workforce, including between urban and rural areas, the role of community-based health workers becomes especially important in the hard-to-reach rural areas.

Vaccine Availability Storage Infrastructure

Similar to other low- and -middle income countries, Pakistan faced inadequate availability of vaccines. Given Pakistan's large population, the government was confronted with a challenging situation to procure enough vaccines to meet the vaccination needs. Pakistan also did not have the cold chain infrastructure in place to support several vaccines. Ensuring the potency of vaccines necessitates their proper storage, transportation, and distribution at specific temperature conditions. However, maintaining the required temperatures poses challenges for countries in Asia, Africa, and Latin America, primarily due to intense heat and infrastructure limitations. Pakistan faced similar concerns when it came to storing the Pfizer vaccine, one of the initial COVID-19 vaccines that exhibited promising efficacy. The Pfizer vaccine had stringent storage requirements of −70 degrees Celsius (−94 F) or colder (Swift et al. 2020). This posed a considerable challenge for Pakistan, as its existing cold chain system had a capacity to store temperature-sensitive commodities at −20 degrees Celsius. Due to these limitations, it was initially suggested that the Pfizer vaccine might be unsuitable for Pakistan and that the country should instead use other vaccines, such as a Chinese vaccine, which did not have similar storage requirements (Gul 2020).

Vaccine Hesitancy

Vaccine hesitancy predates the pandemic in Pakistan. According to a Gallup poll conducted in 2021, 37% of individuals in Pakistan expressed unwillingness to receive the COVID-19 vaccine if it became available to them (*Arab News Pakistan* 2020). But vaccine hesitancy has been a longstanding issue in the country, with Pakistan experiencing high rates of skepticism toward vaccinations. From 2015 to 2019, Pakistan saw a noticeable decline in confidence among the population regarding the safety, importance, and effectiveness of vaccines (Figueiredo et al. 2020). Pakistan ranks among the top three countries worldwide with the highest number of unvaccinated children, which further underscores the severity of the issue. The country has faced significant challenges in achieving its vaccination targets.

Vaccinations have been a contentious political issue in Pakistan for

some time, particularly among minority ethnic and religious groups. In 2011, Islamist militancy played a role in attacks on polio immunization teams after a doctor was accused of running a fake vaccination campaign to help the US Central Intelligence Agency track down Osama bin Laden in Pakistan (Lenzer 2011). Violence again erupted, and several vaccinators and their guards were killed in 2018 after a rumor spread in the religiously conservative northwest tribal belt that children had gotten sick after receiving the polio vaccine (H. N. Khan and Constable 2019).

According to key informants (interviews 1 and 5), many people were hesitant to get vaccinated. Concerns such as long-term health consequences, infertility, or death after two years following a vaccination were some of the concerns raised by people. Therefore, Pakistan faced an uphill battle in vaccinating its citizens not only in terms of capacity constraints but also in terms of preexisting skepticism toward state-sponsored vaccination campaigns among the public.

Vaccination Strategy

Setting Up a Governance Framework

To effectively manage the COVID-19 response, Prime Minister Imran Khan established the National Command and Operation Center (NCOC) in 2020. Chief ministers headed provincial task forces within the NCOC, with the purpose of effectively managing the public health response to the pandemic while safeguarding the economy and essential social services (Zaidi and Hussain 2022). The NCOC comprised a diverse range of stakeholders, including representatives from the Planning Ministry, armed forces, Interior Ministry, national and provincial disaster management agencies, provincial departments of health, National Institutes of Health, and the Drug and Regulatory Authority of Pakistan. Its primary mandate was to coordinate and strategize various aspects of the national response to the pandemic, ensuring effective collaboration and integration among these key entities. Under the National Coordination Committee, the NCOC assumed responsibility for formulating policies and overseeing the implementation of COVID-19 measures throughout Pakistan. The NCOC played a vital role in drafting guidelines for vaccine distribution across the provinces, collaborating closely with provincial authorities (Siddiqui et al. 2021). This diverse staffing of the NCOC ensured that there was representation of public health professionals and clinicians, in addition to technical professionals.

While the main guidelines came from the NCOC, as health is a provincial subject in Pakistan, provinces gave localized policy responses like differentiated mandates, which were above the response floor provided by the NCOC. For example, Pakistan's second largest province, Sindh,

mandated broader lockdowns (Tunio 2021; *Express Tribune* 2021d) to curtail the rapid spread of COVID-19, while the federal government encouraged "smart" lockdowns.

Ensuring Adequate Vaccine Supply

Vaccine requirements were met through several avenues. First, the country received vaccine donations through the COVAX initiative. COVAX, spearheaded by Gavi, the Vaccine Alliance, the Coalition for Epidemic Preparedness and Innovation, and the World Health Organization, aimed to ensure fair and equitable access to COVID-19 vaccines worldwide (World Health Organization, n.d.). Second, Pakistan proactively procured vaccines through direct purchases. For instance, in early 2021, the country procured 1,060,000 doses of Sinopharm and CanSino vaccines. Third, Pakistan became one of the early adopters of allowing private imports of COVID-19 vaccines for commercial sale, including the Russian Sputnik V vaccines (Shahzad 2021a). Fourth, Pakistan collaborated with China to establish local vaccine processing capabilities, leading to the development of the PakVac vaccine. The CanSinoBIO vaccine was imported in its concentrated form and subsequently sterilized and then packaged within Pakistan (*Express Tribune* 2021b).

To purchase vaccines, the government of Pakistan utilized financial resources from international financial institutions such as the World Bank (World Bank 2021) and the Asian Development Bank to fund vaccine purchases. Notably, the World Bank reallocated $153 million to support the country's COVID-19 vaccination efforts. Moreover, the ADB approved a loan of $500 million in 2021 specifically for the procurement and distribution of coronavirus vaccines (Asian Development Bank 2021). The government also allocated approximately PKR 1.1 million in the federal budget to ensure the achievement of vaccination targets. As of July 2022, Pakistan needed an additional 7 million vaccine doses to attain the 70% vaccination target. The total secured vaccine doses amounted to 323 million, comprising 180 million doses expected through COVAX, 11 million doses from bilateral donations, 57 million doses from bilateral agreements, and 21 million doses from other sources (International Monetary Fund and World Health Organization 2022).

Procuring Cold Chain Freezers

To meet infrastructure requirements, the federal government took emergency measures and expedited the installation of an updated cold chain storage system capable of meeting the stringent requirements for storing the Pfizer vaccine. Twenty-three ultra cold chain (UCC) refrigerators were installed at 16 different locations across Pakistan. Financial assistance from the ADB, along with support from UNICEF, facilitated the acquisition

and delivery of these UCC refrigerators from China (Bhatti 2021). Despite the successful rollout of the Pfizer vaccine, concerns persisted among citizens regarding its suitability for Pakistan due to the demanding cold chain storage requirement (Junaidi 2021).

Sequencing Vaccinations

The vaccination rollout began by targeting health-care workers and senior citizens (individuals aged 60 and above), gradually extending eligibility to other segments of the population (*Express Tribune* 2021a) (Siddiqui et al. 2021). As additional vaccines became available, the focus shifted to vaccinating young adults, while the vaccination of children was postponed pending further evidence. Vaccinating the young adult population presented a significant challenge since this age group accounted for 53.9% of Pakistan's total population aged 18–59 (see fig. 23.1).

The NCOC introduced a web and mobile application platform, the National Immunization Management System (NIMS), to ensure streamlined vaccination efforts. NIMS was linked directly with the National Database and Registration Authority and the telecom sector. The NIMS online platform was used for registration, appointment, and verification of applicant records. NIMS also had linkages with the telecom companies, and so they were able to send SMS messages with information about vaccination delivery procedures to citizens registered with mobile numbers (Abbas et al. 2022). NIMS enabled effective vaccine rollout throughout the country.

Expanding Outreach

Vaccine centers were set up in large urban centers initially, and these were then supplemented by fixed vaccination sites (at basic health units and rural health centers) and door-to-door vaccination (*Express Tribune* 2022). The country's mobile health workers who were trained in immunizations were drawn on to increase vaccination coverage (Hadid 2021). Vaccination sites were initially set up in urban centers, which served as the epicenters of the pandemic. However, in order to deliver vaccines to smaller cities and rural areas, a mixed approach was used. Vaccines were made available at fixed sites. In addition, outreach (mobile) sites (Hadid 2022) were created to reach smaller towns and rural areas (*Express Tribune* 2022). Knowledge of the polio model of door-to-door vaccination was leveraged for the mobile vaccination sites. This model involved health workers setting up vaccination desks in neighborhoods and inviting people to get vaccinated by going door to door. According to a key informant (interview 5), under the Reach Every Door (RED) campaign (*Dawn* 2021b), that is, the door-to-door campaign to get COVID-19 vaccines to the people, the province of Punjab managed to increase vaccination numbers. Human workforce capacity (in terms of the number of vaccinators required) was supple-

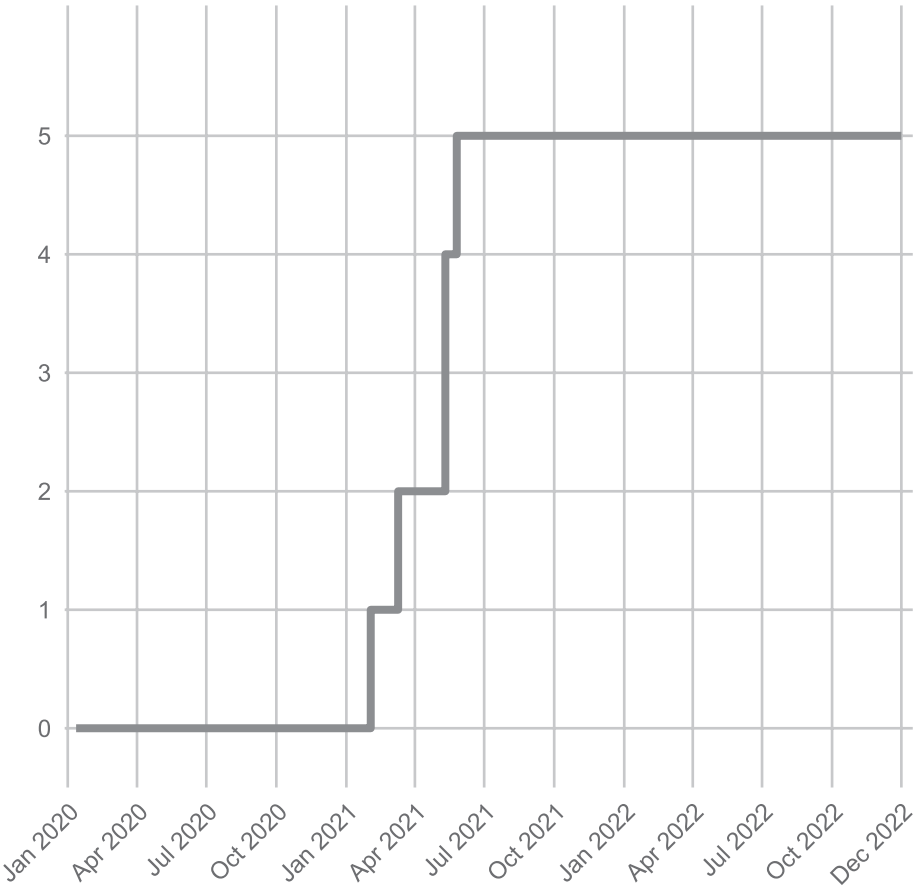

Fig. 23.1. COVID-19 vaccination policy, January 1, 2020–December 31, 2022 (*Note:* Vulnerable groups include key workers, the clinically vulnerable, and the elderly. "Others" include select broad groups, such as by age. [0 = no one eligible; 1 = one vulnerable group; 2 = two vulnerable groups; 3 = three vulnerable groups; 4 = four vulnerable groups; and 5 = everyone]. Data from Our World in Data, COVID-19 Vaccination Policy, https://ourworldindata.org/grapher/covid-vaccination-policys.)

mented by the Health Department of Punjab by drawing on outreach workers of the Population Welfare Department. Lady health workers, already trained to administer intravenous contraceptives, were also brought in to increase the number of vaccinators in Punjab. This explains a rather swift supply-side response from the country's largest province. Staff affiliated with the RED campaign were also leveraged for social mobilization campaigns in rural areas and smaller cities. The dedicated polio eradication helpline called Sehat Tahaffuz 1166, initially set up to answer queries from the public about polio vaccination and technical support, was upgraded with more and trained staff to respond to queries about COVID-19, social distancing, and vaccination rollout (Global Polio Eradication Initiative 2020)

Facilitating Uptake via Mandates and Risk Communication

Vaccine Mandates

A series of vaccine mandates were implemented to facilitate uptake of the vaccine. These ranged from restrictions on entry into public spaces (Shahzad 2021b) to possible restrictions on the use of mobile phones (France 24, 2021). In addition, various sectors of society were incentivized to get vaccinated. For example, sectors such as schools (S. Khan 2022) and the hospitality industry were all encouraged through motivational campaigns to get vaccinated so that they could open up (*The News International* 2021; *Dawn* 2021a).

To encourage the uptake of COVID-19 vaccines, the NCOC in Pakistan employed various strategies. In contrast to countries like the United States, which adopted more lenient approaches by offering incentives such as lottery tickets (Siese 2021), free beer (Brito 2021), and cannabis (Howard 2021), Pakistan pursued a more stringent path (Usman 2021). Pakistan's centralized approach to curtail the spread of COVID-19 and vaccinate the population provided it a different set of alternatives, compared to countries that pursued a more devolved position. Faced with low vaccination rates, the Pakistani government implemented a series of measures to promote COVID-19 vaccination uptake. For example, in Sindh province, government employees were informed that their salaries would be withheld if they failed to get vaccinated. The federal government also enforced several other measures (Fung 2021), including the threat of mobile phone service suspension, travel restrictions, and the prohibition of unvaccinated individuals from entering various public places such as mosques, restaurants, transportation facilities, shopping malls, and public offices without presenting valid vaccination certificates (Shahzad 2021b; ur-Rehman 2022). According to officials, these mandates played a significant role in increasing the number of vaccinations in the country. Reports from vaccination centers indicated that the motivation to receive the vaccine among individuals stemmed more from the fear of potential business closures or SIM card blockage rather than concerns about safety or the disease itself (Shahzad 2021c). According to key informants (interviews 2 and 5), the existence of mandates, which were never really meant to be enforced, along with an increased supply of vaccines and vaccinators explained the rise in the number of vaccinations administered. According to a key informant (interview 2), at the peak of the vaccination campaign, Pakistan was vaccinating between two and three million people daily.

Risk Communication

Pakistan's policy response to the pandemic came in the shape of the Risk Communication and Community Engagement framework. The govern-

ment's communication strategy, as outlined in this framework, was multipronged: engage with the public directly and with multiple local and international stakeholders (Haq et al. 2021). The communication strategy adopted by the government was a mix of orthodox measures like press conferences and press releases and very local measures. Through this framework, the government explored different strategies to communicate with the public, including two-way communication by setting up a toll-free helpline. One such measure involved the release of informative videos by the NCOC, aimed at motivating Pakistanis to get vaccinated. Additionally, advertisements were strategically placed in newspapers to promote the importance of vaccination. Furthermore, robocalls were employed as a means to reach a larger audience and emphasize the significance of getting vaccinated (Usman 2021). Pakistan leveraged mosques to make public service announcements about public health measures, including the importance and locations of vaccination. Moreover, health workers who are sent across the country to administer polio drops were leveraged. In hard-to-reach areas, mobile announcements delivered through loudspeakers mounted on motorcycles (motorcycle miking) was used.

The government also worked with social media giants like Meta to prevent the spread of rumors and fake news. Examples of common fake news, spread through mediums such as WhatsApp, included the spread of conspiracy theories such as Bill Gates intending to place chips in people to track COVID-19 or the presence of a Lake Corona in Kazakhstan that was the source of the virus. Fake remedies (e.g., hepatitis C medicines to cure the virus), vaccine myths (e.g., the vaccine being developed and used for economic leverage), and weather myths were also common (Javed et al. 2022). Facebook (Meta) worked with the Ministry of Health and the Ministry of Information's Digital Media Wing to direct people toward authoritative COVID-19 information. A campaign to create awareness about spotting COVID-19 misinformation was also launched in Urdu for communities in Pakistan without proficiency in Urdu language (*Express Tribune* 2021c). These efforts were a part of Meta's global effort to remove posts that made false claims about cures, treatments, the availability of essential services, or the location and severity of the outbreak. Meta updated information based on guidance from WHO and other health authorities. For example, they banned ads that guarantee a cure or prevention (Clegg 2020).

What Explains Key Decisions by the Pakistani Government?

Two key features of Pakistan's vaccination strategy were the expansion of public health capacity and the use of vaccine mandates. Public health capacity had to be expanded to enable uptake and to vaccinate a large population. The choice of mandates was shaped by low trust in the state, resource constraints, and political considerations.

Expanding Public Health Capacity

Pakistan entered the pandemic with low public health capacity. According to the 2021 Global Health Security profile for Pakistan, the country ranks 130th out of 190 countries. In terms of health capacity in clinics, hospitals, and community centers, the country ranks 129th out of 195, while in terms of emergency preparedness and response planning it ranks 96th out of 195 (Global Health Security Index 2021).

Pakistan's response to the pandemic was shaped by its public health infrastructure, which predates the pandemic. Steps were taken to generate public finances, improve the cold chain technology, and also expand coverage to the small towns and cities and the rural areas.

Health-care organizations, such as hospitals, played a prominent yet mixed role in expanding capacity in addressing COVID-19. Some hospitals were focused on treating symptoms and cases of COVID-19. For example, several hospitals set up COVID-19 PCR testing labs and wards to accommodate the influx of patients (Ayyaz et al. 2020). Other tehsil headquarter hospitals and district headquarter hospitals served as vaccination sites (Primary and Secondary Healthcare Department n.d.).

Through its EPI program, the government had prior knowledge in how to administer vaccines to citizens. According to key informants (interviews 1 and 5), EPI vaccinators administered the COVID-19 vaccines to people in small towns and cities and in rural areas. Setting up mobile clinics and utilizing fixed sites (basic health units and rural health centers) was a known domain for the government, and they utilized this past knowledge for administering the COVID-19 vaccines. Therefore, it appears that experience from past routine immunization programs proved beneficial for the country, and according to a key informant (interview 3), Pakistan effectively harnessed its existing capacities. According to another key informant (interview 4), the COVID-19 vaccination experience in the country shows that in Pakistan the capacity and bandwidth are present—but just that in normal times they are not utilized in the best possible way. According to the informant, during the vaccination drive, these capacities were utilized effectively and 2.3 million doses of the vaccine were administered daily using the same infrastructure.

Choice of Mandates

Low Trust in the State

Immunization programs are pivotal in preventing the spread of infectious diseases and promoting public health (Ali and Altaf 2021). Immunization programs involve direct interactions between citizens and the state. However, the success of these programs relies heavily on the trust and coopera-

tion of citizens, as well as the administrative capacity of the state. Citizens form their opinions of the state through encounters with government programs (Ali and Altaf 2021). These encounters serve as an important test of citizens' trust in the state and reveal the state's administrative capacity (Herd and Moynihan 2018, 2020).

The role of public trust in the government is recognized in public health, and it is considered essential to the legitimacy of the health system (Andrade and Hussain 2018). Citizen cooperation with public institutions is contingent upon trust (A. Khan et al. 2021). Previous studies have found that trust shapes both acceptance of and compliance with preventive and curative health services (Vinck et al. 2019). Particularly during times of crises, such as pandemics, the need for increased public trust becomes crucial as the state relies on citizens for prompt cooperation and effective response. However, in the absence of trust, cooperation may need to be compelled through coercive measures imposed by the state (Besley 2020a; Levi 1988). Lack of trust (Acemoglu et al. 2018) represents a pervasive challenge, particularly in developing countries. Pakistan serves as a prominent example characterized by weak state institutions and low levels of trust in the state (Jackson et al. 2014). The country's context underscores the significance of addressing trust-related issues to foster citizen participation and support in times of crisis.

In Pakistan, where distrust in the state and low administrative capacity prevail, immunization efforts are likely to be undermined. Lack of trust in vaccination efforts in Pakistan has been driven through two main routes. First, politicization of the polio vaccine exacerbated vaccine hesitancy in Pakistan. Polio eradication campaigns faced significant obstacles due to being linked to Western intelligence-gathering activities, which fostered mistrust among some segments of the population. This political aspect further complicates vaccination efforts and uptake (Jadoon and Khalid 2022) and might explain greater confidence in the Chinese vaccines by people aged 18–30 years in Pakistan, based on the few studies that explored this issue. For instance, in a study conducted across all four provinces, with the mean age of 91% of the respondents between 18 and 30, 43.3% preferred the Chinese vaccine, Sinopharm (Arshad et al. 2021). In another study, also conducted across all four provinces in Pakistan with 60% male respondents and 75% respondents between the ages of 18 and 29, 36% of the respondents preferred Chinese-manufactured Sinopharm and Sinovac, while 35% had a preference for US-manufactured Pfizer (Khattak et al. 2022).

Second, Pakistan's weak public health capacity and infrastructure have worked to instill mistrust in government vaccination efforts. For instance, a recent study on immunization in Kasur[1] (Ali and Altaf 2021) found that scarcity of vaccinators (which reflects low administrative capacity of the state) often leaves parents without satisfactory answers to their inquiries, due to competing demands on the vaccinators' time. Inadequate explana-

tions regarding the necessity and mechanisms of vaccination can result in vaccine hesitancy or even outright fear of vaccines. Additionally, reports of issues such as cold chain failures and the availability of poor-quality medicines further erode public confidence. Therefore, even when state services are offered free of charge and at the doorstep, instilling trust in citizens can prove challenging. Citizens may turn to the private sector for medical care, further weakening their confidence in the public health sector (Ali and Altaf 2021).

Although mandates were ultimately implemented to increase vaccination numbers, this approach was not undertaken lightly. There were concerns that these measures might be perceived as overly strict, potentially fueling mistrust in the government and COVID-19 vaccines. Some arguments were raised against the efficacy of specific mandates. For instance, the proposed mandate to block the use of mobile phones was met with criticism (Usman 2021). It was contended that cell phones play a vital role in facilitating financial transactions in rural areas. Moreover, vaccines were not readily accessible in remote regions, thereby making SIM card blocks excessive and counterproductive (Usman 2021). According to a key informant (interview 1), while an array of mandates garnered attention, certain mandates were not intended for actual implementation. Media reports were strategically released to create a perception that these mandates would be enforced, thereby compelling individuals to get vaccinated. For instance, the government did not have any genuine intention to block mobile SIM cards (Mashkoor 2021), but it was cognizant that disseminating information suggesting that access might be restricted would serve as an incentive for people to receive vaccinations. Similarly, the purported restriction on petrol access (Geo News 2021) was never intended to be enforced, but rather it was anticipated that the perception of potential restrictions could motivate individuals to seek vaccination.

Key informants discussed several reasons behind the imposition of mandates; institutional legacy in decision-making played a significant role. According to one key informant (interview 2), the strict mandates observed during the pandemic can be viewed as a continuation of the state's historical approach to addressing pressing issues, which often involves the exercise of force. It is important to recognize that the pandemic did not occur in a vacuum; rather, it unfolded within a broader context characterized by a long-standing mistrust between the state and its citizens. This mistrust has also permeated vaccination efforts, as exemplified by the lasting impact of previous polio campaigns, which have engendered skepticism among the populace regarding vaccination drives (Northam 2021). The informant emphasized that resorting to tactics such as threatening to block mobile SIM cards can be perceived as cruel and may prove counterproductive in the long run. Another informant (interview 5) said that the government thought stricter measures would yield better results, saying that people respond more to "arm twists than toffees."

Political Pressure

There was urgency to meet targets. WHO outlined a vaccination strategy with the aim of immunizing 40% of each country's population by the end of December 2021 and of achieving 70% coverage by the middle of 2022. Pakistan met the 40% target after the specified deadline, though not the goal of 70% coverage (Global COVID-19 Access Tracker, n.d., 2023).

As per key informants (interviews 1 and 5), there was a notable exertion of political pressure originating from senior members of the National Command and Operation Center in order to achieve targets. The responsibility for handling the pandemic was attributed to the highest echelons of the hierarchical structure. Personnel working at the grassroots level within health departments experienced a sense of coercion to fulfill the set targets, as they were answerable to health ministers, who in turn were accountable to chief ministers, members of the armed forces, and other NCOC representatives. Consequently, a series of directives were swiftly disseminated, generating a heightened sense of urgency to meet vaccination goals.

In the early days of the COVID-19 pandemic, there were reports of differences between the center and the provinces on policymaking and speed of implementation (Khalid and Fox 2020), but similar issues were not noted in COVID-19 vaccination efforts. According to a key informant (interview 4), the political leadership was in agreement on the steps that needed to be taken to ensure effective delivery of vaccines. According to a key informant (interview 3), the leadership was "flexible, agile, and humble" in its approach and used evidence-based decision making.

Resource Constraints

Resource constraints shaped the choice of mandates. According to a key informant (interview 5), with the polio campaign, in the past people have been given incentives to get their children vaccinated. For instance, they have been given ghee (cooking oil), but once the giveaway was stopped, they stopped getting vaccinated. In essence, the positive reinforcement did not yield positive behavioral changes. With this assessment, coupled with the sheer number of people to be vaccinated against COVID-19, the government did not have the fiscal space to incentivize vaccination with the proverbial carrot.

Conclusion

Pakistan's vaccination campaign has surpassed expectations despite its history of vaccine hesitancy, limited health system capacity, and political divisions. The country's success can be attributed to a well-rounded

approach, involving the strategic use of vaccine mandates, effective vaccine diplomacy, resource optimization, and political commitment. Nonetheless, challenges persist, necessitating the need for enhanced data collection, ongoing booster programs, and a delicate balance between incentivization and trust building to maintain the progress achieved thus far. Continued questions include the impact of the choice of mandates, especially mandates that were ultimately unenforced on future trust as well as possible spillover effects onto other vaccination programs. Additionally, whether investments in public health infrastructure diminish after attention to the pandemic wanes remains a lingering question.

NOTES

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1. Kasur, a city situated near Lahore, Pakistan, found that despite its relative proximity to the provincial capital and the availability of adequate infrastructure and services, persistent issues in public health service provision persist. Citizen trust is eroded in several ways.

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24 | COVID-19 Vaccination in Thailand

Explaining the Unexpected—How and Why COVID-19 Vaccination Faltered in Thailand

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Roughly six months into the pandemic, Thailand's response to COVID-19 emerged as the envy of the world (Beech 2020; Arungrugstichai and Hartigan 2020). As of July 2020, Thailand ranked first out of 184 countries on the Global COVID-19 Index (PR Thai Government 2020). In September, Thailand joined Vietnam and New Zealand as the only countries in the world that had gone 100 days or more without a case of local transmission of the coronavirus (Durkee 2020). The World Health Organization (WHO) profiled Thailand's COVID-19 response alongside New Zealand's as COVID-19 best practices. Thailand's achievement, however, was even more striking given that the country hosted the first coronavirus case outside of China; had a large number of air travel linkages to Wuhan and other affected provinces in China; and was an internationally known tourist destination and travel hub—and not a remote island nation that made border closure easier, as New Zealand was.

Although some gave Thailand's military—which had controlled the government since a coup d'etat in 2014 and instituted lockdowns—credit for Thailand's early COVID-19 success, even before the pandemic the country ranked sixth out 195 countries in pandemic preparedness, including first in the region and the only middle-income country in the global top 10 (Wise 2020; UNICEF 2020: 15). While the country's strong public health infrastructure, community-based contact tracing and quarantine program, and storied tradition of professionals committed to promoting public health and preventing disease[1] help explain Thailand's early success in preventing COVID-19 (UNICEF 2020: 15; Gharib 2020; Harris 2017a, 2017b)—and with public health issues historically—they do not explain the puzzle of how and why a country that performed so well in COVID-19 prevention suddenly performed so poorly in getting COVID-19 vaccines out to its population, to help minimize the disease's most devastating effects. By July 2021, coronavirus cases were spiking, and Thailand ranked last in the Nikkei Recovery Index (Li 2021). How did a country that had performed so well up to that point during the COVID-19 crisis fall so far?

Corporate greed is certainly part of the explanation. Instead of making proprietary mRNA technology widely available to manufacturers, two private companies sought to preserve an intellectual property monopoly and allowed the world's richest nations to gobble up a severely and unnecessarily restricted supply. By mid-2021, the United States and the European Union (EU) accounted for nearly 40% of total global vaccine deliveries (Pananond and Pongsudhirak 2021). As these corporations made billions, most people living in the Global South were left without access to the world's most effective vaccines. Rich countries holding just 14% of the world's population bought over half of the best vaccines, with the COVID-19 Vaccines Global Access (COVAX) initiative—led by the Vaccine Alliance (Gavi), WHO, and the Norwegian Coalition for Epidemic Preparedness Innovations—left to cover just 3% of the poorest countries of the world's needs (Pananond 2021). Ultimately, this hoarding came at a large financial cost to those rich countries—and a heavy human cost to those countries without those vaccines: by late 2023, conservative estimates suggest that the EU alone threw away 215 million doses of unused vaccines worth over $4 billion euros (Martuscelli and Cokelaere 2023).

Yet, this shortage of mRNA vaccines—while important—does not explain variation cross-nationally in the performance of vaccination campaigns, why Thailand in particular was so slow to get vaccines in the arms of its population relative to other countries, or why vaccine procurement and outreach in Thailand were so marked by delays despite having historically enjoyed an exemplary reputation in public health.

To understand a country's relative success or failure in vaccination, one has to put countries' progress in comparative perspective. The world's first COVID-19 vaccines began to be approved and administered in December 2020, and COVAX began administering vaccinations globally in February 2021. The race to put in place contracts to procure vaccines and ensure supply therefore took place largely in the six months before that (as vaccines were still in development undergoing trials), so a critical period of examination in which to understand a country's procurement strategy and vaccine rollout was the last two quarters of 2020 and the first three quarters of 2021.

Vaccines

Even though the US COVID-19 response has generally been regarded as abysmal by international standards, the United States did enjoy much greater vaccine access than other countries, particularly those in the industrializing world. As of February 2021, 8.7% of US adults had been partially vaccinated (Krouse 2021). By mid-April 2021, in Thailand just 0.8% of the population (500,000) had been partially vaccinated and 0.1% fully vaccinated (80,000) (Achakulwisut 2021a). This slow progress on vac-

cination meant Thailand ranked just 124th out of 154 countries in percentage of adults who were partially vaccinated (*Bangkok Post* 2021a). Even more worrisome, delays in vaccination occurred against a backdrop of a growing number of new COVID-19 cases that began to tick upward on a daily basis beginning in April 2021, followed by more explosive growth as the Delta variant took hold in July 2021. By international standards, Thailand—known internationally for its successful HIV/AIDS prevention efforts (Harris and Thaiprayoon 2022) and as a hub for medical tourism (Farber 2022) and universal health care (Harris and Selway 2020; Harris and Libardi Maia 2021)—lagged behind other nations.

But whereas right-wing governments in some other countries with even greater capacity for vaccine development, like Brazil, stifled vaccine development (Flynn and Massard da Fonseca 2023), Thailand took a multipronged approach that included substantial investment in a number of vaccines being developed in the country. As Health Minister Anutin Charnvirakul noted, "We're not working with one institute. We are collaborating with every institute that is considered to have high potential in developing the vaccines" (quoted in *Bangkok Post* 2020a). Generally, vaccines in Thailand fell into one of three categories: those that were being developed in Thailand either by local institutes or through partnerships with foreign entities; those that were purchased from private drug companies directly (or later at cost through COVAX); and those that were donated bilaterally.

One of the kingdom's biggest early bets—to the tune of 400 million baht ($11.4 million) initially and more than 2.3 billion baht ($65.6 million) in total—was a joint project between Chulalongkorn University's Centre of Excellence in Vaccine Research and Development, the National Vaccine Institute, and the Ministry of Public Health's (MoPH) Department of Medical Sciences (*Bangkok Post* 2020a, 2020b, 2021b; *The Nation* 2022a). Dr. Drew Weissman of the University of Pennsylvania, whose work on RNA paved the way for mRNA vaccines, served as a partner with Chulalongkorn University on the venture, dubbed ChulaCOV-19 (*Bangkok Post* 2021c).

The government also provided 650 million baht ($18.6 million) in funding to another consortium developing a needle-free DNA vaccine called Covigen that involved a jet injection, a joint project of Mahidol University, the National Science and Technology Development Agency, and the Thai-French biotech firm Bionet Asia (Marukatat 2020; *Bangkok Post* 2021d; *The Nation* 2022a). An inactivated, viral vector vaccine project (NDV-HXP-S) between the Government Pharmaceutical Organization and Mahidol University was awarded nearly 46 million baht ($1.3 million) for early trials (*Bangkok Post* 2021d) and almost 435 million baht ($12.3 million) in total (*The Nation* 2022a). Later, a vaccine nasal spray, known as NASTVAC, was created by the National Center for Genetic Engineering and Biotechnology (BIOTEC) with human trials set to begin in April 2022 (*The Nation* 2022b). Thailand's effort took place in the broader context of 150 vaccine proto-

types that had been developed globally, with 10 or more from five countries (China, the United States, Britain, Germany, and Canada) having conducted human trials (*Bangkok Post* 2020b).

The ChulaCOV-19 trial began in March 2020 with an initial phase tested in mice (Marukatat 2020). Following that, ChulaCOV-19 successfully passed clinical trials in guinea pigs, with a three-month trial in macaque monkeys and then, pending success, humans to follow (*Bangkok Post* 2020c). As the monkey trials began, the health minister gave additional visibility to the Thai vaccine trials by volunteering to serve as the first candidate in human trials (*Bangkok Post* 2020d). Initial results from the first injection in macaque monkey trials in May 2020 succeeded in raising antibodies without causing any side effects or ill health in the monkeys (*Bangkok Post* 2020e). A second round of monkey trials was planned for August 2020 (*Bangkok Post* 2020e), with three phases of human trials planned for October, December, and early 2021 (*Bangkok Post* 2020d, 2020f).

The trial involved a partnership with the private sector, including a Canadian factory (*Bangkok Post* 2020d). A local Thai biotechnology corporation was tapped by the government to produce the vaccine locally, with the goal of ensuring that all Thais received the vaccine before it was exported (*Bangkok Post* 2020e). Two other foreign biotech companies came to be part of the production venture, including US-based TriLink; tens of millions of doses were projected to be produced by the end of 2022 if a viable vaccine were developed (Marukatat 2020). Delays marked the project, and the phase 3 human trials of the vaccine did not take place until November 2021—more than nine months after initial projections and well after vaccination campaigns got started in countries around the world (Theparat 2021).

Apart from its effort to develop an mRNA vaccine, Thailand also actively explored the efficacy of traditional medicine in fighting the disease. The MoPH Department of Thai Traditional and Alternative Medicine found one traditional medicinal herb, *fa talai jone,* (andrographis) to show promise in initial test results (Wipatayotin 2020a). In one study, prisoners taking the herb, also known as "green chiretta," had a COVID-19 death rate 6.5 times lower than that outside of prison (Farber and Taylor 2023). In addition, the government provided 1.3 billion baht ($37.1 million) in funding for a tobacco plant–based vaccine ("Baiya vaccine") developed by Baiya Phytopharm Company (a start-up of Chulalongkorn University's Faculty of Pharmaceutical Sciences) that was in phase 3 human trials in November 2021 (Theparat 2021). The company was the first plant-produced biologics venture in Asia (Maneechote 2021; *The Nation* 2022a). But as with ChulaCOV-19, this vaccine remained in clinical trials as countries around the world ramped up vaccination drives in early 2021.

The country was also active internationally. Under General Prayut Chan-o-cha, the dictator-turned-prime minister, Thailand proposed that

an Association of Southeast Asian Nations (ASEAN) Response Fund be set up to finance the purchase of medicine and equipment and to research for a vaccine (Bangprapa 2020a). The proposed partnership did ultimately bear fruit but not until most Thai citizens had already been vaccinated, with Thailand receiving a small donation of 83,070 Pfizer vaccines from UNICEF via the fund in September 2022 (UNICEF 2022). And as it had in other health-related matters previously, Thailand advocated for the lowering of trade barriers to facilitate access to vaccines at the World Trade Organization (Arunmas 2021).

However, even as all other ASEAN countries opted to join COVAX, Thailand opted not to join over apparent legal concerns related to dispute resolution and fears that doing so might compromise its ability to procure vaccines independently in the future (*Bangkok Post* 2021e, 2021f). While COVAX guaranteed that the 145 countries involved would obtain enough vaccines to dose 3.3% of their population by the middle of 2021, it would have required Thailand to pay four billion baht ($114 million) without any clarity about what vaccine it would receive (*Bangkok Post* 2021f). However, the 10 Southeast Asian nations that did sign on to it received 32.3 million doses of AstraZeneca (AZ) or Pfizer vaccines in the first two quarters of 2021 (*Bangkok Post* 2021g). Here again, Thailand instead chose to chart its own course.

Early on, high-level vaccine procurement discussions internationally centered on a technology transfer agreement with Oxford University/AZ (*Bangkok Post* 2020g). While the viral vector vaccine being pioneered by the Oxford-AZ group was not an mRNA vaccine, it was one of the more high-profile vaccine candidates undergoing clinical trials internationally. Since 2012, Thailand's Siam Cement Group (SCG)—a company partially owned by the Crown Property Bureau (CPB), belonging to Thailand's monarchy—and Oxford University had collaborated on the SCG-Oxford Centre of Excellence in Chemistry, to which SCG had provided more than 15 million pounds ($19.1 million) in funding (University of Oxford Department of Chemistry 2023). This relationship deepened with the opening of the SCG Advanced Materials Laboratory at Oxford in 2019 (Royal Thai Embassy London 2022). SCG played an open role in brokering a deal between the Oxford vaccine consortium and a local producer, Siam Bioscience Group (SBG), which had been a subsidiary of CPB (Faulder and Phoonphongphiphat 2021; Prateepchaikul 2021).

SBG was founded by the late King Bhumibol Adulyadej with the aim of ensuring medical supply availability in Thailand (*Bangkok Post* 2020h). The first chair of SBG's board—Sanoh Unakul—was also a director of SCG (Siam Cement Group 2009) and had been the former deputy prime minister and secretary general of the National Economic and Social Development Board in earlier governments in which the military had a role. Air Chief Marshall Satitpong Sukvimol also served as the chair of SCG, SBG, and CPB, in addition to serving as the private secretary to His Royal Highness

the Crown Prince, who became Thailand's king following the death of King Bhumibol in 2016. While the company had not produced vaccines before (Ratcliffe 2021), early in the pandemic it began producing COVID-19 test kits to distribute to local government and to ensure less reliance on scarce imported tests (Thanthong-Knight 2020).

In August 2020, the cabinet began considering a 600 million baht ($17 million) vaccine development partnership between Thailand and Oxford-AZ, with funding earmarked for development of a factory in Thailand (*Bangkok Post* 2020h2). SCG offered 100 million baht ($2.9 million) of funding as a nonrefundable deposit for an advance order of the AZ vaccine ahead of the results of the corporation's vaccine trials, something the government apparently could not offer (Prateepchaikul 2021). SCG stated that it was "delighted to help facilitate this critical technology transfer. SCG and Oxford University have been research and development partners for a long time" (Satrusayang 2021a). More broadly, a press release from the Ministry of Foreign Affairs noted that the royal family had directed 1.3 billion baht ($37.1 million) in their personal funds to fight COVID-19 (Weskosith, n.d.). An early petition drive aimed to ensure that AZ vaccines produced in Thailand by SBG stayed in Thailand (*Bangkok Post* 2021h).

Yet, by mid-September, phase 3 of the UK-based vaccine trials were on hold following an unexplained illness in a volunteer that led to hospitalization (*Bangkok Post* 2020a).[2] Amid these developments and ongoing negotiations with Thailand, AZ encouraged Thailand to sign on to COVAX in September 2020, so that the country could procure additional AZ doses at cost (Satrusayang 2021b). However, at that time, the government elected not to do so.

In mid-October 2020, Thailand agreed to manufacture and supply the AZ vaccine for its own country and for other countries in ASEAN, with SBG as the local partner (*Bangkok Post* 2020h). The agreement included an initial 26 million doses for six billion baht ($171.1 million) at a cost of $5 per shot, covering 20% of the country's population (13 million people) (*Bangkok Post* 2020i; Wipattayotin and Theparat 2020). All told, SBG was slated to produce 200 million vaccine doses annually (*Bangkok Post* 2021). However, vaccines were not scheduled to be ready until mid-2021 (Satrusayang 2021a).

For Thailand, the deal marked some of the first concrete investment in a major international producer and was significant as the first such agreement to produce vaccines for the region. And it came at a time when leading countries in the region had already begun to race to procure doses for their populations, with only Japan (120 million doses) and Australia (10 million doses) securing Pfizer vaccines in the Asia Pacific region and Hong Kong and Macau receiving 10 million from China's Fosun (*Bangkok Post* 2020j). Yet, the deal came more than three months after countries such as the United States, the UK, and Israel completed their own vaccine supply deals (Pananond 2021). It also came at a time when some major vaccine

manufacturers were slashing production estimates for the coming year due to supply chain problems (Paris 2020).

For Oxford-AZ, the deal was not insignificant: SBG would serve as one of its 25 local manufacturers, producing the vaccine not just for Thailand but for Southeast Asia, a region with half the population of China (Reed et al. 2021). The prime minister remarked, "In a crisis, there are always opportunities. And in the Covid-19 crisis, we can turn Thailand into a medical hub" (quoted in *Bangkok Post* 2021i). The reliance on a company owned by CPB, however, added a complex dimension to the venture. At a time of quasi-military rule, youth protests over the use of lèse-majesté law (insulting the monarchy) in Thailand had gripped the nation, and the number of people being charged with lèse-majesté had grown, alarming United Nations officials (OHCHR 2021). While convictions generally resulted in prison sentences ranging from 3 to 15 years, one recent case garnered an 87-year sentence (Amnesty International 2021).

In addition to complicated political dynamics around who was making the vaccine, the AZ price of $5 per dose was higher than the $3 per dose price that a number of other countries that preordered the vaccine enjoyed, which raised questions about the government's negotiating ability (*Bangkok Post* 2021j). Even so, the price remained much lower than some other vaccines' costs (*Bangkok Post* 2021k). To that point, the government had actually prevented the private sector from procuring vaccines on its own, and the government's decision tied the country's future (and citizens' health) heavily to the AZ vaccine. It also left the future of other local vaccine initiatives—including the promising ChulaCOV-19 mRNA partnership that had been slow to come to market—in question.

In January 2021, the popular leader of a political movement and the Move Forward political party—Thanathorn Juangroongruangkit—criticized government transparency in relation to the procurement process and, in particular, the government's decision to rely on SBG to produce the AZ vaccine rather than opt for an mRNA vaccine (*Bangkok Post* 2022a). The opposition leader made "no accusations of impropriety" but said "Siam Bioscience lacked vaccine-making experience and the government was relying on it too heavily" (quoted in Reuters 2021a). Furthermore, he argued that the 26 million AZ doses and 2 million Sinovac doses the government had ordered would only enable the country to inoculate 21.5% of the population—far less than the 70% threshold needed to reach herd immunity (*The Nation* 2021a). The prime minister responded by suggesting that the company was selected "because it met all of the government's criteria" (quoted in Nanuam and Wipatayotin 2021). The health minister emphasized that an additional 35 million AZ doses had also been reserved, suggesting that the total amount would be enough to cover "31.5 million people, or 63 per cent of the country's population, not including pregnant women and those under 18" (quoted in *The Nation* 2021a).[3]

Following months of youth-led protests against the monarchy, Thana-

thorn's remarks led the hashtag #royalvaccine to trend on Thailand's Twitter (Reuters 2021a). The criticism led to high-profile lèse-majesté, the Computer Crime Act, and defamation charges against Thanathorn and stirred unrest among his supporters (*Bangkok Post* 2021l). The high-profile charges amounted to a further cooling of freedom of speech in Thailand and came on the heels of similar royal defamation charges against 70 people that carried long prison sentences (France 24, 2021). The original incarnation of the Move Forward party (Future Forward)—which had championed democratic reform—had already been dissolved following a Constitutional Court ruling in 2020 following major gains in the 2019 elections (Gunia 2020). Amid these developments, the opposition Move Forward party invoked a four-day censure debate and no-confidence vote on Public Health Minister Anutin Charnvirakul over the government's slow progress in procuring and rolling out vaccines. The health minister survived the motion 275–201, but the divisions underscored general upset over the government's handling of COVID-19 (*Bangkok Post* 2021m).

As these critiques unfolded, well-known academics at two of the country's most prestigious universities also drew particular attention to the government's choice of Sinovac (also not an mRNA vaccine) as another principal source for the country's vaccines, given that the Chinese biotech company Sinovac Life Sciences was partially owned by Thailand's CP Group, one of the country's largest corporations (Pananond and Pongsudhirak 2021). The deputy prime minister actually suggested publicly that the health minister's ties to Sinovac were useful in facilitating faster access to the vaccine (*Bangkok Post* 2021n). The CP Group itself, however, insisted that Sinovac procurement was a matter between governments, which CP Group had no hand in (*Bangkok Post* 2021o).

Phase 3 trials of Sinovac at the time were proving disappointing. Reports of just 51% efficacy (and 50% efficacy in the real world) surfaced at a time when many countries were suspending use of the AZ vaccine following news about side effects involving blood clots (Achakulwisut 2021a). The news of more limited efficacy of Sinovac—which still met the global standard of 50% for emergency use but was much less than the 78% efficacy rate the company had announced one week prior—apparently caused Thailand's MoPH to seek more information, even though it ultimately remained committed to the purchase (Wipatayotin 2021a). Thailand was one of 45 countries that approved the Sinovac vaccine for use in its own country before it had received WHO approval (Bangprapa and Wipatayotin 2021). At the time, the vaccine had not yet even been approved by the Chinese Food and Drug Administration (Wipatayotin 2021a).

Thailand's relationship with China had historically been important but had grown even cozier under the government of General Prayut Chan-o-cha, which had negotiated the purchase of costly submarines from Beijing in the preceding years (Nanuam 2021). In April 2020, the country prepared a memorandum of understanding with China for human vaccine trials to

take place in Thailand in a bid to stimulate technology transfer (*Bangkok Post* 2020k; Wipatayotin 2020b). In a meeting with Prayut at Government House in October 2020, the Chinese foreign minister vowed to prioritize sales of its COVID-19 vaccines to countries in the region and "friends" of China (Bangprapa 2020b). China not only sold Thailand the country's first vaccines but was said to be the first country to import COVID-19 vaccines commercially from Sino Biopharmaceuticals Limited, an investor in Sinovac Life Sciences, the Sinovac vaccine maker (Bangprapa and Wancharoen 2021; Sattaburuth 2021a). The two nations discussed a potential vaccine passport scheme between the two countries (following discussions of digital passports in the United States, the UK, and the EU) and strategies to vaccinate Chinese expatriates in Thailand (*Bangkok Post* 2021p; Wipatayotin 2021b).

However, apart from these collaborative efforts, behind the scenes the Chinese government apparently exerted strong pressure on Thailand, sending officials to meet with senior ministers at MoPH "to stress to them that negative press over the Sinovac vaccine could jeopardize the relationship between the two countries . . . [that] it was imperative that Thai government officials, at the very least, not criticize the vaccines in public" (Saronchai 2021). The government subsequently purchased 12 million more Sinovac doses (Bangprapa and Wancharoen 2021). An opposition senator alleged that officials within the military-led government had pocketed two billion baht—the difference between what it paid for five batches of Sinovac vaccine and what had been approved—during a no-confidence debate on government (Sattaburuth 2021b).

With 2021 set to begin, the health minister announced on New Year's Eve that he had also procured two million more doses of COVID-19 vaccine that would arrive between February and April, although he did not name the supplier (*Bangkok Post* 2021q). But as of mid-March 2021, the government had just 200,000 doses of Sinovac—earmarked for frontline medical personnel and high-risk elderly people—and little more than 117,000 AZ doses (Reuters 2021b; *Bangkok Post* 2021r). Although the kingdom had been fortunate to experience just 89 COVID-19 deaths by that time (Reuters 2021b), in part due to strong public health and disease control measures,[4] by mid-April 2021, just 0.8% of the population (500,000) had been partially vaccinated and 0.1% fully vaccinated (80,000) (Achakulwisut 2021a). This meant that Thailand was 124th out of 154 countries in percentage of adults who were partially vaccinated (*Bangkok Post* 2021a). Comparatively, 8.7% of the US population was partially immunized as of February 6, 2021 (Krouse 2021). Amid the slow rollout, the prime minister reversed course and granted permission for private hospitals to procure up to 10 million doses of vaccine to supplement government efforts (Sattaburuth and Bangprapa 2021; *Bangkok Post* 2021a). But polls found that government missteps may have contributed to a drop in Thai citizens' willingness to get vaccinated, from 83% to 63% between January and May (Parpart 2021a).

The prime minister and interior minister both received AZ vaccines, with Prayut the first person in Thailand to receive the AZ vaccine (*Bangkok Post* 2021s, 2021t). The prime minister's first shot in mid-March 2001 took place at a time when news reports about the clotting effects of the AZ vaccine had led some countries—including Germany, Spain, France, and Italy—to suspend rollout of the vaccine and was intended to bolster confidence in the vaccine among the Thai public (*Bangkok Post* 2021u). However, 200,000 doses of Sinovac vaccines were known to have been the first scheduled to arrive in the country on February 24, 2001, as part of a larger two-million-dose Sinovac order (Achakulwisut 2021b; *Bangkok Post* and Mala 2021). The choice of AZ as the prime minister's first shot was surprising not only because the country's main vaccine regimen was one Sinovac shot, followed by an AZ dose, but also because that combination required only four weeks between doses rather than the twelve weeks required between two AZ doses (*Bangkok Post* 2021v). One news report stated that the prime minister did not receive the Sinovac vaccine for his second dose because it had not yet been recommended for people over the age of 60 (*Bangkok Post* 2021t), although the government national communicable disease committee approved Sinovac for use in people 60 and older more than two weeks prior (*Bangkok Post* 2021x, 2021y). Thais had previously been forbidden from choosing which vaccine they received (*Bangkok Post* 2021y).

Amid this highly visible and symbolic vaccine politics, opposition leaders and academics were not the only high-profile Thai individuals or groups to criticize the government over its approach to procurement and reliance on AZ and Sinovac to the exclusion of mRNA vaccines. In April 2021, Thaksin Shinawatra, the former prime minister in exile, suggested that vaccination efforts were not happening fast enough and that the country needed to look beyond AZ and Sinovac, offering to help facilitate Thai access to the Russian Sputnik V vaccine, drawing on his ties to Russian Prime Minister Vladimir Putin (Wipatayotin 2021c). A group of medical professionals calling itself the "Mor Mai Thon" (Doctors Without Patience) group presented a petition with over 200,000 signatures to Parliament calling for the government to do more to procure mRNA vaccines (Sattaburuth and Bangprapa 2021). Thailand's own Infectious Disease Association argued in a letter that the government should prioritize the purchase of more effective mRNA vaccines and less Sinovac over concern about its comparative effectiveness against the Delta variant (Parpart 2021b). And a prominent *Bangkok Post* news reporter asked, "Has [the government] been so carried away by the dream of having Siam Bioscience serving as a regional hub for AstraZeneca's Covid-19 vaccine production that it has forgotten the reality on the ground?" (quoted in Achakulwisut 2021c).

In response to criticism, the prime minister argued, "It's not that we acted too late or too little. . . . All we have ever thought about is safety" (quoted in Bangprapa 2021a). But the health minister asserted in separate comments that beyond safety, government concern with cost, waste, and

efficacy played a role in decision-making. In one set of public remarks, he noted, "We won't buy in large numbers. . . . We don't want to be sitting on a huge pile of useless vaccines that can't keep up with the virus" (quoted in *Bangkok Post* 2021a). In another set of remarks, he argued that Thailand bought "just enough for timely vaccination," given the possibility of variants emerging that could elude the vaccine (quoted in Sattaburuth 2021b). Amid the shortages and mixed messages from officials, a public relations campaign rolled out that emphasized the importance of four "vaccines"—masks, social distance, hope, and understanding—to stay safe from COVID-19 (Parpart and Satrusayang 2021).

Vaccinations

While more than 90% of Thailand's medical personnel had been vaccinated by mid-May 2021 (Wipatayotin 2021d), just 10% of the general population had been vaccinated (*Bangkok Post* 2021aa). The slow progress led the prime minister to announce that the government would increase its vaccine procurement targets by 50% to 100% (*Bangkok Post* 2021bb). What had been an original target of 65 million doses ballooned to 100 million and then almost immediately up again to 150–200 million (*Bangkok Post* 2021bb, 2021cc). But as the rate of COVID-19 deaths began to creep up to 30 per day in the kingdom, these belated announcements left the government open to criticism that its decision to rely primarily on just two vaccines to inoculate less than half of the population amounted to too little, too late (Achakulwisut 2021d).

The country's mass vaccination program began encouraging residents, including foreigners, to register in May 2021 to receive vaccines as part of a mass vaccination campaign that kicked off in June (Raksaseri 2021). Big business played an important role in the process. CP Group opened registration stations at all of the company's 3,314 7-Eleven stores in Thailand in a joint project with the Bangkok Metropolitan Administration and the Thai Chamber of Commerce (Wipatayotin 2021e).[5] The government likewise relied on a partnership with Krungthai Bank to oversee a Health Wallet vaccine registration app (Bangprapa 2021b).[6]

The MoPH opened 23 COVID-19 vaccination centers, which stood in addition to more than 100 centers targeting students and staff and other doctors' offices and private clinics and hospitals offering vaccines (*Bangkok Post* 2021dd). A goal was set for 50% of Thais to be vaccinated by the end of October and 70% of the population to be vaccinated by the end of the year (Bangprapa 2021c; Raksaseri 2021). The MoPH requested that the Centre for COVID-19 Situation Administration (CCSA)—overseeing the national response, headed by the prime minister—establish militaristic "forward command centres" in the 10 provinces in the country's south that had been among the first to receive Pfizer doses donated from the US

government in August but had confronted sharp increases in community transmission (*Bangkok Post* 2021ee; Wipatayotin 2021f). The campaigns generally aimed to have patients who had received two shots of the Sinovac vaccine receive an AZ booster by year's end (*Bangkok Post* 2021ff). At that time, five vaccines had been approved for emergency use by Thailand's Food and Drug Administration—AstraZeneca, Johnson & Johnson, Moderna, Sinovac, and Sinopharm—with the Pfizer vaccine later receiving emergency use authorization (Raksaseri 2021). Of those, only the Moderna and Pfizer-BioNTech vaccines were mRNA vaccines. Additional registration applications for Russia's Sputnik V and India's Covaxin vaccines were being reviewed by the Food and Drug Administration (Raksaseri 2021).

Early on, bottlenecks in the distribution of vaccines and difficulty procuring them led to delays and conflict. While the health minister had said in January that 35 million additional AZ doses (on top of the initial order of 26 million doses) had also been reserved (*The Nation* 2021a), it was not until May that the government formally contracted an additional 35 million AZ doses (Keating 2021). The 61 million doses were intended to fully inoculate about 45% of the country's 66 million people—still well under the 70% threshold of herd immunity (Faulder and Phoonphongphiphat 2021). An additional 1.5 million Sinovac vaccines arrived on May 20, 2021 (Wipatayotin 2021g). But as of May 25, 2021, less than 118,000 doses of AZ vaccine had arrived (in February) (*Bangkok Post* 2021gg).

To that point, Sinovac had been the country's most widely held vaccine, with 3.5 million doses imported and an additional 500,000 doses donated (Wipatayotin 2021h; *Bangkok Post* 2021hh). However, by the end of May, even the CEO of CP Group, which partially owned Sinovac, announced that he supported government efforts to procure vaccines through multiple sources to expand access more quickly (*Bangkok Post* 2021ii). The activist Rural Doctors' Society accused the government of concealing supply shortages of the locally produced AZ vaccine and procuring 500,000 doses from South Korea at a substantial markup in order to meet its promise of having 1.8 million jabs on hand for the start of the mass vaccination campaign (*Bangkok Post* 2021jj). Hospitals were instructed to draw 12 doses out of an AZ vial rather than the 10 doses that were recommended (*Bangkok Post* 2021jj).

A royal order in May 2021 from Princess Chulabhorn allowing her Chulabhorn Royal Academy (CRA) to import vaccines for distribution reportedly came as a surprise to the health minister, who said, "If it is a benefit to the country, we are ready" (quoted in Barrett 2021). The CRA subsequently obtained three million doses of Sinopharm and began vaccination in July alongside another six million doses that arrived later (*The Nation* 2021b). The shot was not free: the CRA priced the shot at 888 baht—a lucky number—to cover "transportation, storage, and insurance," recognizing that service and administration fees might be added by hospitals (Rarueysong 2021). While the Food and Drug Administration had only

approved the Pfizer vaccine for adults, the CRA began vaccinating students aged 10 to 18 with Sinopharm ahead of classes in September, arguing that it was safe (*Bangkok Post* 2021kk).

Opposition party Pheu Thai suggested that the CRA's decision to get involved highlighted "government inflexibility and failure" and showed that the government lacked "management capabilities" (Pichai Naripthaphan in Wilson 2021). An order of 20 million Pfizer vaccines to be delivered in the fourth quarter of 2021 was signed mid-July (Keating 2021). Amid the shortage, Thailand also reconsidered its decision not to join COVAX, opting to join the initiative after months of refusing to do so and despite AZ's own encouragement to do so (Parpart 2021c).

The first 11.3 million doses of AZ vaccines arrived in Thailand in July 2021, with 5.3 million of those doses earmarked for use in Thailand and a further 6 million doses for the region (Wipatayotin and Nanuam 2021). Pfizer vaccines began to arrive in larger quantities in Thailand in late September 2021, with 2 million arriving on September 29, 6 million additional doses scheduled for October, and an additional 22 million by the end of the year (Wipatayotin 2021i). These stood in addition to 100,000 Sinopharm vaccines donated to the Thai Red Cross, 6–7 seven million doses of the Sinovac vaccine that the government had purchased from Beijing, arriving in October, and 2.5 million doses Beijing subsequently agreed to donate (Wipatayotin 2021i; Bangprapa 2021d).

Despite being classified as an upper middle-income country that had to self-finance its own purchases under COVAX (Malaysia and Singapore were the other two self-financing countries in the region) (*Bangkok Post* 2021f), a significant number of vaccines used in Thailand came via charitable donations from foreign governments. A donation by the United States of 1.5 million Pfizer doses to Thailand in July was supplemented with another commitment of 1 million Moderna doses in September (*Bangkok Post* 2021ll). As part of the British government's larger commitment to donate 100 million vaccines globally by June 2022, 415,000 doses of AZ vaccine donated by the UK arrived in Thailand in early August 2021 (*Bangkok Post* 2021mm). France likewise agreed to donate 400,000 Pfizer vaccine doses, and Iceland 100,000 Pfizer doses alongside 346,000 AZ doses; the MoPH bought 400,000 more AZ doses from Hungary (*Bangkok Post* 2021nn; Bangprapa 2021e). China ultimately donated 3.35 million vaccine doses in total by January 2022 (*Bangkok Post* 2022b). Thammasat University Hospital anticipated a donation of several hundred thousand doses of mRNA vaccines (*Bangkok Post* 2021oo), although a donation of 3 million doses of the Moderna vaccine by Poland to Thammasat University had been held up by bureaucratic paperwork (*Bangkok Post* 2021pp). Alongside that hang-up, controversy ensued over delays in receiving the second round of US donations; in both cases, the Thai government denied any role in the delay (*Bangkok Post* 2021qq).

Although the Moderna vaccine did not feature prominently in the gov-

ernment's vaccination plans, Thai citizens had independently booked and paid for over 9.2 million doses of the Moderna shot through private hospitals, dating back to June in the hopes of receiving them in October (*Bangkok Post* 2021rr). After initially announcing that Moderna doses might be available in October, one month earlier than anticipated (*Bangkok Post* 2021ss), the first 560,000 doses of Moderna vaccine arrived around November, with a further 1.34 million scheduled for delivery before the year's end and an additional 6.8 million in the first three months of 2022; 4 million of the first 5 million Moderna doses were ordered by private hospitals (which ordered 8.6 million in total and charged 3,300 baht for the 2,200-baht two course), with the remaining 1 million doses ordered by the Thai Red Cross (which provide at cost to provincial health authorities), and a large number of half-dose boosters ordered by the Chulabhorn Royal Academy (for purchase by companies and organization for 555 baht each) (*Bangkok Post* 2021tt).

Supply shortages forced closures of vaccine centers in Bangkok in July and early August (*Bangkok Post* 2021uu, 2021vv). Reports of foreigners being excluded from hospital queues surfaced in the media (Williams 2021). As these goals faltered and the new Delta variant appeared, a pandemic that had claimed just 89 lives as of March claimed 8,586 lives and infected nearly a million by mid-August (Maneechote 2021). While vaccine procurement plans were left up to the national government, provinces decided provincial vaccine distribution plans. While the original distribution plan intended to distribute vaccines sufficient for provinces to immunize 70% of their populations and achieve herd immunity, infection outbreaks led the government to reallocate vaccines to provinces most in need at the expense of those that had achieved disease control, leading to cries of unfairness (Marukatat 2021). In one case, provincial authorities in wealthy Nakhon Ratchasima (or Korat) and Surat Thani provinces actually sought to go around CCSA and purchase Sinopharm doses directly from the CRA, albeit unsuccessfully (Tangprasert et al. 2021).

Thailand's vaccination drive was inextricably linked to the reopening of the country's tourist industry. While the opposition Move Forward party argued that the government's interminable delays had led to a loss of 250 billion baht for each month that mass vaccination was delayed (*Bangkok Post* 2021xx), the prime minister argued that "vaccines will play a part in helping the tourism industry and business operations to recover" (quoted in Bangprapa and Nanuam 2021). The reopening of the country to international visitors commenced with the opening of the Phuket Sandbox on July 1, 2021, with the island of Samui following and five additional provinces (including Bangkok and Chiang Mai) to open on November 1, 2021 (Bangprapa 2021f). Sinovac doses were a mainstay of the immunization plans in these provinces, with AZ shots initially reserved for the elderly and the chronically ill (Chuenniran 2021).

The Bangkok governor wanted 70% of Bangkokians to be fully vacci-

nated before the Bangkok metropolitan area was reopened to tourists, a statement that temporarily put him at odds with statements by the prime minister's CCSA authorities overseeing the national response (Wancharoen 2021a). By mid-October 2021, 70% of Bangkok—nearly 5.5 million people—had received two doses of COVID-19 vaccine (Wancharoen 2021b), up from just 40% on September 18 (Wipatayotin 2021j). And by the end of October, close to 75 million COVID-19 vaccine doses had been given in Thailand, leaving 42.2% of the population fully immunized with two shots and 58.2% partially immunized (*Bangkok Post* 2021yy).

On November 1, 2021, Thailand reopened its main international airport in Bangkok to vaccinated international visitors, with less than 1% of the first 4,510 arrivals testing positive on the first two days (*Bangkok Post* 2021zz). Proof of either two doses of COVID-19 vaccine or a negative test was required to enter the popular diving islands Koh Tao and Phangan without quarantine or testing, representing a significant loosening of travel restrictions after a severe lockdown in Thailand that left the tourism industry reeling (Chaolan and Rakrun 2021).

Toward the end of 2021, government officials began mulling over what to do about the 11 million people in the country who had not yet been vaccinated (approximately 17% of the population), including whether to begin requiring proof of immunization to enter different public spaces, as some countries in Europe had done (*Bangkok Post* 2021aaa, 2021nn). The MoPH sought to publicly dispel social media rumors about the Pfizer vaccine's reliance on lipid nanoparticles and radioactive contamination (Wipatayotin 2021k). The Chinese embassy publicized scientific findings showing the effectiveness of Sinovac in Chile and Indonesia in an effort to counter criticism that its vaccine was inferior to Western vaccines (Bangprapa 2021g).

A separate initiative by the National Health Security Office—the financing arm of Thailand's Universal Health Coverage program—offered any patients suffering side effects from vaccination up to 400,000 baht ($11,412) in no-fault compensation (Bangprapa 2021h). Between April 5 and March 2022, the fund had paid out 1.5 billion baht ($42.6 million) to a number approaching 10,000 people, the vast majority with mild to moderate side effects, though 1,962 people had apparently either died or been left permanently paralyzed after being vaccinated by the end of 2021 (*Bangkok Post* 2021bbb; *The Nation* 2022d). While that number might seem large, it was still extremely small both in percentage terms relative to the population (affecting roughly 0.000029% of the population by one count) and to the number of doses given, underscoring the very low risk the vaccines posed.

Toward the end of 2021, the MoPH began to lay out plans for vaccine procurement for 2022. In late October, the prime minister became one of the first Thai citizens to receive two AZ doses and a Pfizer mRNA booster (*Bangkok Post* 2021ccc). The health minister was actually forced to get a

second AZ booster to enter Switzerland for the WHO meetings, as Sinovac was not accepted, and the experience prompted him to reconsider the country's vaccination strategy in light of international travel standards (*Bangkok Post* 2021ddd). The government ultimately procured 60 million AZ doses (originally scheduled to be delivered by the end of 2021 but delayed to May 2022), in addition to 30 million Pfizer doses, on top of Novavax and the locally made ChulaCOV-19 and Baiya boosters (*Bangkok Post* 2021nn; Chetchotiros 2021). Later, an additional 30 million Pfizer doses were added (Bangprapa 2021i). In total, the government's order amounted to 170 million doses for its population of more than 70 million (Achakulwisut 2021e). These orders aimed to ensure that the country could vaccinate fully 80% or more of its population (Wipatayotin 2021l). But as late as April 10, 2022, the government was amending vaccine standards, extending the expiration dates of Sinovac, AZ, and Pfizer vaccines to reflect their "true expiry date" for nonemergency use (*The Nation* 2022d).

Why?

Thailand's emergency decree ended on September 30, 2022, and the CCSA was dissolved as the government downgraded COVID-19 from a "dangerous communicable disease" to a "communicable disease under surveillance" (Parpart 2022). One month later, an MoPH announcement stated that Thailand's vaccine stock "was now sufficient to meet demand and there is no need to procure additional vaccines" (*The Nation* 2022e). Several months prior, a popular Thai satirist wrote an article posing as Public Health Minister Anutin Charnvirakul in which he apologized publicly for the ministry's poor response procuring vaccines, blaming his own marijuana addiction for the response (Volthai 2022). Anutin had successfully championed marijuana legalization in Thailand previously. However, a rapid and chaotic implementation left many Thais feeling that it had not been sufficiently regulated; some people expressed concern over children's exposure to cannabis, and political parties began reconsidering decriminalization just a year after legalization (Duangdee 2023).

Thailand's experience with COVID-19 vaccination illustrates the extreme challenges that governments faced in responding to COVID-19 in the context of vaccine scarcity and the Delta variant. But in many ways, the messiness that characterized Thailand's marijuana legalization mirrored the country's COVID-19 vaccine procurement and rollout strategy. Its approach to vaccination also departed from the country's historical achievements in so many other areas of public health, from HIV/AIDS prevention, to tobacco control, to health technology assessment, to universal health coverage and access, to essential medicine. Why was this the case? The greed of private corporations is certainly an important part of

the story. News reports show that other industrializing nations, like South Africa, were forced to accept non-mRNA vaccine contracts at rates higher than what the European Union paid or at the nonprofit price, alongside large nonrefundable advance payments (Lekabe 2023). While these dynamics are very real, this chapter also sheds light on what happens when business and political interests are allowed to overshadow recognized public health expertise and a competent and capable public health bureaucracy.

Arguably, Thailand's outcomes diverged from historical achievements in public health because recognized public health expertise that had stood out previously (Harris 2014) did not dictate the response. In this way, Thailand's less than stellar approach to vaccination showcases how Thailand's different versions of military and quasi-military rule since 2014 are distinct from previous periods of military rule when generals relied on technocrats to come up with and institute important health policies of great benefit to the populace, including both HIV prevention policies in the early 1990s and expanded access to health care and medicine in 2006–7 (Harris and Thaiprayoon 2022; Harris 2017a). These and other public health innovations had led Thailand to reap significant political capital internationally that the government had recently begun to appreciate the value of and deploy. However, the chilling methods this government took to mute criticism of its approach hurt not only its international standing on the issue of the vaccine rollout but its international reputation more generally.

In the absence of vaccines, Thai citizens sought to get them any way they could, with those who could afford it relying on the private sector to try to secure the Moderna vaccine. Ultimately, even individuals who paid out of pocket had to endure significant waiting times to get vaccine access as the Delta variant enveloped the country. Institutions associated with Thailand's royal family stepped in and directed resources to address the country's COVID-19 needs in an autonomous manner. Even with that extra support, vaccine access came slowly relative to many other countries, and the vast majority of the population relied on vaccines that were not mRNA vaccines, including vaccines with lower efficacy and side effects that gave some other countries pause. The vaccines Thailand relied on were widely used around the world, particularly in the Global South, where vaccination access was generally poor and availability slow to roll out. Thailand's choices, however, were made as an emerging upper middle-income country that increasingly sought to demonstrate its own mettle in international affairs, particularly in the field of global health.

Conclusions

This chapter contributes to a new stream of research in political science and sociology on politics and power in global health (Harris and White

2019; Greer et al. 2021; Farber and Harris 2022; Fonseca et al. 2022; Harris and Shaffer 2022; Dionne and Harris 2023), including more specific research on the role of conservative governments in health policy. Against classical scholarship in the "power resources" tradition (Stephens 1979), recent work has charted out changing socioeconomic conditions that have left working-class voters ripe for populism and the way in which conservative governments have introduced expansionary health reforms to accrue electoral benefits (Harris 2019; Dorlach and Yeğen 2023; also see Rogers et al. 2023). Yet, while this chapter demonstrates that some right-leaning governments invest in, rather than cut, scientific capacity (including in a number of different local vaccine candidates), we also see that business and political considerations can influence decision-making and that scientific investment does not always translate into a smooth or rapid vaccination campaign. Thailand's experience, however, diverges from other important cases where conservative governments have reduced or disabled investments in scientific institutions, including vaccine production capacity (Flynn and Massard da Fonseca 2023).

Two important questions remain in Thailand's vaccine story: First, will any new capacity developed (and any lessons learned) from this recent episode enable the country to respond to pandemics better in the future? And second, will the human lives it cost to develop that capacity and those lessons learned ultimately be worth it? Green chiretta has since been delisted from the country's essential drug list of COVID-19 medications. By March 2022, Thailand was running over 20 different COVID-19 vaccine trials in the country, four having been tested on humans with a fifth human trial to begin the following month (*Bangkok Post* 2022eee). Although these vaccine candidates missed the window to be useful in Thailand's initial crisis, it remains to be seen what they—and the considerable scientific capacity they represent—will mean for the country's future.

NOTES

CONFLICT OF INTEREST STATEMENT: Joseph Harris has previously published on HIV/AIDS and Thailand's role at the World Health Assembly with Suriwan Thaiprayoon from Thailand's Division of Global Health. He has received no funding from the Thai government for these projects or this chapter. There is no funding to report for this chapter, and the views presented in this chapter—and any errors or omissions—are entirely his own.

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1. Thailand's consistent success in health promotion and disease control is even more remarkable given that vaccine procurement amounts to less than 1% of the overall government budget for health care and just 7% of the overall Disease Prevention and Health Promotion budget; the two areas have also historically been underfunded, with actual budgets allocated always coming in below proposed levels (Gatekeaw et al. 2022).

2. Another volunteer died in Brazil in late October (Simões and Burger 2021).

3. Note that 31.5 million people was less than half of Thailand's total population.

4. As in all countries, there was also likely some underreporting of COVID-19 cases and deaths.

5. CP Group also opened a field hospital in Samut Prakan, with the WHA Group and Chularat Hospital Group, and provided similar assistance to the Lerdsin Field Hospital in Bangkok and Ramkhamhaeng Community Isolation Center (*The Nation* 2022g).

6. Notably, CP Group rolled out a digital bond called CP All with Krungthai Bank one year later (Krungthai Bank 2022).

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25 | COVID-19 Vaccination in Australia

Compromised but Ultimately Successful

Evelyne de Leeuw, Deborah Gleeson, Belinda Townsend, and Stephen Duckett

Australia's policy and practice with respect to COVID-19 vaccine procurement and distribution started very poorly but eventually achieved high two-dose vaccination rates. While its experience provides many salutary lessons about what *not* to do during a public health emergency, Australia's vaccination rollout became ultimately one of the most successful up to the moment systematic COVID-19 case finding and vaccination monitoring ceased (in early 2023).

This chapter first explains roles and responsibilities for the COVID-19 response between Australia's Commonwealth and state and territory governments. It then documents Australia's vaccine procurement and policy approach, demonstrating a strategy of vaccine nationalism as opposed to global cosmopolitanism. We then show how delays in the vaccine rollout reflected Commonwealth and state tensions, poor public health messaging, and a lack of planning by the Morrison Commonwealth government. Once supply increased, Australia's vaccination rates increased significantly, shaped by other primarily state-led public health interventions (including lockdowns and vaccine mandates). Yet there were tragic mistakes for priority groups, including aged care and First Nations, whose access remains significantly lower than non-Indigenous Australians.

Roles and Responsibilities in Australia's System

Australia is a federation in the Westminster style of democratic nations, with responsibility for health shared between the Commonwealth (federal) and state and territory governments. Quarantine is listed in the Constitution of Australia as an area of Commonwealth power (Moloney and Moloney 2020), while public health is essentially a state responsibility. States were front and center in the implementation of COVID-19 public health measures from early 2020, including managing public hospitals, testing for and tracing COVID-19, and introducing lockdowns designed to limit the movement of persons. The length and stringency of lockdowns

varied by state and territory but included limitations on reasons for leaving home, maximum size for gatherings, which businesses could remain open for on-site trading, and whether proof of vaccination was required to enter restaurants (Australian Bureau of Statistics 2021). Some states and employers also required proof of vaccination to attend workplaces (Australian Human Rights Commission 2020).

A much-heralded feature of the early pandemic response was the creation of a "national cabinet" consisting of the prime minister and state and territory chief ministers as a way of attempting to include the Commonwealth in public health decision-making. As it turned out, the national cabinet was neither national, as each of the constituent members continued to pursue their own policies, nor a cabinet, as there was no semblance of cabinet solidarity. It was determined, following judicial review, not to be a legal cabinet (Twomey 2022).

In the early stages of the pandemic, the Commonwealth and most states pursued diametrically opposed policies, with states generally pursuing a "zero-Covid" strategy until late 2021 through the use of lockdowns and testing and tracing (Duckett et al. 2020). In contrast the Commonwealth advocated a "suppression" strategy of allowing controlled spread of the virus and opposing the stringency of state public health control measures (Duckett 2022). Australia's vaccine procurement and rollout needs to be seen in this political context.

The Commonwealth became a more central actor in the COVID-19 response when vaccines became a key health intervention and the way out of seemingly never-ending lockdowns. The Commonwealth took leadership of vaccine policy and procurement for three main reasons. First, traditionally immunization policy rests with the Commonwealth. It is responsible for the national immunization register, had previously implemented financial incentives and penalties to encourage immunization (Ashwell and Murray 2020; Attwell and Drislane 2022), and had established immunization advisory mechanisms to determine the national schedule of recommended vaccines (Nolan 2010). Second, the Commonwealth has historically paid for vaccine procurement and for medical practitioners and pharmacists to provide vaccinations on a fee-for-service basis (Nolan 2010). Third, the Commonwealth government probably hoped to recover national political leadership and gain political credit for a smooth vaccination rollout in the lead-up to a federal election that was expected in late 2021.

Vaccines

Australia's Vaccine Procurement Decision-Making in a Global Context

Globally, for the first few months of the pandemic, it was an open question whether a vaccine against the SARS-CoV-2 virus would be developed

despite the enormous resources devoted to the task. But by mid-2020 a number of teams had potential candidates, and the policy question shifted to which vaccines might be successful and when they might be delivered (Burgos et al. 2021; J. Wang et al. 2020), and this in turn raised the question of what should be the appropriate vaccine procurement policy in Australia.

The global context in which Australia's decision-making about vaccine procurement took place was not a level playing field. Failures of global governance meant that COVAX, the global program set up in 2020 to equitably procure and distribute COVID-19 vaccines, was quickly undermined, as high-income countries (HICs) essentially "jumped the queue" by negotiating directly with vaccine manufacturers (Gleeson et al. 2023). By November 2020, more than half of the first 7.5 billion vaccine doses had been pre-purchased by HICs that accounted for only 14% of the world's population (So and Woo 2020), with disastrous effects for global vaccine equity. Australia, like other HICs, unfortunately prioritized its local strategy over global equity (Scheibner et al. 2022), despite paying lip service to the COVAX approach.

In the context of these global failures, along with intense domestic pressure to procure vaccines and significant global competition for limited vaccine doses, Australia's choices—as a nation with a tiny sovereign pharmaceutical production sector in global terms—were constrained. However, the nation was a particularly enthusiastic participant in the global trend of vaccine nationalism and by August 2021 had exceeded most other HICs in the number of doses ordered per head of population, with prepurchase arrangements in place for 280 million COVID-19 doses for a population just short of 26 million people (Gleeson et al. 2022).

Vaccine Procurement

Having decided to follow other HICs in entering contracts directly with vaccine manufacturers, Australia proceeded to do this badly. In contrast to many other countries, Australia did not hedge its bets across a broad portfolio of options but rather chose a narrow procurement strategy based on two main candidates. This failure to diversify sufficiently and to prepare for contingencies—underpinned by a "cost-containment mentality" and complacency due Australia's relative success at keeping the virus at bay in the early stages of the pandemic (de Leeuw et al. 2022)—proved very costly in both health and economic terms (Holden and Leigh 2022).

Australia's vaccine procurement approach was intensely political. The states had taken the lead on the public health response, and for the first year of the pandemic, state governments rode very high in terms of public popularity and attention, despite lengthy lockdowns that were seen as protecting the public in the absence of a vaccine (Duckett 2022). The Commonwealth government seized on vaccine procurement and distribution

as a policy issue where it would be front and center, sidelining the states. The key decision-makers in this process were the prime minister, Scott Morrison (who covertly had himself appointed as health minister in addition to the publicly announced appointee, Greg Hunt), and public service advisers from the Department of Health and Aged Care.

Australia's initial strategy was to procure vaccines that could be produced locally: a potential Australian-developed candidate developed by a team at the University of Queensland and the AstraZeneca vaccine, which was licensed to be manufactured in Australia by the Australian pharmaceutical firm CSL (originally Commonwealth Serum Laboratories established as a government agency in 1914 until it was privatized in 1994). This strategy may have been pursued in an attempt to preempt potential vaccine nationalism by other countries in which vaccine candidates were being developed (Zhou 2022) and projected consequent disruptions to the Australian supply chain.

Both vaccine candidates ended up with fundamental flaws. The University of Queensland product failed in early trials due to false positive HIV tests among some participants (Gillespie et al. 2022). CSL, tasked with producing 50 million doses of the AstraZeneca vaccine, was initially afflicted by manufacturing delays. The risk of a rare blood-clotting disorder associated with the AstraZeneca vaccine and bungled messaging around this by public officials then undermined its acceptability to many Australians.

Australia's procurement strategy subsequently pivoted to the mRNA vaccines from late 2021—initially versions produced by Pfizer and eventually also by Moderna. However, a long wait for doses due to Australia's late negotiation of contracts, along with intense global competition and supply constraints, led to a very slow vaccination rollout with devastating consequences in terms of lengthy lockdowns. Facing intense pressure from the public, in the interim, the Australian government entered into several "dose-sharing partnerships" with other countries, receiving small (in relative terms) parcels of doses from other countries with surplus doses close to expiry, with the promise to reciprocate at a later stage (e.g., 500,000 Pfizer doses were received from Singapore in September 2021 and returned in November the same year) (Australian Government 2021). In desperation to secure doses, it also quietly drew down 500,000 Pfizer doses from COVAX in May 2021. While it was entitled to do so, having contributed funds for this purpose, this delivery occurred at a time when there were still massive inequities in access globally and when COVAX's role had already been reduced by the actions of HICs to a smaller safety net for low-income countries.

Despite the necessary shift from locally produced COVID-19 vaccines to imported ones, the priority given to local production and domestic vac-

cine security persisted. In December 2021 came the announcement of a partnership between the Victorian and Australian governments and Moderna to build and operate an onshore mRNA facility capable of producing up to 25 million vaccine doses annually from 2024 (Victorian State Government 2021). This was expected to be the first mRNA facility in the Southern Hemisphere but was projected to come on line more than two years later—by early 2024 (Butler 2021).

The Australian government also purchased 51 million doses of the Novavax vaccine, a US-made protein-based vaccine; however, this did not become available in Australia until February 2022. This vaccine, with its traditional technology, was seen as providing another option for those who were unable or unwilling to take up other COVID-19 vaccines, but production delays and hiccups with regulatory hurdles meant that the Novavax vaccine entered the market very late globally (Tinari and Riva 2021). By the time it reached Australia, over 95% of adults were already vaccinated, leading to predictions of an oversupply and potential wastage in 2023 (Halton 2022). Furthermore, Australia may have been hampered from deferring deliveries and redistributing doses to other countries due to the conditions of its vaccine procurement contracts (Halton 2022). Concerns regarding COVID-19 vaccine contracts, generally treated in their entirety as proprietary information, include restrictions on the use of the vaccines. These contracts have been characterized by extraordinarily low levels of transparency, despite the expenditure of public funds (Rhodes et al. 2021). Combined with a lack of transparency and accountability on the part of national governments, this means it is impossible for the public to know what conditions Australia was forced to agree to and is extraordinarily difficult to trace what happened to Australia's surplus vaccine doses.

Assistance to Other Countries

Australia's overall approach to vaccine procurement and distribution was guided by moral nationalism, "an ethical perspective that individuals owe a heightened duty to their fellow citizens, and governments owe a heightened duty to their own citizens, in times of crisis," rather than moral cosmopolitanism, a perspective from which "all individuals are part of a singular global community" (Scheibner et al. 2022). However, it did endeavor to assist neighboring countries in the Asia-Pacific region, making a series of significant commitments to donate doses, funds, and rollout support (Gleeson et al. 2022). The locally manufactured AstraZeneca doses—no longer sought after by Australians—initially formed the backbone of the Australian government's donation strategy, and Pfizer doses were added at a later stage once supply was surplus to demand. However, despite committing an initial $130 million in funds to COVAX for low-income countries, Australia's donations of doses were made bilaterally, outside of the

COVAX structure and arguably in line with its national interests rather than targeted to areas of greatest need globally. This type of "vaccine diplomacy" has been heavily criticized both for failing to adequately address the gap in access between rich and poor countries (with most donations arriving too late, too close to expiry, or in an ad hoc fashion that prevented adequate preparation—often leading to unnecessary wastage) and for being a Band-Aid solution that protects the status quo against pressure for "vaccine liberty" for the poor (Gleeson et al. 2023; Sparke and Levy 2022).

Financing

The Australian government's initial investment in developing medical products for COVID-19 vaccines, set out in Australia's COVID-19 Vaccine and Treatment Strategy, was a mere AUD 333 million (Australian Government 2020). By July 2022, AUD 8 billion had been spent on COVID-19 vaccines (Australian National Audit Office 2022), and by the time of writing (July 2023), more than AUD 18 billion had been invested (Australian Government 2021). In line with Australia's policies about vaccines on its recommended immunization schedule, vaccines were distributed without charge to the consumer.

Market Authorization

In Australia, the Therapeutic Goods Administration (TGA) is the regulatory agency with responsibility for ensuring vaccines have "met the high safety, efficacy and quality standards required for use in Australia" (Therapeutic Goods Administration 2023). Australia does not have an emergency approval pathway like the United States, but a provisional approval pathway provides for temporary registration of products, for which early access is needed, when the benefits outweigh the risks (Therapeutic Goods Administration 2023). The TGA provided provisional approval for the Pfizer vaccine in January 2021, AstraZeneca in February 2021, Janssen in June 2021, Moderna in August 2021, and Novavax in January 2022 (Therapeutic Goods Administration 2023). The timing of the first critical TGA provisional approval decisions, while "broadly comparable" to those in Europe and the United States (Halton 2022), occurred several weeks later than emergency authorizations issued for AstraZeneca in the UK and Pfizer in the United States. These differences would usually be considered insignificant, but they mattered to a public suffering under, or facing the prospect of, harsh lockdowns (Hamilton and Holden 2021). The Moderna COVID-19 vaccine was the first to be granted full registration in April 2023, followed within months by Pfizer and Novavax.

Vaccinations

Initial Vaccine Rollout—2021

While Australia's early management of many aspects of the pandemic was done well, its initial vaccine rollout in the first six months of 2021 put it at the bottom of the Organization for Economic Cooperation and Development ranking for the proportion of the population fully vaccinated (Holden and Leigh 2022) and was widely perceived as a dreadful policy failure on the part of the Commonwealth government (Duckett 2022; Gillespie et al. 2022; Hawksley and Georgiou 2023). Vaccination was promoted by the Commonwealth government and seen by the public as enabling an end to the seemingly interminable lockdowns. Although various strategies were suggested to stimulate vaccine demand—including a lottery—these proved unnecessary as the chance to escape movement restrictions and "vaccine passports" (where entry to restaurants and other public gathering places required proof of vaccination status) meant vaccine hesitancy was very low. The rate-limiting factor for vaccine uptake was therefore supply and not demand. Supply limitations meant that by mid-2021, only 6% of the eligible population had been fully vaccinated, in comparison with 56% in Israel and 49% in the UK and United States (Halton 2022).

The initial rollout for the vaccine was planned to commence in early 2021, constrained by the slow start of manufacture of the AstraZeneca vaccine and a somewhat lackadaisical approach to rollout planning, with the prime minister famously declaring that vaccination rollout was "not a race" (Taylor 2021). But it always was a race against the virus. Even though Australia had few infections in early 2021, the potential for a new outbreak was always present, and outbreaks did indeed occur midyear (Grout et al. 2021). Access to vaccines was prioritized, first for health, disability, and border control workers and people in residential aged care or disability accommodation and then for the balance of the population, with older people and people with underlying conditions prioritized. First Nations—Aboriginal and Torres Strait Islander—Australians had younger age thresholds in the priority setting process (e.g., First Nations Australians under the age of 55 were accorded the same priority as other Australians under 70).

The vaccine rollout to aged care residents—a priority group—was mishandled, resulting in continuing high death rates in these facilities well after vaccines were available in the wider community. The initial target set in February 2021 was to complete the rollout in aged care within six weeks, but it was June 2021 before 99% of aged care facilities had administered second doses (Australian National Audit Office 2022). Vaccination rates were also slow for First Nations Australians—a second priority group—due to longer periods of waiting for alternatives to AstraZeneca for younger age groups.

The rollout also suffered logistical challenges, partly caused by the interplay of the politics of the Australian federation with the Commonwealth government, which prioritized rollout in medical practices and pharmacies—for which it is seen as responsible—rather than in large state-run vaccination centers or public hospitals (Gillespie et al. 2022). Australian vaccinations started on 22 February 2022, later than most other wealthy countries but even so, all the early targets for proportion of the population vaccinated were missed, with the vaccination rollout pejoratively relabeled in public commentary as the "stroll-out."

Some analysts have attributed these failures to flawed government rhetoric (e.g., Prime Minister Scott Morrison claiming that "vaccination is not a race" and "Australia (is) at the front of the queue for a safe and effective vaccine") and a reliance on unaccountable high-cost outsourcing of logistics and information management to consultancy firms such as Deloitte (de Leeuw et al. 2022, see also Ratnatunga 2023). The situation worsened when public sentiment turned against the AstraZeneca vaccine with reports of vaccine-related adverse events and the consequent poorly communicated narrowing of the population cohort for which AstraZeneca was recommended, initially to those over 50 years old and then to those over 60 years old. Australia started playing catch-up internationally, racing to secure Pfizer doses to use in younger age groups (Choiseul et al. 2021).

Although the early concerns of policy were how to increase demand for vaccinations—addressing vaccine hesitancy—the dominant policy issue of 2021 became one of securing supply and the logistics of distribution. Demand for vaccinations exceeded supply until September 2021. Despite the supply shortages, all states introduced vaccine mandates, for example, requirements to demonstrate that one was fully vaccinated to attend many workplaces, to enter a restaurant, or to travel by plane (Attwell et al. 2022; Duckett 2024). Many employers also introduced vaccine mandates (Carabetta 2022).

Australia, like other countries, had its share of anti-vaxxers (Court et al. 2021), but the proportion of the Australian population that reported they would "definitely not" be vaccinated was low both before a vaccine became available and during the early stages of the rollout—between 5% and 15% of the population, depending on the survey (Edwards et al. 2021; Essential Research 2021), with somewhat higher rates during the height of the controversy about the safety of the AstraZeneca vaccine, with rates stabilizing at lower levels after that. So it was not surprising that, despite low levels of COVID-19 infections, once supply problems were resolved, vaccination uptake in 2021 was among the highest in the world (greater than 90%), including in culturally and linguistically diverse populations (Gillespie et al. 2022).

A number of push and pull factors can explain why the vaccine hesitant were converted to being prepared to accept vaccination, including a desire to end lockdowns, the restrictions on movement of the unvaccinated (one

had to show vaccination status to enter restaurants or shops or attend many workplaces), and acceptance that vaccination was safe and effective in protecting oneself and others.

Subsequent Rollout—2022

The year 2022 saw the winding back of public health measures (Williams 2024) and an unfortunate simultaneous fall in the emphasis on being up-to-date in vaccinations. Even though the Australian population accepted the need for third and fourth doses, policy continued to describe "fully vaccinated" as having two doses, with relatively weak campaigns to boost vaccination rates. As of late October 2022, the third-dose vaccination rate was just over 70% (Department of Health and Aged Care 2022); vaccination rates in culturally and linguistically diverse populations mirror the rest of the population.

Despite engagement and leadership by Aboriginal Controlled Community Health Organisations (Graham et al. 2022; Naren et al. 2021), vaccination rates for First Nations Australians have never attained the rate achieved in the non-Indigenous population, with the First Nations' two-dose rate about 10% below the non-Indigenous rate and the three-dose rate about 15% below (Department of Health and Aged Care 2022). Early research suggests that reasons for continued lower vaccination rates include "fear of side effects, negative stories on social media, and distrust in Australian governments and medical institutions," with a preference for access through Aboriginal health services or known general practitioners (Graham et al. 2022).

Given that third and fourth doses were mostly delivered in the first few months of 2022, the impact of waning vaccine immunity means that the proportion of the Australian population with effective protection against the SARS-CoV-2 virus in late 2022 was probably below 50%.

Why?

In other reflections on government responses to the pandemic, some of us have characterized the Australian approach as "running on custard" (that is, with the appearance of solid ground but under scrutiny becoming fluid; de Leeuw et al. 2024) and one that "over-promises and under-delivers" (in an inversion of official government rhetoric; de Leeuw et al. 2022). Similar assessments would be valid for the vaccination politics across the Commonwealth. The vaccination nationalism we mentioned above may in fact have been pandemic insularity—the belief that closing off the island of Australia from the disease onslaught until the pandemic had been weathered was a real option.

Failing rhetoric was exacerbated by the perennial challenge in the Australian federal political landscape: the tendency to shift blame and respon-

sibility and to assume triumph and success between the different levels of government. The Morrison Commonwealth government, in office during the first years of the pandemic, was particularly adept at trying to avoid responsibility across a range of domains (Grattan et al. 2023) and also tended to deemphasize public health concerns during the initial waves of the pandemic, prioritizing perceived economic issues (Duckett 2023b).

The Morrison Commonwealth government sought to capitalize on its responsibility for the vaccine rollout, trumpeting each step of the procurement pathway. But this all came unstuck when its procurement strategy unraveled. States stepped in to establish their own mass vaccination centers, supplementing the Commonwealth's own preferred channels of general practices and pharmacies. Limited vaccine supply led to public verbal brawls and sniping between the states and the Commonwealth about whether scarce vaccines were being distributed equitably among the states and the various channels. For example, in September 2021, Victorian Premier Daniel Andrews claimed that New South Wales had received more than its fair share of vaccines, reportedly stating, "I signed up to a national plan to vaccinate our nation, not a national plan to vaccinate Sydney" (Crowe 2021).

Although in our introduction we highlighted the three key reasons why the Commonwealth remains the only level of government to plan, manage, and implement vaccine development, procurement, and rollout strategies, the realities are that vaccination is a quintessential element of broader public health approaches. And the Australian public health model falters. Despite a strong professional landscape with an important national public health association, institutionally the field is fragmented and ill-coordinated.

A case in point is provided by the pandemic preparedness and response plan that was published literally weeks before the COVID-19 pandemic was formally declared (de Leeuw et al. 2024). In this plan, the Australian Health Management Plan for Pandemic Influenza (Department of Health 2019), the diverse smorgasbord of state/territory–Commonwealth and third-party public health expertise (e.g., research institutes, think tanks) is captured in complex multicolored drawings that lack clear guidance on governance and accountability. Worse, in the "menu of options" in the pandemic preparedness and response plan (a series of appendices to the policy itself) is wishful thinking about vaccine development and procurement, as well as exceedingly neo-liberal positions on pandemic-related behavioral interventions. As to the latter, recommendations on masking, social distancing, and individual or institutional action on clean air are all consistent with the neoliberal orientation of the Morrison Commonwealth government, framed in the "personal responsibility" sphere and meant to deemphasize opportunities for state public policy intervention.

The public health messaging was weak, confusing, and contradictory (Gillespie et al. 2022). Basseal et al. (2023) find that the lack of clear

evidence-based public health communication in Australia has challenged trust in government and health-care authorities. This seems particularly the case for inequitable lockdowns and vaccine-communicative differentials in regard to disadvantaged populations (de Leeuw et al. 2022; Wild et al. 2021).

Institutional Parameters

Both the clinical and the policy processes around vaccination opportunities and rollout have been sub-optimally opaque in Australia. Our analysis above suggests that the reason for this opacity can be traced back to policy and vaccination nationalism rather than cosmopolitanism; a proclivity of government to govern by "announceables" (including slogans such as "vaccination is not a race"); and an incomplete (or perhaps rather "supremely political") link between evidence and policy action. But more than anything, these causes of haphazard policy processes have been exacerbated by a fractured design of an institutional public health architecture. This infrastructure challenge encompasses every level of government and should somehow also bridge the divides between government, nongovernment, community, and industry interests and their institutional foundations and interests.

The COVID-19 pandemic has been termed the "first neo-liberal pandemic" (Moosa 2021), and the consequences of neoliberalism in Australia can be seen in almost every aspect of the country's response (Duckett 2023a; Williams 2024). Perhaps few modern welfare states that have adopted a neo-liberal public management ideology are embracing a public health infrastructure that is strong and unequivocal. Maani and Galea (2020) focus their analysis on the United States, but their findings are universal. Our description of the prevailing Australian public health infrastructure as "trifle" or "smorgasbord" was recognized by the Australian Labor Party in its national election campaign platform in 2022—and in fact followed an argument prosecuted for a long time by the Public Health Association of Australia (Watson 1987; Slevin and Weeramanthri 2021). Establishment of an Australian Centre for Disease Control (ACDC) was called for. Upon winning government, the Labor Party set out to scope and establish this body. But, as things stand at the time of writing, the government has not taken this opportunity to frame a bold and visionary perspective. The current version of the ACDC—perhaps predictably the result of federal-state and public-private compromise—has no remit, such as the European Center for Disease Prevention and Control or the US Centers for Disease Control and Prevention, to preempt, prevent, and prepare for major public health events or invest in population health in any significant manner (Smith et al. 2023).

Global Parochialism

We observed that vaccine politics in Australia have been subject to nationalism rather than cosmopolitan solidarity. We highlighted the exploitative compliance with the COVAX governance parameters. Australia's options were constrained to some extent by global governance failures (leading to a competition for doses by high-income countries at the expense of low- and middle-income countries), its small pharmaceutical sector, and domestic political pressures. However, there are ways in which it could have assisted other countries to a greater degree while still catering to the needs of the Australian population, for example, by donating more doses earlier and through COVAX and by providing more support for international efforts to remove intellectual property barriers to more widespread production (Gleeson et al. 2022). Interestingly, such an analysis would probably not be shared by the Australian federal political elite and its bureaucratic apparatus. An illustration of this would be the limited scope of the Halton (2022) review of Australia's COVID-19 vaccine and treatment purchasing and procurement and the Commonwealth Government COVID-19 Response Inquiry announced in September 2023. In contrast to Canada, there has been no review of Australia's response in terms of assisting other countries during the pandemic.

Another, perhaps more poignant, illustration that demonstrates an awkward global diplomatic cognitive dissonance is the early adoption by the Australian government of the international travel vaccination certification mandated by the World Health Organization and the United Nations. B. Wang and Ping (2022) describe an international comparative analysis of vaccine certification that includes twelve countries and regions around the world, including Australia and the EU. Australia in itself has an already bewildering variety of certification, with some states and territories issuing (digital) certificates within their own jurisdictions. But at the Commonwealth level, the nation became compliant with the global standard set by WHO and the International Civil Aviation Organisation (Wang and Ping 2022). Unfortunately, though, this standard was redundant by the time it was adopted. The EU and 37 further countries had already adopted a different standard (Wang and Ping 2022), as did New Zealand, Canada, and the United States. An Australian-compliant international vaccine certificate did not provide access to at least 100 other countries around the world without additional testing, scrutiny, and validation. In sum, Australia did its best to demonstrate global compliance without recognizing that the real world had already moved on.

Conclusions

Australia was a slow, parochial, and clumsy starter in the vaccination response to the WHO-declared Public Health Emergency of International

Concern. A particular antipodean version of the federal neo-liberal hollow state (Milward and Provan 2000) led to unproductive and counterproductive relations between states and federal government, public and private providers and procurers, and an outsourcing of critical infrastructure and hardware that can be deemed unaccountable. Vaccine procurement as well as rollout logistics were initially haphazard and unnecessarily nationalist, following unwarranted beliefs of equity occurring naturally through market-like mechanisms.

Another analytical view of the "stroll-out" is provided by Gillespie et al. (2022), who apply the concept of the federal health-care state to the vaccination mayhem. They demonstrate that AUD 10 billion was spent on outsourcing the vaccination effort without serious tangible results. Rather, as they report, the beneficiaries were not vulnerable or at-risk populations but rather "The Big Four" (consultancy firms PwC, EY, Deloitte, and KPMG), private health-care industries (Aspen Medical, Health Care Australia, Sonic Clinical Services), and numerous other established and budding medtechs.

A further observation should be that the policy framing of vaccine development, procurement, implementation, and monitoring has been incoherent and inconsistent. The language and messages that were used initially—in early 2020 when the pandemic was recognized and initial strong public health measures like lockdowns and other nonpharmaceutical interventions were designed and implemented—seemed to have been aimed at projecting confidence in various governments' policies and protocols. The careful scripting of daily news conferences by state and Commonwealth chief health and medical officers was aimed at reinforcing that confidence—seeking a delicate balance between realistic epidemiology-informed communications of risk and assurances to the public (e.g., Diget and Goddard 2022). This was happening in an environment where objective evidence may have been challenged by inequities (e.g., between strict lockdown enforcement in migrant communities at the same moment that affluent groups in society managed to organize beach parties; cf. de Leeuw et al. 2022) and conspiracy thinking. The daily press conferences with much public health speak may have been understandable but not necessarily the most effective public policy approach. In terms of vaccination messaging, government media engagement also had to account for social media echo chambers and polarization (Graham et al. 2021). Another notable communication challenge has been to consider what "full vaccination" actually means—two shots; two shots of different vaccine types; two shots with at least one being bivalent; regular six-month shots; and so forth? It seems the general public has become weary of the subtleties of vaccine messaging.

Ultimately, though, against what appears to be a global standard in vaccination sufficiency (i.e., two shots), Australia performed exceptionally well up to the end of 2021. The year 2022 saw backsliding as politicians—especially federal politicians—appeared to want to put COVID-19 behind

them, with most of the public also relieved that those times appeared to be over. COVID-19 still circulates, of course; and with lower third and fourth vaccination rates, infections and hospitalizations remained high during 2022. Perhaps another lesson is that public health requires continued vigilance, despite some getting bored with the messages.

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Part V

Vaccination Politics in Africa, the Middle East, and North Africa

26 | COVID-19 Vaccination in the African Union

An Integrated and Bold Approach to the Pandemic

Emmanuel Balogun and Ana B. Amaya

At the onset of the COVID-19 pandemic, public health scientists and experts raised concerns about the effects the pandemic would have on the African continent and the preparedness of African countries, given the fragility of public health systems throughout Africa (Wadoum and Clark 2020). Responses to epidemics in Africa are frequently challenged by the fragility of health systems and inadequate mechanisms for surveillance.

Despite these warnings and expectations, the continental response to COVID-19 reflected an integrated, more forward-looking approach spearheaded by the African Union (AU) and its health organ, the Africa Centres for Disease Control and Prevention (Africa CDC). From the beginning, the AU worked with international institutions to garner resources to combat the disease. Early interventions by Africa CDC included the rapid establishment of a COVID-19 preparedness and response task force, collaborations with the World Health Organization (WHO) Regional Office for Africa, and the establishment of a community of practice among health practitioners across the continent to share data, develop strategies for risk communication, and share best practices at the outset of the pandemic. However, in this chapter, we show how despite these attempts at an integrated, multilateral response to COVID-19, African countries were still subjected to scarce medical resources and a diminished ability to provide vaccinations to their citizens at the same scale and pace as Western countries.

The initial response by African countries and the AU also reflected the experiences African countries faced with other epidemics and outbreaks. For example, Senegal's experience with active case-contact detection allowed health practitioners to identify growing clusters and help response teams mitigate the spread of the disease (Diarra et al. 2023). Similarly, Sierra Leone's experience with an Ebola outbreak from 2014 to 2016 allowed the government to rapidly implement quarantine measures, install public handwashing stations, and collaborate with community members, which contributed to a low reported number of deaths from COVID-19 and a 70% COVID-19 vaccination rate by 2022 (World Health Organization 2023).

While there was reason to be optimistic about the initial response to COVID-19 in Africa, the prospect of mass vaccination on the continent emerged as a key political and logistical challenge. African leaders accused Western countries of hoarding COVID-19 vaccinations, vaccine manufacturers were reluctant to sell their vaccines to African countries, and issues of trust emerged in societies with leaders who downplayed the disease. In this chapter, we explain how the AU navigated the acquisition and dissemination of COVID-19 vaccines across Africa. We argue that despite the AU's attempts to work with international institutions and coordinate the continent's COVID-19 response, its efforts to vaccinate the continent were shaped by an exclusionary global vaccine market and an at best nascent vaccine manufacturing market on the continent driven by single country strategies that limited harmonization. We also find that issues of domestic trust within African countries created challenges with mass vaccination campaigns. Citizens were unsure when they'd be vaccinated, as well as unsure of what kind of vaccine they'd receive. This left countries and the continent as a whole short of its vaccination targets. Though the AU was able to procure vaccines and make deals to increase vaccine production to Africa's benefit, African countries were slow to order and administer vaccines. The AU response also reflects attempts by Africa CDC to navigate the various forms of inequity the continent faced in procurement, production, and dissemination of vaccines. This chapter highlights the ways the AU was able to use international institutions and partnerships to increase African access to vaccines, while also highlighting how trust is still an important determinant of citizens' compliance with emergency health responses and public health policies.

Vaccines

During the initial global rollout of COVID-19 vaccinations, vaccination on the African continent was well below global averages—with 20 doses per 1,000 people (Tessema and Nkengasong 2021). Africa CDC set a goal to vaccinate 70% of the continent by the end of 2022. It was also difficult for African countries to receive vaccines, given the lack of vaccine manufacturing on the continent and the lack of vaccine technology transfer from the pharmaceutical companies Moderna and Pfizer. The gaps created by global vaccine inequality, sometimes labelled "vaccine apartheid" (Prasad et al. 2022), led to a "two-track pandemic" wherein high-income countries received vaccines at higher rates, while people in low-income countries had not yet received their first dose (Bajaj et al. 2022).

To scale up vaccine availability on the continent, the AU developed the African Vaccine Acquisition Task Team (AVATT), established by South African President Cyril Ramaphosa in his capacity as AU chairperson in conjunction with Africa CDC, the United Nations Economic Commission for

Africa, and the African Export-Import Bank. The goal of AVATT is to be the central purchasing agent on behalf of AU member states to secure COVID-19 and financing resources to vaccinate the continent. AVATT was developed to be a complementary partner to WHO's COVAX initiative and its COVID-19 Vaccine Delivery Partnership. As the main mechanism to increase vaccine access, Africa CDC and COVAX commonly make the claim that the COVID-19 vaccine rollout in Africa was the biggest, most rapid, and most complex continental drive in the history of the continent (Africa CDC 2022).

A key component to Africa CDC's COVID-19 vaccine rollout was the embrace of international partnerships. For example, the African Union's special envoy on COVID-19 and head of AVATT, Strive Masiyiwa, a Zimbabwean billionaire, worked closely with Africa CDC Director General Dr. John Nkengasong to negotiate a deal to acquire up to 400 million doses of the Johnson & Johnson vaccine in March 2021 (African Union 2021). Similarly, the Mastercard Foundation pledged to deploy $1.3 billion from 2021 to 2024 to Africa CDC to ensure equitable access and delivery of vaccines across Africa. The United States also delivered over 200 million vaccines to African countries through COVAX. These efforts emerged from an empowered Africa CDC director general who used his political capital and experience in global public health to catalyze the international community to invest in Africa's response to the pandemic. Dr. Nkengasong's efforts represented a broader attempt to center Africa in the global response to COVID-19. Dr. Nkengasong often linked the need for vaccine equity to the collateral impact of the pandemic and the fact that Africa and low-income countries were systematically separated from the Western world regarding the proliferation of vaccines.

Africa CDC and other African leaders also wanted to use the vaccine rollout to address the structural issues that contributed to uneven health governance outcomes on the continent. The AU, going back to 2017, cited the need for a reformed public health order that accounted for the inequities in global public health on the continent. From the Africa CDC perspective, the procurement and eventual manufacturing of vaccines on the continent would democratize access to COVID-19 therapeutics and allow Africans to be reliant on their domestic health-care systems. Africa CDC officials often cited the slow pace of vaccine delivery to Africa as a reason to upend the global health status quo. One official frequently mentioned that Africa received "less than 5%" of all COVID-19 vaccines, despite the fragile health-care systems and large populations across the continent.[1]

Heads of state from both Africa and the Global South more broadly attributed the gap in vaccine access on the continent to a lack of vaccine manufacturing on the continent. In response, India and South Africa submitted a proposal to the World Trade Organization (WTO) to suspend intellectual property (IP) on the manufacturing of all COVID-19 vaccines through a waiver of the Agreement on Trade-Related Aspects of Intellec-

tual Property Rights (TRIPS). India and South Africa pursued the TRIPS waiver by claiming that Western countries were hoarding COVID-19 therapeutics and vaccines and that waiving IP rights would create the conditions that would allow for widespread vaccination in the Global South. The proposal by India and South Africa had widespread support from low-income countries but was contested by the European Union (EU) and the United States, with interest groups in the United States particularly calling the proposal vague. The United States ultimately supported the TRIPS waiver, which represented a reversal of its typical highly protectionist stance on international intellectual property rights. After 18 months of negotiations, South Africa, India, the EU, and the United States brokered a compromise deal that authorized eligible WTO members to use patented ingredients for the production of COVID-19 vaccines and would consider diagnostics and therapeutics at a later date (WTO 2022).

Vaccinations

While South Africa and other African countries believed the negotiated TRIPS wavier proposal did not go far enough, the push for more vaccine manufacturing on the continent continued. In April 2021, the AU held an African Vaccine Manufacturing Summit, where it launched the Partnership for African Vaccine Manufacturing platform. By late 2021, Algeria launched local production of the Sinovac vaccine (CoronaVac), Egypt signed agreements to manufacture Sinovac, and Rwanda and Senegal signed memoranda of understanding with pharmaceutical company BioNTech to create local mRNA vaccine production plants in each country. South Africa created a consortium for mRNA technology to be transferred through a hub in South Africa. The consortium included the Medicines Patent Pool, WHO, Afrigen Biologics, the Biologicals and Vaccines Institute of Southern Africa (Biovac), Africa CDC, and the South African Medical Research Council.

Given the accelerated progress on manufacturing after the TRIPS negotiation, the African Union convened a workshop in Rwanda with its health, trade, and development organs: Africa CDC, African Medicines Agency, the AU Development Agency, and the African Continental Free Trade Area. The goal of the workshop was to develop and agree on an AU-endorsed approach to facilitate regulatory approval of vaccines produced in Africa, align on a plan for a pooled procurement mechanism for vaccine manufacturing in Africa, and pilot a COVID-19 drug manufacturing hub. Despite these efforts from African countries and the African Union, the challenges to vaccination on the continent persisted. For instance, while there were plans in place to scale up vaccine production on the continent, African companies, namely Afrigen and Biovac in South Africa, only had access to publicly available information to recreate the Moderna

vaccine, which it had to use to teach vaccine manufacturing companies how to use across the continent. Pfizer, Moderna, and BionNTech failed to respond to African researchers when they reached out to ask for support on how to make the mRNA vaccines. There were also concerns of how to obtain access to biologics and raw materials, in addition to manufacturing capacity. Ultimately, the knowledge and structural gaps in vaccine production could not keep pace with the institutional changes and promises of Africa CDC.

Despite attempts by the AU/Africa CDC to procure vaccines and push for more vaccine production on the continent, significant institutional challenges limited Africa CDC's ability to ensure widespread vaccination on the continent. One of the most significant challenges was distribution and dissemination. Africa CDC facilitated the partnerships with WHO, and Africa CDC leadership was instrumental in finding partnerships to help accelerate Africa's response to the pandemic. However, African countries, not Africa CDC, were responsible for receiving vaccines. It was often unclear if Africa CDC was negotiating on behalf of African countries or if African countries were left to negotiate for vaccines on their own. For example, Senegal, a country lauded for its initial response to the pandemic, experienced shortages in receiving vaccines and was unable to purchase vaccines because vaccine manufacturers were preselling their vaccine supply to high-income countries. Further, Africa CDC officials maintained it was outside the scope of their mandate to negotiate vaccine deals for individual countries; instead, their job was to facilitate the ease of working through entities such as COVAX to vaccinate the continent.[2] Many African countries relied on donor pledges to COVAX.

Further compounding the challenges of distribution is the variation of health infrastructure in most African countries. According to the WHO regional director for Africa, most African countries did not have the refrigerated storage requirements needed to preserve some brands of the vaccine. Representatives from the World Bank highlighted a lack of access to reliable electricity, which also limited the ability to preserve vaccines (Blimpo and Cosgrove-Davies 2022). Some countries were able to overcome some of these structural constraints. For example, Ghana's national vaccine deployment strategy initially focused on regulatory preparedness, safety and immunization monitoring system, communication and information planning, and waste management. Ghana decided to prioritize high-risk citizens, including those who would experience severe symptoms of the virus, frontline workers and those who worked in essential businesses, and national security personnel. Health centers and hospitals were the primary vaccination sites. The Ghanaian minister of health also ensured that there was communication about the safety and efficacy of the vaccine, and virtual training and planning sessions were provided to health-care workers responsible for administering the vaccines. Ghana relied heavily on data collection to aid its contact tracing efforts and its

monitoring of vaccine management. Ghanaian health workers were able to digitally track individual records and remind citizens when they needed to get follow-up doses. These efforts led to an initial 48% rate of vaccination in Ghana.

In Tanzania, President Samia Hassan publicly declared the vaccine safe and received her vaccine on national television, which launched a public campaign in the country to encourage citizens to get vaccinated. This comes in stark contrast to former Tanzanian President John Magufli, who downplayed the severity of the virus and was reluctant to roll out the COVID-19 vaccine, later dying due to complications from the virus. President Hassan's strategy relied on information campaigns and vaccination drives by university students, local and international nongovernmental organizations, and religious leaders to increase vaccination rates. The COVID-19 vaccine campaign was also integrated into routine HIV/AIDS care and treatments, allowing the vaccine to reach high-risk groups (Tinuga and Conner 2022).

By contrast, South Africa and Kenya, two of the more resourced countries on the continent, did not have a clear deployment strategy when they received their first shipment of vaccinations. Eventually, South Africa and Kenya decided to focus on a vaccine delivery strategy that focused on work-based programs, outreach programs, which used mobile teams that moved between health-care facilities, and vaccination centers in rural and remote areas. In countries where there was limited or passive government activism on deploying vaccination plans, external actors such as the Tony Blair Institute, the US Agency for International Development (USAID), and UNICEF aided countries in vaccine quality control, strategic communication, and logistics and supply chain management.

While procurement was one of the central impediments to vaccine deployment on the continent, "vaccine hoarding" by the United States, Canada, Germany, and others also impacted the supply of vaccines on the continent. Vaccine manufactures worked with wealthy countries to supply them with over 70% of the global vaccine distribution (Ndlovu 2021). Specifically, in July 2020, wealthy countries were competing for access to candidate vaccines against the coronavirus that were either in development or at the clinical trial phase (Bollyky and Brown 2020). Criticisms against vaccine hoarding and "vaccine nationalism" became a key rallying cry for many African leaders at the AU and in health ministries across the continent, as they collectively sought out collective responses to the pandemic. AU actors in particular referred to vaccine hoarding as another form of systemic exclusion of African citizens from access to global public goods—a refrain reiterated by the director general of WHO and by the United Nations secretary general.

Beyond the challenges that African countries faced in manufacturing and procurement, the AU faced challenges in managing the pandemic as well. Initial responses to the pandemic by Africa CDC focused on harmo-

nization and coordination—with the aim of leveraging continental expertise in epidemic response (Patterson and Balogun 2021). Though Africa CDC was established in 2016 and operational in 2017, the COVID-19 pandemic forced the AU to accelerate its capacity to assist member states. Perhaps its best human resource was Director General John Nkengasong. Dr. Nkengasong leveraged his experience and connections in the global health diplomatic space to ensure that Africa CDC was included in any multilateral or collective attempt at managing the pandemic. Dr. Nkengasong also realized the need to develop harmonized surveillance data at the national level while also implementing a community of practitioners that would meet weekly to determine best practices for managing the pandemic across the continent. Indeed, Dr. Nkengasong was a key catalyst in the Africa CDC response. He was, however, unable to overcome some of the embedded institutional challenges of the Africa Union broadly—how to disburse funds. As a result, Africa CDC did not have many of the bureaucratic resources in place to deal with the scale at which it was receiving cross-sector investment from the continent and beyond. One Africa CDC practitioner lamented that while donations from Mastercard Foundation and Western governments are welcome, it is more important to have people in the building "who know what to do with the funding." Another practitioner also stressed that there was a misperception of how many people are on hand to facilitate the work of Africa CDC.[3] Despite these institutional roadblocks, Africa CDC worked hard to urge African governments to manage the pandemic through collective action.

Why?

Africa CDC was instrumental in building partnerships with WHO and other private and public health stakeholders to ensure Africa's inclusion in the global vaccination campaign. What makes the AU's approach more comparatively distinct from other regional organizations is that it has an advantage of collaboration based on past responses to epidemics on the continent. For example, in West Africa, the Economic Community of West African States had been using its own specialized health agency, the West African Health Organization, to increase the region's health resiliency and capacity to respond to acute outbreaks, learning especially from the region's experiences during the Ebola outbreak in 2014–15 (Balogun 2021). What also makes the AU response comparatively different from other regions is its ability to translate the global goal of vaccination to a regional context and articulate it to its member states (Amaya and De Lombaerde 2019). This resulted in governments' collaboration of networked partnerships with civil society and research teams to facilitate national vaccination ad campaigns.

One notable example of this vertical translation from the global to the

regional to the national is the partnership between the Nigerian Ministry of Health and Breakthrough ACTION, an eight-year cooperative agreement funded by USAID and a partnership led by the Johns Hopkins Center for Communication Programs in collaboration with Save the Children, ThinkPlace, ideas42, Camber Collective, the International Center for Research on Women, and Viamo. In conjunction with this campaign, the Nigerian government created the COVID-19 Crisis Communication Centre, which worked with the West African Health Organization to scale up the COVID-19 vaccination rate to over 50% by December 2022. During the vaccination campaign, the prevalence and mortality rate of COVID-19 decreased from 60% to 39% (Ogunniyi et al. 2023).

Despite the regional efforts to mainstream vaccine usage in Africa, national governments still had two significant hurdles in achieving their goals: access to vaccines and civilian trust. In addition to low vaccine coverage and production, vaccination rates were impacted by "vaccine hesitancy." Across the continent, citizens either delayed or refused to accept the COVID-19 vaccine. For example, in May 2021, Malawi publicly burned nearly 20,000 AstraZeneca vaccines in an effort to reassure citizens that they would not receive tainted or expired vaccines. A study on public attitudes toward COVID-19 vaccines in Africa found that common reasons for refusing the vaccine included concerns over the quality of the vaccines distributed in Africa, lack of sufficient clinical trials, fear of vaccine side effects, and belief that their immune system is sufficient to fight the virus (Ngangue et al. 2022).

Vaccine hesitancy has deep historical roots in the region, which stems from its cultural and historical context influenced in no small way by colonialism and proven vaccine research abuse. This has led to rumors of the region being used as a "testing ground for vaccines" (Archibong and Annan 2021) and has had an effect on the uptake of other vaccines, including the polio and human papillomavirus vaccines. Another study looking at the influence of trust in six sub-Saharan African countries (Ghana, Kenya, Nigeria, South Africa, Tanzania, and Uganda) found, perhaps unsurprisingly, that individuals with low levels of trust in the national government, pharmaceutical companies, and society were more likely to be vaccine hesitant, with lack of trust in government being a higher predictor of hesitancy. Interestingly, trust in national media and science wasn't found to be a reliable predictor of vaccine hesitancy (Unfried and Priebe 2024).

Reliable funding also remains a significant problem curtailing the work of Africa CDC, which is still primarily externally funded by high-income countries, foundations, such as the Bill and Melinda Gates Foundation, and private companies. Tied funding can limit the independence of the AU and lead to conflicts of interest when private interests do not match the goals of the institution. This was exemplified when several

pharmaceutical companies attempted to stop the establishment of the first mRNA vaccine technology transfer hub in South Africa (Davies 2022). The AU is aware of these limitations and has sought to mobilize more domestic funds from their member states.

Nonetheless, since the pandemic, the region has moved to harmonize and streamline processes throughout the region, for instance, through the African Medicines Agency treaty (Ncube et al. 2021), and has collaborated with other regions on mRNA vaccine technology transfer through Afrigen (Maxman 2024). These types of partnerships are important catalysts to deepen harmonization and collaboration in health diplomacy and governance. These partnerships are also important for Africa as they help respond to critical capacity issues that have plagued previous regional responses to health outbreaks. More importantly, they demonstrate how the African Union actively determines their own priorities and partnerships rather than passively relying on external actors to provide solutions on the continent.

Conclusions

The response to COVID-19 in the African region was plagued by structural, institutional, and financial problems. However, in contrast with other regions in the Global South, the AU emerged from the pandemic as a credible mobilizer for its member states and a reliable international partner.

Several factors contributed to the AU's relative success in convening a regional response to address COVID-19. First, it benefited from the experience of previous disease outbreaks that required international cooperation and strengthened its institutional capacity to prepare and respond to disease outbreaks. In that sense, the region was already on high alert for any possible epidemics and had developed mechanisms for interregional cooperation.

Second, the region had a clear champion in Dr. Nkengasong, who was seen as a reliable partner within the region as well as internationally in the response. He was able to keep Africa high on the agenda for international actors and bring together a community of practitioners to strategize on how to best manage the response. Although this was taking place in an environment of significant global inequities in the distribution of vaccines and supplies, the attention that was placed on the region allowed the member states to see the value of resource pooling and of the AU more generally. Relatedly, although there are various subregional organizations in Africa, it is important to note that during the COVID-19 pandemic, these organizations, and the member states more generally, primarily put their support behind the AU.

The results of these efforts post-pandemic have been greater support

from member states to the AU; further involvement of the AU in global health discussions, for example, through their inclusion in the Group of Twenty (G20) as its 21st member in 2023; and global calls for regionalizing pandemic prevention, preparedness, and response based on the experience of the AU's role in representing its member states under one voice during a health emergency—scenarios that would have been unlikely 10 years ago.

While these outcomes have clear African characteristics and were the result of many years of setting the groundwork for collaboration in the region, they illustrate some important lessons for other regions in the Global South—namely, the importance of developing mechanisms for regional cooperation to prepare for and respond to disease outbreaks and pandemics before these occur; the need to train or prepare regional "champions," or health diplomats, who can navigate the complexities of the global governance of health; and the need to generate trust among member states of their regional organizations as effective agents for pooling efforts and representing regional needs. The latter is perhaps the most complex to achieve but is crucially important, so that the Global South can fare better when the next pandemic takes place.

NOTES

1. Author interview, Addis Ababa, Ethiopia, May 2023.
2. Author interview, Africa CDC official, Addis Ababa, May 2023.
3. Author interview, July 2022.

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27 | COVID-19 Vaccination in Ghana

Between National Efforts and Global Dynamics

Kofi Takyi Asante

COVID-19 uncovered the "hidden" links between national-level efforts and the geopolitical structures that affect the ability of developing countries to effectively respond to crises. The Ghanaian government earned international praise for the proactive measures it took in 2020 in response to the pandemic outbreak.[1] The following year, the country again mounted a well-coordinated mass vaccination campaign. I argue in this chapter that Ghana's strong performance in the vaccine rollout was partly due to the existence of "residual capacity" in the public health system. The concept of residual capacity has emerged to explain the ability of public sectors to overcome weak state capacity by activating "dormant" structures and resources in response to emergencies. However, residual capacity becomes increasingly inadequate over a protracted crisis and, thus, cannot be a substitute for the "routine" or "core" capacity that is essential for long-term public sector effectiveness (Asante 2025). This is what happened in the course of Ghana's pandemic response in 2020—the limits of residual capacity became increasingly apparent as the vaccine rollout unfolded over two years and pandemic fatigue set in (Dube and McDonald 2022). This was further compounded by the constraints imposed by the global dynamics that shaped developing countries' access to, and citizens' attitudes toward, the vaccines.

Drawing on secondary sources like policy statements, news articles, and study reports, I lay forth a two-tiered analysis consisting of a narrow lens—focusing on national-level factors—and a broad lens—focusing on the geopolitical factors—to explain how and why Ghana's vaccine rollout unfolded the way it did. Using the narrow lens, I argue that Ghana was able to achieve qualified success in its vaccine rollout by leveraging residual capacity to develop a robust vaccine deployment strategy that addressed deficiencies in the public health system. Specifically, the vaccine deployment plan leveraged personnel, equipment, and knowhow from previous years' mass immunization campaigns and developed flexible approaches targeting hard-to-reach populations (Amponsa-Achiano et al. 2022). The rollout was strengthened by consensus among the national elites about

the need for comprehensive vaccine coverage and the absence of a mobilized vaccine-hesitant community.

However, beyond this narrow lens, the chapter also uses a broad lens to put the country's vaccine rollout within the geopolitical context in which monopoly capitalism and vaccine hoarding/nationalism impeded the country's initial vaccine deployment plan (Atinga et al. 2022). The insistence on patent rights by pharmaceutical companies exposed the preference for profits over global public health concerns. This, in turn, undermined messaging about the need to combat the pandemic through vaccinations and added further fuel to the flames of vaccine-hesitant narratives that at this point had been set ablaze.

Overall, this chapter contributes to a growing body of COVID-19 scholarship "that takes politics as a serious focus" (Greer et al. 2020: 1413) by investigating how state action affected the trajectory of the pandemic (Asante 2022; Gisselquist and Vacarro 2022; Greer et al. 2020, 2021). The rest of the chapter proceeds as follows: The second and third sections provide an account of Ghana's vaccine acquisition and deployment processes, respectively. The fourth section explains the factors that shaped the rollout and its subsequent trajectory. The last section concludes the findings of the chapter.

Ghana's Vaccine Acquisition Efforts

Ghana's vaccine acquisition efforts started early. In May 2020, President Akufo-Addo joined other world leaders and global figures to sign the "UNAIDS Public Letter on People's Vaccine" as part of a campaign to make the vaccine accessible to all. The letter appealed that "when a safe and effective vaccine is developed, it is produced rapidly at scale and made available to all people, in all countries, free of charge."[2] It emphasized the need to place global public health above "the interests of the wealthiest corporations and governments" and expressed concern about the potential for "monopolies, crude competition and near-sighted nationalism to stand in the way."

The government took other steps to secure access to the vaccines and to prepare for a mass vaccination program. At the core of these efforts was the setting up of an interagency technical team tasked with procurement and deployment. The president subsequently announced at the University of Ghana's 2021 New Year School that the government was ready to begin engagements with vaccine manufacturers.[3] However, this would turn out to be more complicated than anticipated, and the fears expressed in the "People's Vaccine" letter proved prescient when mass COVID-19 vaccine rollouts got underway with grotesque disparities between the West and the rest of the world (see fig. 27.1). This was due largely to the problem of vaccine hoarding by wealthier countries (Atinga et al. 2022; Hagan 2023).

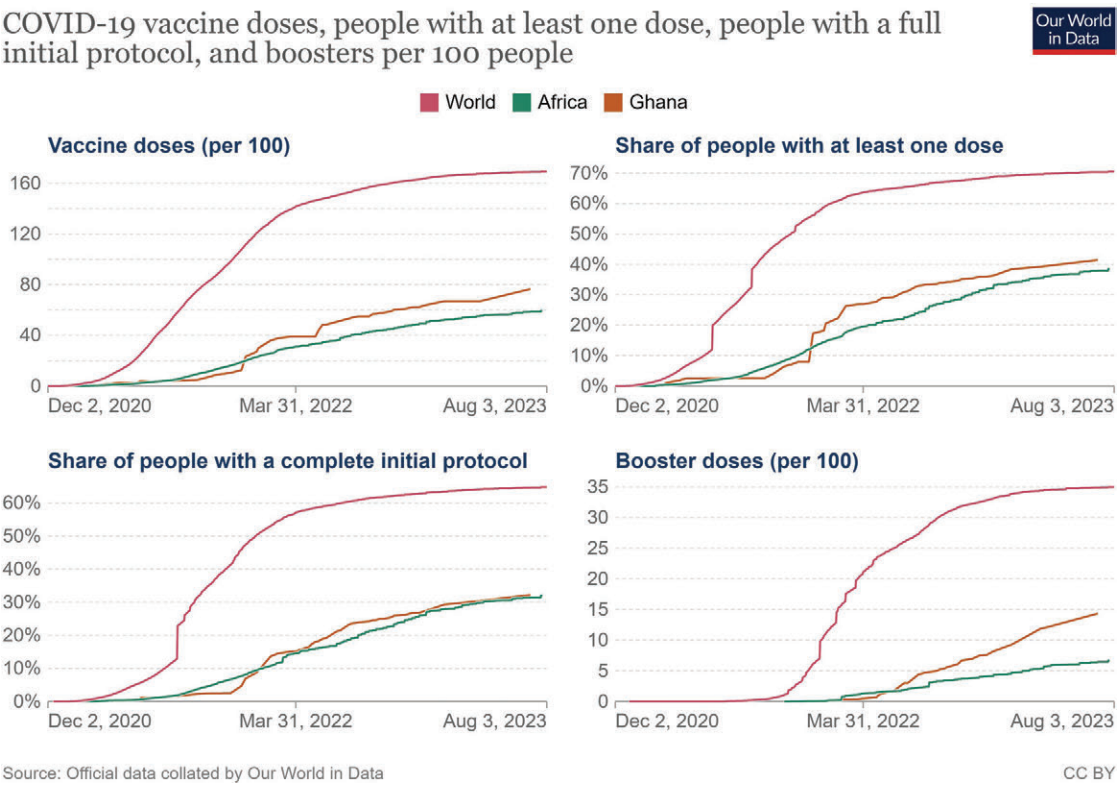

Fig. 27.1. COVID-19 vaccine doses, people with one dose, people with a full initial protocol, and boosters per 100 people

In a series of televised addresses between December and February, the president updated the country on efforts to acquire the vaccines and took great pains to stress that the vaccines were safe and effective.[4] The government set an initial target of vaccinating 20 million people as part of its larger vision of getting the entire population vaccinated. To meet this goal, it made frantic efforts at both bilateral and multilateral levels. In addition to COVAX, the government opened discussions with the embassies of vaccine-producing countries, including China and Russia, "to see what they can do as quickly as possible to ensure that we are able as a country to procure vaccines."[5] Additionally, the Cuban Centre for State Control of Drugs and Medical Devices, which had signed a memorandum of understanding with the Ghana Food and Drugs Authority (FDA) to deepen bilateral cooperation on public health matters, held a follow-up meeting in February 2021 to brief the Ghanaian partners on progress with Cuba's Soberana 02 vaccine, which had then progressed to phase 3 trials.[6] The Cuban government also offered to transfer the vaccine technology to Ghana through an agreement with Ghana's pharmaceutical industry for local vaccine production.[7]

On the international front, Ghana's Ministry of Health was part of efforts by the West African Health Organisation and the Africa Centre for Disease Control and Prevention (Africa CDC) to procure vaccines for member states.[8] The African Union was expected to secure 270 million doses for the continent, in addition to an initial pledge of 600 million doses.[9] The government also tried to secure access through the private sector and international civil society organizations "like the Tony Blair Foundation which is also helping us to get some of the vaccines from the UK."[10] The health minister and other senior government officials were "at the forefront of establishing agreements with vaccine manufacturers, COVAX and multinational agencies for the procurement and supply of vaccines" (Atinga et al. 2022: 8). The government expected that these engagements would enable the country to secure 17.6 million vaccines by June 2021.[11]

The government was constantly under pressure from national elites to do even more to ensure greater access to the vaccines. For example, a researcher at the influential Ghana Centre for Democratic Development admonished the government to explore all options and secure access to as many vaccines as possible.[12] Members of the opposition National Democratic Congress also insisted on the need for expanded coverage for the vaccine rollout.[13] In May 2021, a member of Parliament expressed alarm and regret about the struggle of African countries to secure access to the vaccines: "We sit on a time bomb. Just look at COVID-19 and how this whole continent was found wanting and miserable and looking as beggars hoping that somebody would bring us vaccines" (cited in Atinga et al. 2022: 5). As such, there was an absence of vaccine-skeptical messaging in high-level public discourse, unlike the case in the United States and other Western countries.

On February 19, 2021, the Ghana FDA gave emergency use authorization (EUA) to the Covishield (AstraZeneca by the Serum Institute of India) and Sputnik V vaccines.[14] By July 2021, four more vaccines had been issued EUAs, namely, COVID-19 Vaccine Janssen, Pfizer-BioNTech's Comirnaty, Moderna's Spikevax, and Vaxzevira (previously COVID-19 Vaccine AstraZeneca).[15]

COVID-19 Vaccine Rollout in Ghana

The country's vaccine deployment plan was developed by the National Immunisation and Technical Advisory Group (NITAG) at the instance of the Inter-Ministerial Coordinating Committee, which had been in charge of the country's response efforts since the outbreak of the pandemic. The WHO Strategic Advisory Group of Experts on Immunizations provided technical guidance for the development of the deployment plan (Amponsa-Achiano et al. 2022). The program manager of the Expanded Programme

on Immunisation (EPI) of the Ghana Health Service estimated that the National Vaccine Deployment Plan (NVDP) for COVID-19 would cost close to $52 million.[16]

Health sector officials announced that the first batch of vaccines would arrive in the first quarter of 2021 through the COVAX Facility. In anticipation, the government outlined its mass vaccination strategy, which was initially designed to be rolled out in phases between March and October 2021.[17] The phasing was based on the spatial concentration of infections and population vulnerability. Based on these considerations, it was decided that vaccinations would begin in Greater Accra and Ashanti because of the high infection rates in these regions.[18] The deployment plan divided the population into four categories for prioritization based on the burden of infections and deaths (Amponsa-Achiano et al. 2022). The first category included health workers, the elderly and people with underlying health conditions, members of the arms of government considered to be on the front line, and some prominent public figures like religious and traditional leaders. The composition of the other groups was as follows:

> Group 2 is made up of other essential service providers and the rest of the security agencies. . . . Group 3 consists of the rest of the general public, that is all persons over eighteen (18) years, except for pregnant women. The final group, that is Group 4, will include pregnant mothers and persons under the age of eighteen (18), and they will be vaccinated when an appropriate vaccine, hopefully, is found, or when enough safety data on the present vaccines is available. Special arrangements will be made for persons with disabilities who fall within these groups.[19]

According to the deployment plan, the 600,000 doses expected from the first COVAX shipment would be administered only to members of the first two groups.[20] Thereafter, the mass vaccination campaign would be expanded to include the other groups when the country secured more vaccines doses. Leading members of the opposition party criticized officials involved in planning the rollout for lacking enough details to keep the public fully informed about the rollout. For instance, a former minister of communications expressed shock at the announcement by the Ghana Standards Authority director general that some segments of the population, like pregnant women and persons with allergies, would be excluded from the vaccine rollout until further tests are conducted; he rhetorically asked, "Why must mother Ghana deprive people with underlying medical conditions and the aged protection if there are no contraindications (i.e. medical reasons not to give the vaccine)?"[21] Thus, while leaders of the two leading political parties differed on the strategy for the vaccination campaign, the necessity for the vaccination was not in doubt among them.

The vaccination campaign would involve the deployment of 12,471 vaccinators, 37,413 volunteers, and 2,079 team supervisors for the two rounds of vaccination.[22] A simulation exercise conducted by the Technical Working Group for Health Technology Assessment of the Ministry of Health estimated that the total cost for the vaccine rollout was between $348.7 million and $486.1 million (Nonvignon et al. 2022). However, the government was not expected to fully bear the entire cost of the rollout. Eight million free vaccines were expected to be delivered by COVAX and the African Union, leaving a deficit of 12–13 million that the country would need to purchase.[23]

As part of its pandemic communications strategy, members of the government held a series of media engagement events to inform the public about its mass vaccination plans. On 19 February 2021, multiple government agencies, including the Ministry of Health and the Ministry of Information, organized a public engagement on the vaccination rollout plan that was broadcast live on radio, television, and the social media handles of the Ministry of Information. In addition to informing the public, government officials also sought to assuage apprehensions about the vaccine and assured the public that a safety surveillance system had been set up to detect and manage adverse effects from the vaccination in any part of the country. They also stressed the need for the country "to break the coronavirus transmission chain through vaccination."[24] Government spokespersons repeatedly emphasized the policy that the vaccines would be administered for free. The presidential adviser on health stated that the government did not "want money to be a barrier" and noted that even though private health facilities would be used as vaccination centers, people who went there for the vaccine would not be charged for it.[25]

The president himself played a key role in addressing apprehensions about the vaccine. In a nationally televised address on 28 February 2021, he acknowledged that "there are still some who continue to express doubts about the vaccine," with worries ranging from the efficacy of the vaccine to "conspiracy theorists who believe the vaccine had been created to wipe out the African race."[26] To allay such fears, he pointed to the stellar reputation of the Ghana FDA and expressed confidence that they had done a thorough job before approving the vaccines.[27] The FDA also issued a fact sheet responding to the most frequently asked questions about the safety of the vaccine.[28]

On 24 February 2021, the country took delivery of a shipment of 600,000 doses of Covishield vaccine from the Serum Institute of India through the COVAX Facility to much international fanfare. The event was described as historic because Ghana was the first to receive COVAX vaccine shipments.[29] A joint statement by the UNICEF and WHO representatives to Ghana hailed the arrival as "a momentous occasion" and re-echoed the government's assertions that "the only way out of this crisis is to ensure that vaccinations are available for all."[30] The president gave assurances

TABLE 27.1. Performance of Phase 1 COVID-19 Vaccine Deployment, Ghana (March 1–August 23, 2021)

Phase	*Start date*	No. regions	No. districts	Target segmentation	No. doses administered
Phase 1A	2021 Mar. 1	3	43	Most at-risk groups in 43 hotspot districts	535,408
Phase 1B	2021 Mar. 24	13	217	All health-care workers	316,639
Phase 1C	2021 May 19	3	43	All persons vaccinated in phase 1A during March 1–9, 2021 (12 weeks after first dose)	380,829
Phase 1D	2021 June 20	16	260	2021 census enumerators (1st dose) and 2nd dose vaccinations in selected districts	65,034
Phase 1E	2021 Aug. 13	3	11	General population in selected areas	126,178
Total					1,424,088

Source: Amponsa-Achiano et al. (2022), S235.

that this shipment was "the first consignment of many more to come" and that "preparations are being made for the vaccination of twenty million Ghanaians" down the line.[31]

The mass vaccination campaign kicked off on 2 March 2021, one week after the arrival of the vaccines. To boost public confidence in the vaccines, the president and vice president, along with their spouses, took their shots on live television.[32] Other members of the government and high-profile personalities including traditional and religious leaders were also publicly vaccinated for the same purpose.[33] Outreach teams also visited local markets, lorry parks, and places of worship to conduct sensitization campaigns.[34] As stipulated in the NVDP, the rollout was done on the bases of population and geographic segmentation (Amponsa-Achiano et al. 2022). Using this segmentation approach, over 1.4 million people were vaccinated during phase 1 (1 March–23 August 2021) of the vaccination drive (table 27.1).

The Strengths and Limits of Residual Capacity

Undertaking nationwide vaccination requires high state capacity, a well-resourced public health system, and multilateral cooperation (Adeshina

et al. 2023: Osei et al. 2019; Williams et al. 2021). Initial assessments of what it takes to successfully deploy the COVID-19 vaccine clearly indicated that Ghana's poorly resourced health sector was ill-equipped for the task:

> Countries must scale up research on vaccine effectiveness, prioritise funding for and access to efficacious vaccines, strengthen high-quality and large-capacity storage and infrastructure, maintain efficient cold chain, ensure effective pharmacovigilance, and address vaccine hesitancy while identifying priority populations for vaccination. Effective health communication and intensive community engagement are needed to convey accurate information and facilitate optimal vaccine uptake. (Nachega, Sam-Agudu, Masekela, et al. 2021: e746)

Given the reality of the country's frail health sector, the NVDP drew lessons from recent mass vaccinations for yellow fever and polio in order to anticipate and address challenges that could potentially hamper the smooth rollout of the COVID-19 vaccines. Many of the anticipated challenges were factored into the microplanning for the vaccination rollout. First, as mentioned above, the NITAG, which led the development of the NVDP, commenced collaboration with the FDA early to build up regulatory preparedness and put in place systems for monitoring and reporting (Amponsa-Achiano et al. 2022).

Second, the task force recognized that a mass vaccination campaign on the scale planned for COVID-19 was a monumental undertaking. While the country had experience with successful mass vaccinations of infants, a campaign to vaccinate the adult population could raise many unanticipated logistical and personnel issues (Nonvignon et al. 2022). Moreover, the nature of the vaccination (injections rather than mouth drops) required highly trained field personnel (Nonvignon et al. 2022). To resolve these issues, the planning task force engaged the Field Epidemiology and Laboratory Training Program for the deployment of residents and alumni of the program as surge staff, which had proved successful in previous vaccination campaigns. The agencies represented on the NVDP task force also provided officials who served as support staff during the monitoring activities (Amponsa-Achiano et al. 2022).

Third, effective vaccine management is of particular concern given the multiple bottlenecks along the vaccine supply value chain. A study conducted in the Tolon District of the Northern Region that assessed six vaccine stores using WHO assessment tools and procedures reported that none of the facilities met the WHO minimum target on all but one criteria (Osei et al. 2019). Maintaining a cold chain throughout the supply chain is a difficult problem that is further compounded by the country's sometimes unreliable access to electricity (Osei et al. 2019; Asamoah et al. 2021). This was an important issue given the ultra-cold storage needed for

the mRNA vaccines. To fill this serious logistical gap, Ghana got support from Gavi, the Vaccine Alliance, to revamp the country's cold chain. While this provided a stopgap measure in the face of the urgency of the vaccination rollout, the NVDP task force observed that there were still unresolved long-term challenges relating to the expansion of cold chain capacity as well as the need for "additional resources to transport vaccines to other parts of the country while maintaining the cold chain," owing to the unequal distribution of facilities at the subnational levels (Amponsa-Achiano et al. 2022: S236).

Fourth, the wide variation in access to public health services across the country was another serious challenge identified by the planning task force (Asante 2022; Nonvignon et al. 2022). In addition to the inequitable distribution of health-care facilities, many deprived communities are geographically difficult to access (e.g., located in mountainous areas, beyond lakes, etc.) (Amponsa-Achiano et al. 2022). To address issues that could potentially arise from the uneven geographical distribution of health facilities, the NVDP developed three rollout modalities as follows: (1) "fixed sites with cold-storage"; (2) "campaigns at fixed sites with no cold-storage"; and (3) "remote Outreach & Mobile sites requiring overnight, multiday outreach" (Nonvignon et al. 2022). In previous mass vaccination campaigns, about 10% of the target population in these areas could not be covered. To address this challenge, the task force extended the vaccination period in these areas by one week (Amponsa-Achiano et al. 2022). These strategies were largely successful in that they "helped reduce the time for vaccine deployment for COVID-19 by ~50% and ensured equity in vaccine distribution in rural, urban, and hard-to-reach communities within earmarked regions and districts" (Amponsa-Achiano et al. 2022: S236).

However, other challenges were less tractable. This was particularly the case for reliable access to the vaccines, which disrupted the NVDP. The second dose, which was scheduled to be administered eight weeks after the first jab, was modified due to the shortage, drawing sharp criticisms from the opposition party, who challenged the basis for modifying the dosing regime and worrying "that the delay provided incentives for people to trade off the first jab or receive unauthorized jabs to remain protected" (Atinga et al. 2022: 6). By November 2021, 7% of the target population had been fully vaccinated while 21% had only received one dose (Reuters, 28 November 2021).

By the time global supplies of the vaccines began easing up, the initial public enthusiasm about the vaccines had worn thin, partly because the vaccine nationalism and hoarding by Western countries undermined WHO messaging that equal access to the vaccine was necessary to break the chain of infections. Consequently, the government then resorted to increasingly stringent measures to enforce uptake, including the imposition of mandates on selected categories of persons and the requirement

of proof of vaccination to access certain social venues (Reuters, 28 November 2021; Addadzi-Koom 2022). In addition to the mandates, the government also tried to reignite enthusiasm by embarking on a mass vaccination drive in December 2021 (Reuters, 28 November 2021). Dubbed National COVID-19 Vaccination Day, and later extended to cover the whole month, the drive achieved moderate success. By mid-January 2022, 15.7% (9.3 million) of the eligible population of 17.5 million people had completed the primary schedule (Nonvignon et al. 2023).

Before the end of 2022, the number of administered doses had increased to over 21 million,[35] and by January 2023, 31% (9.8 million people) of the national population was fully vaccinated while 70% (12.9 million people) had received at least one dose. While it was a sign of the success of the various strategies adopted to improve uptake, this figure was just over half of the target of 18.2 million estimated for reaching herd immunity (Andoh 2023). The president declared an end to the country's COVID-19 emergency status on 28 May 2023.[36] By 30 June 2023, 25.7 million doses had been administered, of which 10.8 million persons had been fully vaccinated. Thus, the country was able to attain 59.3% of its target of fully vaccinating 18.2 million people. The following were the vaccines administered during the rollout: AstraZeneca, Sputnik V, Moderna, Pfizer-BioNTech, and COVID-19 Vaccine Jannsen.[37]

The challenges involved in securing access to the vaccines seemed to have impressed upon the political leaders the urgency of acquiring national production capabilities in vaccine manufacturing, as reflected in a parliamentarian's description of the country's lack of access to the vaccine as "a ticking time bomb" (cited in Atinga et al. 2022: 5). In February 2021, the president announced the establishment of a committee to formulate an action plan for local vaccine development and production.[38] The committee's work led to the establishment of the National Vaccine Institute, created by an act of Parliament. The institute subsequently received seed funding of $25 million from the European Investment Bank. Construction of the manufacturing plant, the first phase of which is estimated to cost $122.6 million, started in April 2023.[39]

Two Perspectives for Understanding Ghana's Vaccine Rollout

A complete assessment of Ghana's vaccine deployment needs to adopt both narrow and broad lenses. From the narrow point of view, the country's vaccine deployment was a qualified success. The original goal was to vaccinate everyone eligible—that is, persons aged 18 years and older who were not pregnant—in 2021. However, this was delayed to 2022 in light of the country's struggles to gain access to sufficient vaccine doses (Nonvignon et al. 2022: 1881). The scope was also scaled down from the initial target of the entire eligible population to 18.2 million people. By 30 June

2023, a month after the president declared the end of the COVID-19 emergency, the country had attained 59.3% of the revised target.[40]

The government approached the vaccine rollout with commendable proactivity. The president displayed some foresight by joining early global advocacy to make vaccines accessible to all. The group tasked with developing a rollout plan was composed of experienced public health experts. The task force was able to overcome most of the country's health sector weaknesses by leveraging the system's residual capacity, which refers to the "rapid mobilisation of pre-existing as well as ad hoc structures in response to crises" (Asante 2025). For the NVDP, residual capacity came from the lessons, resources, and infrastructure from previous years' mass vaccination campaigns. Specifically, the EPI "structures used for polio and yellow fever vaccine deployment and lessons learned from these previous campaigns were leveraged to quickly deploy COVID-19 vaccines in Ghana during March 1–August 23, 2021, regardless of the short shelf-life of vaccines received (1–3 months)" (Amponsa-Achiano et al. 2022: S233). In spite of the short shelf life of the vaccines, the deployment recorded "<5% vaccine wastage" (S237).

Proactive action by policymakers and stakeholders in the vaccine deployment program helped to anticipate and respond in a timely manner to implementation challenges. The identified areas of weakness were quickly remedied to the extent that the country's circumstances allowed. Taking all the contextual factors into account, this can be considered as a modest success even though the country only succeeded to meet half of its target. Part of the reason for the country's vaccination outcome was that, unlike the case in the West, Ghana did not have a visible and mobilized community of vaccine skeptics before the outbreak of COVID-19. As such, vaccine hesitancy did not become a wedge issue. In fact, political opponents who criticized the government did so because they wanted the government to do more to secure more vaccines and to vaccinate more people. As such, even though vaccine hesitancy eventually emerged, political leaders from both sides of the aisle attempted to assuage those worries (Atinga et al. 2022).

From the broad perspective, however, the vaccine rollout was a failure that highlights both the limits of residual capacity and the constraints imposed by the geopolitical context within which the vaccination campaigns were undertaken across the world. Far from being unique or arising from domestic shortcomings, Ghana's failure was the logical outcome of "twenty-first century capitalism," which hampered the ability of even powerful and well-resourced countries from adequately responding to a global crisis that required proactive and agile state action (Sell 2020; Wolff 2020). Among many reasons for the failure, a variety of structural barriers imposed significant constraints on access to the vaccines. The apparent reluctance of rich vaccine-producing countries to expand access to the vaccines (Hagan 2023; Ojong and Agbe 2023) belied continued messaging

by WHO and other multilateral agencies that "no one is safe until everyone is safe. . . . Multilateral collaboration is the best way to defeat this pandemic."[41]

There were serious lapses in the delivery of vaccines to poor countries via COVAX, and the scheme failed to meet its own projection for 2021 (Puyvallée and Storeng 2022). A year later, it had still only delivered 1 billion doses by January 2022 and 1.8 billion doses by November 2022.[42] This deficit, caused in part by the failure of donors to honor their pledges to the COVAX Facility (Puyvallée and Storeng 2022), prompted sharp criticisms by the AU special envoy on COVID-19, who insisted that had COVAX communicated to the body about its struggles to make timely deliveries, "we may have acted very differently," that is, relied on regional structures rather than COVAX.[43]

Highly unequal access to medical treatment and therapies is a longstanding global health issue (Sambala and Manderson 2017). African countries "face issues with reciprocation after vaccine trials are done among their populations," including refusal to devolve vaccine manufacturing locally (Nachega, Sam-Agudu, Masekela, et al. 2021: e746). In that sense, COVAX's struggle to meet its target was only the most recent iteration of historical trends and was "reminiscent of concerns raised about responding to the HIV pandemic in the mid-1990s and early 2000s, when highly active anti-retroviral treatment (ART) was accessible in high-income countries but had limited availability in African countries" (Nachega, Sam-Agudu, Mellors, et al. 2021: 196). However, the problem was further compounded by the fact that unlike the case of the ARTs, where lack of funding was the main barrier, access to the COVID-19 vaccines was obstructed by a combination of vaccine hoarding, on the one hand, and pandemic profiteering via the insistence by pharmaceutical giants to hold onto their patents, on the other hand (Hagan 2023; Puyvallée and Storeng 2022; Ojong and Agbe 2023).

Under these conditions, low- and middle-income countries (LMICs) found themselves locked out of the global vaccine markets due to advance purchasing agreements signed by Western countries during the vaccine rush that started back in 2020. To compound matters, the vaccines were being sold to poorer countries at costs two to three times higher than wealthier countries (Hagan 2023). In February 2021, Ghana's foreign minister designate, Shirley Ayorkor Botchway, told Parliament that "because vaccines have become such a hot commodity, even if you have money it is difficult to procure" and that the government was scrambling to secure access through its bilateral and multilateral ties.[44]

The global vaccine shortage was not an accident. As Sell (2020) argues, the shortage of personal protective equipment, ventilators, and other medical supplies since the start of the pandemic was a logical outcome of "twenty-first century capitalism," key features of which include "the outsized role of intangibles in the global economy (e.g., intellectual property,

services, financial instruments such as derivatives and securities), the rise of financialization, the quest for profits over economic growth, and the pursuit of competitiveness—not competition—in global markets" (Sell 2022: 150). In other words, this mode of capitalist accumulation involves a shift from production to an emphasis on rent seeking via acquisition of "smaller, more innovative companies . . . in order to quash the potential competition and maintain the larger firms' higher prices" (151).

The vaccine shortage, in turn, provided further opportunities for rent-seeking behavior by the leading vaccine manufacturers, including their imposition of draconian purchasing agreements on countries seeking to buy the vaccines (Hagan 2023). First-world leaders failed to intervene to make their pharmaceutical companies suspend intellectual property rights to the vaccines that would have enabled the production of cheaper generic versions of the vaccine (Hagan 2023). Added to the rush by Western countries to preorder all available vaccines, the stark picture that emerged at the commencement of the global vaccine rollout was one of a veritable public health arms race in which poor countries were sidelined even as global health experts repeatedly warned that universal vaccine coverage was necessary to end the pandemic.

The wave of vaccine hesitancy that emerged in the course of the vaccine rollout in Ghana and other poorer countries was partly fueled by this geopolitics of vaccine access. Studies conducted in 2020 and early 2021 showed that vaccine acceptance was quite high across Africa and other poorer regions prior to the commencement of vaccine deployment (Kanyanda et al. 2021). However, the extreme barriers to access undermined messaging by WHO and other global health experts who repeatedly insisted on the need for universal vaccine coverage. The delay in vaccine acquisition created room for the proliferation of vaccine-skeptical messaging. As argued by Attwell et al. (2022: 576), "If governments fail to reach people promptly with easy-to-get vaccines and clear encouragement, other messages fill the void and people are likely to grow more worried about getting vaccinated" (see also Okai and Abekah-Nkrumah 2022). Confidence in the vaccine was further undermined by the refusal of the European Union Digital COVID Green Pass to recognize the COVAX vaccines shots as meeting vaccination requirements.[45]

Conclusion

I have argued in this chapter that an analytical framework consisting of narrow and broad lenses is necessary to explain country-level COVID-19 vaccine deployment. Using this framework, I have demonstrated that Ghana's fragile health system still possessed residual capacity that the government was able to leverage to design and deploy a robust vaccination campaign. The rollout also benefited from a strong elite consensus about

the need to achieve comprehensive vaccine coverage. Further, the absence of a mobilized vaccine-hesitant community meant that even though vaccine hesitancy eventually emerged, vaccine skepticism did not become a wedge issue, and political leaders from across the political spectrum contributed to efforts to boost confidence in the vaccines.

However, to account for how global vaccine supply shortages and geopolitical dynamics affected vaccine access, the broader lens is required. Even before human trials were concluded for vaccine candidates, geopolitical developments from the second half of 2020 indicated that access to the vaccines was going to be characterized by sharp disparities in access, as wealthy countries rushed to sign bilateral agreements with pharmaceutical companies to secure access for their populations. In the process, the COVAX Facility, which was designed as a mechanism to ensure that all countries had enough doses to vaccinate their populations, failed to meet its target and donors failed to deliver on their pledges to the scheme.[46]

Lessons for state building abound for Ghana and other LMICs from this bleak episode. Experiences from both the pandemic response in 2021 and the vaccine deployment in 2022 suggest that it is important to build core state capacity because residual capacity is not enough to tide a country over a protracted crisis. However, public sector reform efforts intended to build up capacity have failed to yield their desired outcomes due to the political logic that has emerged under Ghana's Fourth Republic (Asante 2023; Appiah and Abdulai 2017), characterized by what has been described as "strong democracy, weak state" (Resnick 2019). Under these circumstances, what the country needs is a stronger and bigger state, contrary to the neoliberal policy prescriptions continually pushed by its donors.

NOTES

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31. Communications Bureau (2021, January 31), *Update No 24: Measures Taken to Combat Spread of Coronavirus*, retrieved August 14, 2023, https://presidency.gov.gh/index.php/briefing-room/speeches/1865-update-no-24-measures-taken-to-combat-spread-of-coronavirus. A few days later, the presidential adviser on health also announced that the second batch of vaccines was expected within two weeks and that this was likely to "be a combination of what the government is buying directly and what we have also from COVID-19 Vaccine Global Access Facility (COVAX)"; 2nd batch of COVID-19 vaccines arriving in Ghana in 2 weeks (2021, February 27), *Graphic Online*, retrieved August 14, 2023, https://www.graphic.com.gh/news/general-news/ghana-news-2nd-batch-of-covid-19-vaccines-arriving-in-2-weeks.html?template=ghananewsh&is_preview=on

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28 | COVID-19 Vaccination in Malawi

How Inequity and Hesitancy Impeded Uptake

Karen Ferree, Sara E. Fischer, Kim Yi Dionne, and Boniface Dulani

Much attention in 2022 was focused on vaccine hesitancy in Malawi. This was appropriate, given that 7.5 million eligible Malawians were not vaccinated against COVID-19 as of December 31, 2022, when vaccines were widely available in health facilities across the country. As figure 28.1 demonstrates, the African region had lower rates of vaccination than the rest of the world and Malawi underperformed relative to other African countries. In this chapter, we provide background to and analysis of Malawi's experience with COVID-19 vaccines. We point to the broader global challenges for vaccine inequity, describe national-level policy approaches to vaccinate Malawians, and draw on survey data to report on patterns of vaccine hesitancy among Malawians.

Our examination of the Malawian case highlights three key lessons about the politics of vaccination. First, global and local inequities in vaccine access and distribution played outsized roles in limiting vaccine uptake in the early period after COVID-19 vaccines became available. The strong demand for vaccines outstripped supply in this early period, demonstrated by multiple vaccine stockouts in the country. Second, newspaper reports chronicling the vaccine stockouts highlighted how Malawian civil society organizations put pressure on the government to improve vaccine uptake, especially in increasing awareness and access in more remote parts of the country. Third, while initial demand outstripped supply, after vaccine availability improved in the later period, there was weak uptake; we analyze data from surveys of ordinary Malawians and find concerning trends, especially regarding how partisanship and other factors like gender, education, and rural residence may be influencing vaccine uptake.

Vaccines in Malawi

Malawi relied largely on AstraZeneca vaccines, although the country also administered Pfizer and Johnson & Johnson (J&J) vaccines. Malawi's first batch of 360,000 doses of the AstraZeneca COVID-19 vaccine arrived on

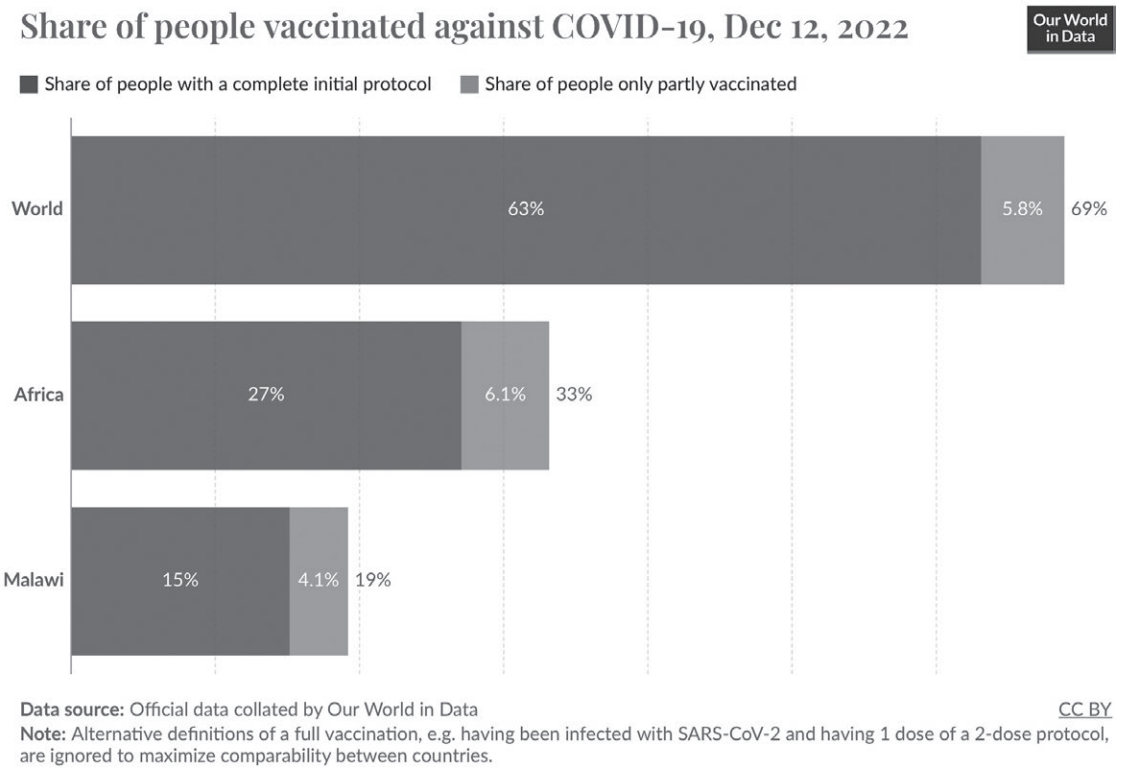

Fig. 28.1. Share of people vaccinated against COVID-19, December 12, 2022

March 5, 2021, procured through the COVAX initiative. COVAX is a collaboration between the Coalition for Epidemic Preparedness Innovations, the World Health Organization (WHO), and Gavi, an independent public-private partnership focused on immunization. These multilateral organizations created COVAX to promote equitable access to COVID-19 vaccines regardless of a country's ability to pay for them. COVAX failed to achieve equity, however, in the period shortly after WHO authorized vaccinations for emergency use. COVAX's lack of resources hampered COVAX-supported countries' access to vaccines, and this was particularly acute in Malawi. Compounding the problem was Malawi's early reliance on sourcing vaccine doses primarily from the Serum Institute in India, which faced supply challenges when a severe spike in COVID-19 infections in India in April 2021 reduced the already limited stock of vaccine doses (Paravicini 2021; Farge 2021; Mwale 2021; Buliyani 2021).

Malawi has long been dependent on donors (Wroe 2012), particularly in supporting the health sector (Dionne 2018), and the procurement of COVID-19 vaccines continued this legacy. In addition to vaccines received via COVAX, Malawi also received vaccine doses from bilateral and multilateral sources as well as from private foundations and businesses. For

example, in March 2021, the government of India donated 50,000 doses of AstraZeneca vaccines to Malawi (High Commission of India 2021). In the same month, COVID-19 vaccine doses were delivered to Malawi through an African Union (AU) program funded by a South African telecommunications company, MTN Group (Reuters 2021a). The World Bank, meanwhile, provided funding to the Malawi government at various points to facilitate the purchase of additional COVID-19 vaccines (World Bank 2021). Malawi's vaccination strategy relied heavily on donations, though after criticism from activists and civil society organizations, the government eventually reported it would spend "emergency funds" and funds it received from the World Bank to procure vaccine doses (Matonga and Mzale 2021; Buliyani 2021).

By July 2021, the Ministry of Health, through the Pharmacy and Medicines Regulatory Authority (PMRA), expanded the vaccine program beyond AstraZeneca doses to include vaccines manufactured by J&J, Pfizer-BioNTech, Sinopharm, Sinovac, and Moderna. Shortly thereafter, Malawi received a new batch of 302,400 doses of J&J vaccines from the US government via the COVAX Facility. By the end of 2021, alongside AstraZeneca and J&J, Malawi also received shipments of Pfizer vaccines.

Because the PMRA had only approved AstraZeneca and J&J vaccines for adults aged 18 and older, it was only after the arrival of Pfizer vaccines in late 2021 that Malawian children were able to be vaccinated against COVID-19. Although elsewhere Pfizer vaccines were approved for children as young as six months, Malawi authorities only authorized Pfizer for those aged 12 and above (Mkandawire 2021b). The availability of Pfizer vaccines thus made it possible for the Malawi government to extend its vaccination campaign to cover children in the 12–17-year-old range, thereby increasing the proportion of the population eligible to receive COVID-19 vaccinations. By the end of 2022, this policy of vaccinating only those Malawians aged 12 and above remained in place.

Through a series of press releases and social media posts, the Ministry of Health kept the public informed on doses received and available as well as any changes in vaccination policy. For example, during the 2021 and 2022 pushes for Malawians to complete the initial vaccination protocol (requiring two doses),[1] the Ministry of Health mandated a policy that people use the same vaccine brand for the second dose as they had received for the first. In August 2022, Malawi reversed its single-brand policy in favor of a "mix and match" policy between vaccine doses (Ministry of Health 2022).

Vaccination Chronology and Challenges

The government of Malawi created a National COVID-19 Preparedness and Response Strategy and Plan to guide overall response to the pan-

demic, which broke down the responsibilities for implementation by cluster (Republic of Malawi 2021; Dionne et al. 2021). Alongside this overarching plan and to more effectively distribute vaccines, the Ministry of Health also created a COVID-19 Vaccine Deployment Plan (Ministry of Health 2021a). The plan distributed responsibility across governmental levels: the National Taskforce, the Expanded Program on Immunization (EPI) subtechnical working group, and the Malawi Immunization Technical Advisory Group at the national level as well as the District Taskforces at the subnational level. These technical groups worked alongside a COVID-19 coordinator within the Office of the President and Cabinet and the Presidential Taskforce. There was also a Risk Communication and Community Engagement Committee put in place at the national, district, and community levels to coordinate and monitor communications, implementation, and monitoring.

Alongside the National COVID-19 Preparedness and Response Strategy and Plan, the government also created a COVID-19 Vaccine Social Mobilisation and Risk Communication Strategy in March 2021. Some of the major communications strategies included official press releases and media briefings; face-to-face orientation (for health workers and community leaders); radio programs and spots; community dialogues and theater; social media (e.g., WhatsApp groups and Facebook); communications through religious leaders, traditional authorities, and influencers; door-to-door and mobile van announcements; posters and pamphlets in public spaces and health facilities; and newspaper advertisements. General communication messages focused on positive experiences people have generally had with routine childhood vaccines; the managing of expectations about the effectiveness of the COVID-19 vaccine; who should get the vaccine and why; schedule and delivery mode; vaccine safety and efficacy; and dates and places where vaccines would be delivered (Ministry of Health 2021b). One COVID-19 vaccine communication strategy involved billboards featuring traditional leaders—also referred to as chiefs—encouraging Malawians to get vaccinated against COVID-19. This strategy was consistent with research findings from the GLD/IPOR and Afrobarometer surveys that showed high public confidence in traditional leaders (Logan 2009; Lust et al. 2020). This approach is also consistent with political science scholarship that has demonstrated that traditional leaders in Africa more generally, and Malawi in particular, are highly respected and serve as important social agents and important partners in development (Baldwin 2016; Logan 2009, Muriaas et al. 2018) and health (Dionne 2018; van der Windt and Voors 2020).

Malawi's COVID-19 vaccination campaign launched in March 2021. The rollout involved a phased approach that aimed to vaccinate 20% of the population, prioritizing health-care workers, followed by immigration officers, the Malawi Defense Force, prison warders, prisoners, teachers, the elderly (Malawians aged 60 years and older), and people with underly-

ing health conditions (World Health Organization 2022a). All other adults could seek vaccination after May 2021 when more vaccine doses were expected to become available (Sethy et al. 2022). President Lazarus Chakwera was the first to be vaccinated in the country, in an attempt to garner trust and demonstrate safety. Other public figures who received the vaccine during the launch event included Vice President Saulos Chilima, the United Nations resident coordinator in Malawi, the speaker of Parliament, the chiefs leading the Malawi Defense Force and Malawi Police Service, national religious leaders, traditional leaders, and several senior government officials (Chitsulo 2021a). By the end of the first week of the vaccine launch, 5,417 people had been vaccinated.

Malawi faced significant issues with vaccine supply, namely, delays in vaccine arrival and supplies that had quick expiry dates (World Health Organization 2022a). To put this in a global context, wealthier states in the West supplied their health-care workers and general populations with initial and booster vaccine doses while poorer countries like Malawi waited months to receive initial COVID-19 vaccine doses that had short expiry dates. As of April 2021, more than 80% of vaccines globally went to people in wealthy countries, compared to only 0.3% going to people in low-income countries (Harman et al. 2021). Figure 28.2 illustrates graphically how long Malawi waited before vaccines arrived, comparing it to the broader African region and the world. Some scholars and practitioners referred to this global vaccine inequity as "vaccine apartheid," where only specific populations can benefit from life-saving treatments because capitalism and philanthropy are the engines driving the global health system (Bajaj et al. 2022; Harman et al. 2021). Even with COVAX, the allocation of vaccines to most recipient countries still failed to sufficiently vaccinate even health-care workers (Ghebreyesus 2021). Mechanisms like COVAX relied on high-income countries to donate doses or at least allow other countries to purchase doses, but high-income countries instead stockpiled vaccine doses. Like most African countries, Malawi depended on donations from COVAX. When African countries purchased additional vaccines directly from pharmaceutical companies, they often had to pay higher prices than wealthier countries (Karim et al. 2023).

Global inequities in vaccine access seriously delayed Malawi's COVID-19 vaccination program. The government of Malawi aimed to vaccinate 20% of their target population within the first year of receiving its initial COVID-19 vaccines through COVAX. However, they fell short. By March 2022 (after one year), only 4.4% of Malawian adults were fully vaccinated (World Health Organization 2022a). It took the country until the end of 2022 to reach the initial first-year goal, with 18.1% fully vaccinated and 23.4% with at least one dose (World Health Organization 2023a). Malawi did finally achieve the relatively low target but nearly nine months behind schedule.

A good deal of the delay in the initial rollout was due to vaccine supply challenges. There were frequent stockouts of vaccine doses, including as

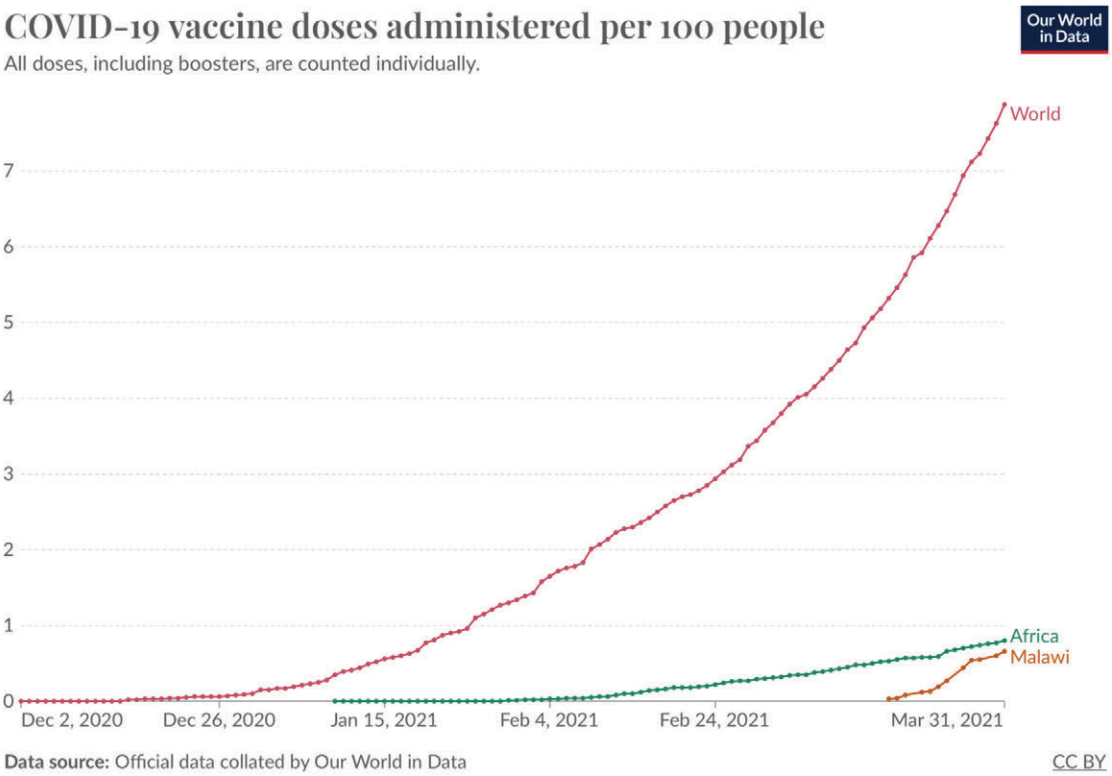

Fig. 28.2. Inequity in vaccine availability as of March 2021

early as June 2021 (Mwale 2021). This irregular supply made it difficult for the health sector to anticipate and manage distribution, and supply did not always coincide with the waves of increased COVID-19 burden. For example, there was a stockout right before Malawi's third wave in June 2021, and only after a new shipment arrived at the end of July could vaccination in the country resume (Chinele 2021). As a result, thousands of Malawians who were due to receive a second vaccine dose had to wait beyond the due dates before they could be fully vaccinated (Mkandawire 2021a; Mtenje 2021). At the end of July 2021, Malawi received a second shipment of 192,000 vaccines through COVAX. Only a week after the resumption of COVID-19 vaccination in the country, however, district and urban hospitals ran out of vaccine doses (Chitsulo 2021b). The quick vaccine uptake suggests that at least during the earlier period of availability, there was significant demand for COVID-19 vaccines among some Malawians.

Multiple international media outlets reported on an event in Malawi when government officials publicly destroyed 19,610 doses of expired AstraZeneca COVID-19 vaccine (see, e.g., *The Economist* 2021; Gondwe 2021; Odhiambo 2021; Phiri 2021). The AstraZeneca doses that were incin-

erated in May 2021 were part of a batch donated by the AU's Africa Vaccine Acquisition Task Team and produced by the Serum Institute of India that had an expiry date of April 13, 2021, which was just 18 days after arriving in Malawi (Gondwe 2021; Odhiambo 2021; Phiri 2021). It is worth noting that Malawi's health system managed to distribute more than 80,000 doses from this same AU-donated batch in the intervening 18 days before vaccines from that batch expired (Gondwe 2021). However, despite a government campaign to fast-track the vaccination campaign to exhaust the 80,000 vaccine batches that were fast reaching their expiry date, there was not enough time to utilize the entire batch.

The public destruction of expired vaccines—widely documented in photos published in the local and international press of Malawi's minister of health throwing expired doses into an incinerator—delivered a clear message of vaccine safety and efficacy. The minister was showing Malawians that if they were to go and get vaccinated, they could be sure that they wouldn't be given an expired dose; the ministry's goal with this event was to raise public confidence that the vaccines being administered were not of questionable quality (Gondwe 2021). Such communication is necessary in a setting where the population is cautiously optimistic about medical scientific breakthroughs given persistent suspicions of global and local inequalities (Wilson 2012).

In September 2021, Malawi celebrated 1 million doses administered, against a new target of 11 million people to reach herd immunity (Masina 2021). However, by the end of 2021, only 9% had received any vaccine and fewer than 4% were fully vaccinated. In December 2021, the government attempted to make vaccination mandatory for frontline workers (Reuters 2021b), but after challenges from civil society, including the Malawi Human Rights Commission, it was never implemented (Pensulo 2022).

Concerns about equity in vaccine access largely centered around increasing uptake in rural areas. Civil society organizations put pressure on government to increase vaccine availability, delivering a petition in June 2021. This petition called for government to spend funds to procure vaccine doses, as all doses received to that date had been via donations. When the petition was submitted, health rights activists noted the existing inequities between urban and rural areas in vaccine administration and information dissemination and called for campaigns to increase awareness of vaccination's benefits in rural areas, with the hope that vaccine uptake there would increase (Buliyani 2021).

To increase uptake of COVID-19 vaccines in the general population, Malawi's Ministry of Health began a mobile vaccination campaign in late 2021, dubbed the "COVID-19 Vaccination Express" initiative. The initiative consisted of a mobile van in each district traveling to remote places to serve hard-to-reach populations, engaging in raising community awareness and "sensitization" to the COVID-19 vaccines, and offering vaccinations. The mobile teams also provided logistics such as reporting and

documentation and ensuring proper biowaste management (Sethy et al. 2022). The mobile teams ran the "Vaccinate My Village" campaign, which sent health surveillance assistants door-to-door to create a mass vaccination campaign in rural villages (Sethy et al. 2023). Because this strategy used trusted frontline workers, it expanded not only availability of vaccines but also acceptability. Together, the COVID-19 Vaccination Express and Vaccinate My Village initiatives drastically improved vaccine uptake (Sethy et al. 2022, 2023). By the end of 2022, 8.6 million vaccine doses had been administered, with 3.4 million people fully vaccinated and 719,801 having also received booster doses (Ministry of Health, Presidential Taskforce on COVID-19 and Cholera 2023a).

Even with these important interventions to increase vaccination demand, it is necessary to note that after COVID-19 vaccine availability improved in late 2021, uptake weakened. We turn now to the factors influencing COVID-19 vaccine hesitancy, by which we mean the delay in acceptance or refusal of COVID-19 vaccines despite availability of vaccine services (MacDonald 2015). A social listening survey identified multiple sources of vaccine hesitancy: misinformation, disinformation, and lack of general knowledge about COVID-19 vaccines (World Health Organization 2022a). In addition, several studies pointed to people's fears that vaccines were unsafe or would cause other issues like infertility (Aron et al. 2022; Kanyanda et al. 2021; Safary and Mtaita 2022; Adeyanju et al. 2021); beliefs that the vaccine would cause harm or lead to devil worship (Aron et al. 2022; Lines et al. 2022); low perceived risk of catching COVID-19 (Kanyanda et al. 2021); and sentiments that the distances to locations where vaccines were available were too long to travel to or that the vaccine was simply not a priority (Lines et al. 2022). One study even showed that people were unhappy with the level of political pressure being put on them to get vaccinated (Safary and Mtaita 2022), and another reported that some got vaccinated in secret because of conspiracy theories or fear of being stigmatized (Lines et al. 2022).

A phone survey conducted by the Governance and Local Development Institute (GLD) at the University of Gothenburg in Sweden and the Institute for Public Opinion Research (IPOR) in Malawi in March–May 2021 provides further insight into vaccine hesitancy in the early days of the vaccination campaign.[2] The survey asked 1,403 respondents how likely they would be to accept a free, government-approved COVID-19 vaccine if offered one. Around one-third indicated that they would not take the vaccine. Those who were hesitant ($n = 438$) were then asked to explain the reasons for their hesitancy. Table 28.1 shows a breakdown of these answers (multiple responses were possible). The most common reason involved concerns about vaccine side effects (death and infertility). A fairly large number of responses likely reflected fear about being infected by COVID-19 from vaccination ("inject you with COVID-19"). Few respondents indicated a belief that COVID-19 was not real or deadly or articulated

TABLE 28.1. Reasons for Vaccine Hesitancy in Malawi

Reason	Number of responses
Vaccine might kill you	242
Other side effects	136
Inject you with COVID-19	73
Other	71
Vaccine won't work	64
Make infertile	64
COVID-19 not real	9
COVID-19 not deadly	9
Too hard to travel to health center	2
Refused to answer	12

Source: GLD/IPOR Survey of 1,403 adult Malawians in March–May 2021.

challenges regarding traveling to a health center. Overall, these data suggest that concerns about risk of the vaccine were the main factor driving hesitancy.

Looking at subgroup differences (fig. 28.3), women were about twice as likely as men to report hesitancy; rural and peri-urban respondents reported higher hesitancy than urban respondents; and individuals who reported feeling close to the opposition political party, the Democratic Progressive Party (DPP), had substantially higher rates of hesitancy (close to half saying they would not take the vaccine) than supporters of other parties. Other correlates of hesitancy include age (older people were somewhat more hesitant about vaccines than younger people) and religion (Seventh-day Adventists[3] were more hesitant than Malawians practicing other faiths). Interestingly, those with higher levels of anxiety about COVID-19 were most likely to have vaccine hesitancy. Those who reported visiting more frequently with neighbors were less hesitant to be vaccinated.

Almost a year after the GLD/IPOR survey, the nonpartisan pan-African research network Afrobarometer conducted face-to-face interviews with a nationally representative sample of 1,200 Malawians aged 18 and above. In that survey, 28% of Malawians self-reported as having received at least one dose of the COVID-19 vaccine (Afrobarometer 2022). Among the nearly three-quarters of Malawians who said they had not received even a single dose of the COVID-19 vaccine, 56% said they were unlikely to ever receive the vaccine. When asked why they would not get vaccinated, the top reason was that the vaccines were developed too quickly and thus could not be trusted; the vaccines could cause bad side effects; lack of trust in the vaccine; concerns about potential counterfeit vaccine doses; and a belief that God would protect respondents from COVID-19.

Consistent with the findings of the GLD/IPOR survey, the Afrobarometer findings show that DPP partisans were less likely to be vaccinated (22%) compared to supporters of the political parties in the ruling coali-

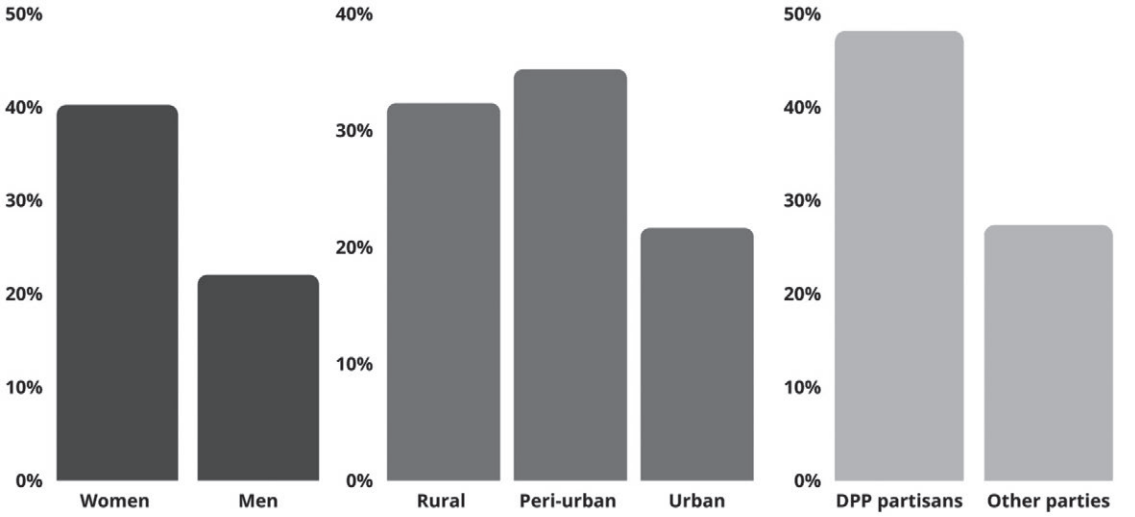

Fig. 28.3. Subgroup differences in vaccine hesitancy in Malawi

tion, known as the Tonse Alliance: Malawi Congress Party (38%) and UTM Party (46%). Meanwhile, the likelihood of being vaccinated was also closely correlated with education, with more educated Malawians being more likely to be vaccinated compared to those with lower levels of education (see fig. 28.4).

Key Explanations for Malawi's Vaccination Challenges

Political Partisanship and COVID-19 Vaccination

The onset of the COVID-19 pandemic and the rollout of vaccines in Malawi came against a backdrop of major political developments that affected the government's ability to run an effective vaccine campaign. As Dionne et al. (2021) have observed, during the early months of the epidemic, the DPP government led by President Peter Mutharika struggled to persuade Malawians to adhere to public health regulations aimed at containing COVID-19 transmission. This has been attributed to weak government legitimacy following disputed elections in 2019. A constitutional court decision to annul the 2019 presidential elections and the subsequent ordering of a fresh poll in June 2020 resulted in many Malawians openly defying the government's initial efforts to implement a series of COVID-19 regulations. It was only after a new administration took office after June 2020 that the government was able to push through multiple COVID-19 regulations. It was eventually this new government, led by President Lazarus Chakwera of the Malawi Congress Party (MCP) leading the Tonse Alliance of nine political parties, that presided over the rollout of the COVID-19 vaccination campaign from early 2021.

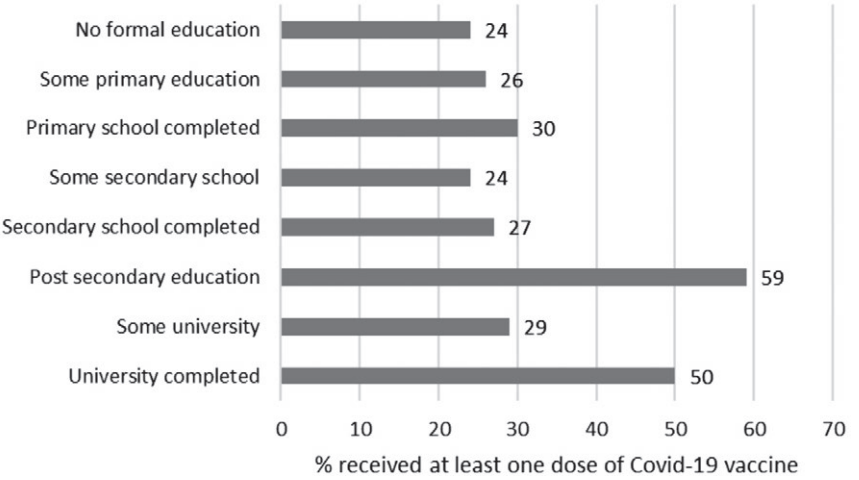

Fig. 28.4. Proportion of Malawians reporting to have received at least one dose of COVID-19 vaccine by education level in 2022

This political context seems to have shaped the uptake of COVID-19 vaccines in Malawi, with vaccine hesitancy following partisan lines. According to findings from the 2022 Afrobarometer survey, nearly half of opposition DPP partisans (47%) said they were unlikely to get vaccinated if a vaccine became available. That is compared to 30% of MCP and 20% of UTM party supporters, the two main political parties in the Tonse Alliance government, expressing similar reservations about getting vaccinated (Afrobarometer 2022).

Lack of Trust and Confidence in Government and Other Potential Sources of Vaccine Hesitancy

Did the Malawian government have a reservoir of trust and confidence in the population that would allow it to implement COVID-19 policies at the beginning of the pandemic? We evaluate this question using a sample of 4,658 adult Malawians interviewed by phone in May 2020 by GLD and IPOR.[4] This sample drew from all regions of Malawi, including both rural and urban areas, but was not nationally representative. It likely oversampled better resourced Malawians (all individuals in the sample had access to a cell phone, which is true for only 59% of adult Malawians) and those with a higher average level of education. The sample nonetheless provides a useful window into Malawians' state of mind at the beginning of the pandemic.[5]

A mixed picture of trust and confidence in the government emerges from the data (see table 28.2). Only 48% of respondents in the sample said they trusted the Malawian government "a lot." Of those who knew about the government's Special Cabinet Committee on COVID-19, only 31% granted it substantial trust. Trust in opposition parties was even lower. In

TABLE 28.2. Trust in Malawi's Government Early in COVID-19 Pandemic

	A lot (%)	Somewhat (%)	Just a little / Not at all (%)	Haven't heard enough to say (%)	Refuse to answer (%)
Government of Malawi	48	14	36	1	1
Opposition parties	28	13	53	3	3
Special cabinet Committee on COVID-19	29	10	37	22	2
Your religious leader	78	10	10	1	1
World Health Organization	53	11	12	24	1
Head of your district hospital	64	11	17	8	1
Your traditional authority	60	13	23	3	1

Source: GLD/IPOR survey of 4,658 adult Malawians in May 2020. Question asked: "How much do you trust each of the following, or haven't you heard enough to say?"

contrast, trust in other types of authorities was higher: 60% of the sample had substantial trust in their traditional authority, 64% in the head of their district hospital, 78% in their religious leader, and 70% in WHO (of those who knew enough about it to say).

While trust in government might have been tepid, a majority (68%) of the sample nonetheless had confidence in the government's ability to handle the COVID-19 crisis (see table 28.3). A similar number agreed with the government's attempt to enforce a lockdown in the early days of the pandemic, which was, however, stayed by the courts (Dionne et al. 2021). And a large number (79%) expressed confidence in the public/government health-care system. The data thus suggest that while the Malawi government had some degree of public trust and confidence to assist it in coping with the pandemic—especially if it worked through the public health system and partnered with trusted local actors and possibly international actors like WHO—trust and confidence were likely neither deep nor universal enough to carry the government should it try to implement unpopular policies.

Meanwhile, the 2022 Afrobarometer survey, which was fielded after the change of government in June 2020, asked respondents to indicate their level of trust in their government's ability to ensure that any vaccination administered to its citizens was safe. Almost one-third (36%) of the nationally representative sample said they had no trust at all (36%) or had just a little trust (27%), meaning that nearly two-thirds had no trust in the Malawi government's ability to ensure vaccine safety (Afrobarometer 2022). This is perhaps not surprising, as the Malawi government relied entirely on

TABLE 28.3. Confidence in Malawian Government's Ability to Handle COVID-19

	Yes (%)	No (%)	Don't know or refuse (%)
Government of Malawi	68	30	3
Public/government health-care system	79	18	3

Source: GLD/IPOR survey of 4,658 adult Malawians in May 2020. Question asked: "Do you have confidence in the ability of each of the following to handle the COVID-19 crisis?"

vaccines that were donated and had limited to no capacity to test the vaccines before they were distributed for administration nationwide.

Rumors and misinformation about vaccine safety are particularly powerful drivers of vaccine hesitancy in Malawi (Adeyanju et al. 2021). Local journalistic accounts report sensational misinformation about COVID-19 vaccines circulating on social media. For example. Mtengang'ombe (2021) documents that some Malawians believed the COVID-19 vaccine to be "a biological weapon meant to reduce the African population, either by sterilising children or infecting them with a deadly disease." Beyond the specific damage to COVID-19 vaccine uptake, there were reports that misinformation about COVID-19 vaccines also interrupted routine childhood vaccination (Manjawira 2021) and prenatal care (Buliyani 2021). In their facility-based surveys of health-care workers' uptake of COVID-19 vaccination in March–May 2021, Moucheraud et al. (2023) found that exposure to negative information about COVID-19 vaccination was common and that messaging apps and social media posts, as well as friends and patients, were common sources of negative information among health-care workers. In the southern Malawi district of Neno, Aron et al. (2022) found that among patients and caregivers unwilling to get vaccinated, 83% got information from the mass media and 22% from family and friends. However, 50% got information from health-care workers and 42% from the Ministry of Health, or the government, and the vast majority reported trust in their local health-care workers and Ministry of Health (73% and 72%, respectively). Taking these two studies together, health-care workers are an important and trusted source of information, but this population is not immune from negative information about COVID-19.

To be sure, adverse events from vaccination also occurred locally and globally, and such knowledge circulated in Malawi. For example, a shopkeeper in the country's capital city, Lilongwe, interviewed by an international journalist remarked, "I have heard a lot of stories about people getting blood clots and some even dying after getting immunised. Are those people telling lies? If it is the truth, why are we being given the same vaccines?" (Odhiambo 2021). The concerns about side effects reported by Malawians surveyed across the aforementioned studies will reflect—at least in part—people hearing about adverse events.

Donor Dependence and an Under-Resourced Health System Limited Capacity to Vaccinate the Public

Like elsewhere, the already strained public health system in Malawi was put under increasing stress during the COVID-19 pandemic. It has been shown that some resources were redirected to COVID-19 to meet demand, which had the effect of reducing health coverage for other essential services (Chiumia et al. 2022).

Malawi remains heavily donor dependent, and the COVID-19 response, including for vaccines, came largely from donations. While there was limited public health investment from the government, as described above, Malawi relied on donated vaccines rather than procuring them using funds from the government budget. In addition, the campaign-style vaccination programs like "Vaccinate My Village" are costly, requiring extra resources (e.g., mobile vans and allowances for health workers) that are difficult to sustain through the regular government budget. In addition, coordinating the various partners contributing to the COVID-19 response was difficult (Haldane and Butler 2022). Overall, lack of investment and an already overburdened health system complicated the COVID-19 vaccine response.

The Malawi Ministry of Health had the primary responsibility for COVID-19 vaccination. In the early months of 2021, the Department of Disaster Management Affairs and the National COVID-19 Office worked alongside other government ministries (such as the Ministry of Health), United Nations agencies, and nongovernmental organizations, with oversight from the Presidential Taskforce on Coronavirus and Cholera, to draft the National COVID-19 Preparedness and Response Strategy and Plan, launched in July 2021 and covering a one-year period through June 2022. The plan assumed a weak health system and inadequate workforce. Multiple investigations of Malawi's response to COVID-19 concluded that the country's health system was ill-equipped to handle surges in infections, despite significant resource allocation and important innovations in increasing access to treatment (Matonga and Chitete 2021). Still, the EPI program in Malawi is considered strong, with more than 90% coverage on most routine immunizations according to analysis of data from the Demographic and Health Surveys collected prior to the pandemic (Mmanga et al. 2022).

The health workforce in Malawi was already deemed inadequate prepandemic. During COVID-19, increased workload, hazardous conditions, and illness or death of health-care workers increased this strain. The fear of catching COVID-19 from health-care staff meanwhile created widespread suspicions about health personnel that occasionally resulted in physical violence and harassment against them (Odenigbo and Crighton 2023). Still, the health workforce was a key part of the vaccination strategy, and when vaccine rollout commenced in Malawi, 83% of surveyed health-care workers reported receiving the first COVID-19 vaccine dose (Mouch-

eraud et al. 2023). The same study found slightly lower uptake among lay cadres, such as community-based health surveillance assistants (HSAs), who were largely responsible for vaccinations within communities. HSAs received training on logistics, supply chain, safety, and community engagement prior to vaccines entering the country. However, HSAs are already overburdened, and extra COVID-19 responsibilities may have contributed to a decrease in other essential services (Fischer 2022; Alban et al. 2023).

By mid-2022, Malawi was facing a triple outbreak of COVID-19, polio,[6] and cholera.[7] Vaccination interventions for polio and cholera were therefore ongoing simultaneously with the COVID-19 vaccination campaign through the end of 2022. As the threat of polio and cholera receded somewhat, the COVID-19 vaccination campaign remained in place and was still in place at the end of 2022.

Conclusions

In this chapter, we drew on media reports and government documents and communications to describe Malawi's experience in vaccinating its citizens against COVID-19. We also analyzed survey data measuring vaccine hesitancy and uptake among Malawian adults. Drawing on previous scholarship examining health broadly and immunizations specifically, we situate Malawi's contemporary COVID-19 vaccine experience in a context of both suspicion and inequality.

There are a few potential explanations for the disconnect between unmet demand for vaccines in the early period and our examination of vaccine hesitancy as we saw weak demand when vaccine availability improved. First, it could be that the latent level of vaccine hesitancy and vaccine acceptance was constant over time and that the unmet demand in the early period compared to lack of demand later on reflected sorting; in other words, vaccine-acceptant Malawians actively pursued doses when vaccines first became available, but demand dropped once these vaccine-acceptant Malawians were vaccinated and only vaccine-hesitant Malawians remained. Alternatively, there could have been a shift in vaccine hesitancy among Malawians over time. For example, vaccine acceptance may have been higher in the early period but dropped over time. Such a drop—or put another way, such an increase in vaccine hesitancy—could have been a result of dissatisfaction or disappointment with limited availability, increased mistrust because of limited availability, and increased mistrust as a result of vaccine misinformation and disinformation circulating among Malawians, as well as a number of other factors explaining why Malawians could have become more vaccine hesitant over time. Given that our analysis relies on data collected only during the early period, we cannot adjudicate between these potential explanations. Fur-

thermore, we do not claim that these explanations are an exhaustive list. Future research should explore to what extent global inequities in vaccine availability can affect vaccine acceptance over time.

The Malawi case offers a number of lessons for the politics surrounding vaccination, and we highlight three in particular. First, like other poor countries, Malawi experienced what some scholars call "vaccine apartheid," an unequal system of vaccine distribution in which capitalism and rich philanthropists drive global health (Bajaj et al. 2022; Harman et al. 2021; Ghebreyesus 2021). The case thus has relevance for other low-income countries that are significantly dependent on foreign aid and have weak health systems. Vaccination is a priority in such settings not least because weak health systems that responded to COVID-19 with improvised rather than purposively built treatment centers simply did not have the adequate equipment, treatments, or personnel to meet the tremendous needs of patients very ill with coronavirus (Matonga and Chitete 2021). Second, but also relatedly, Malawians are well aware of the limits to donor dependency, and so civil society leaders and the media pushed the possibility of self-reliance in vaccine procurement. While an unequal global market featuring hoarding by wealthier nations and higher prices for poorer ones constrains such strategies (Karim et al. 2023), this push from Malawian civil society leaders is relatively novel, particularly compared to collective responses to other health crises (Dionne 2018). The third key takeaway from this chapter concerns the demographic correlates of COVID-19 vaccine hesitancy. Scholars had not previously identified partisanship as having any connection to health-promoting behavior in Malawi. Given the absence of partisan rhetoric of the framing of the pandemic in Malawi (Dionne et al. 2021), these findings raise important questions about the potential for politicization of disease threats and government response. Partisan politicization of health and health programming is understudied in Malawi and elsewhere in Africa and thus deserves attention for further inquiry.

NOTES

The authors made equal contributions to this chapter, and names are ordered randomly using the list randomizer tool at random.org.

1. This was true for all available vaccines except the J&J vaccine, Janssen, which at this time was considered a "single dose" vaccine.

2. The Covid 19 Round 3 survey (Lust et al. 2021) was administered by phone in March 2021 by IPOR and GLD, using the same set of phone numbers as the Covid 19 Round 1 survey (see footnote 5), but with a lower response rate and smaller sample. One-third of this sample was randomly selected for the vaccine hesitancy questions (n = 1,403). See also Ferree (2021).

3. There is nothing in the Seventh-day Adventists' doctrine that explains this discrepancy; the official church position is to "encourage our members to consider responsible immunization and the promotion and facilitation of the development of

what is commonly termed herd immunity" while also respecting "each individual's freedom of choice to make responsible decisions regarding their own health" (General Conference Administration et al. 2021). Nonetheless, Holden et al. (2023) found that Seventh-day Adventists members in Malawi tended to have lower trust in vaccines.

4. It is important to note that this survey took place prior to the June 2020 fresh presidential elections, and thus questions about the government referred to that led by Peter Mutharika and the DPP.

5. The Covid 19 Round 1 survey (Lust et al. 2020) was administered by phone in May 2020 by IPOR and GLD (n = 4,658). Phone numbers came from 2016 and 2019 Local Governance Performance Index surveys (see Lust et al. 2016, 2019). The 2019 study drew random samples from Lilongwe and districts along the Malawi-Zambia border but did not include the Southern Region. The 2016 study was a random sample of Malawi as a whole. Around half (54%) of the 2020 Covid Round 1 study was drawn from respondents who volunteered their phone numbers in the 2019 study, and they (or another member of their household) could be recontacted and agreed to take the survey. The remaining were individuals from the 2016 study who lived in the Southern Region, could be recontacted, and agreed to take the survey. The resulting sample is not a random sample of the Malawian population but includes respondents from all three regions and most districts of the country. The overall response rate was 62%. More information about the COVID-19 survey sampling procedures can be found in the appendix of Ferree et al. (2023).

6. Before it was documented in February 2022 that a young child tested positive for wild polio virus (WPV) in Malawi's capital city, Lilongwe, the last clinically confirmed WPV case was reported in 1992 (World Health Organization 2022b).

7. The cholera outbreak that began in March 2022 was the worst recorded in Malawi's history (World Health Organization 2023b).

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29 | COVID-19 Vaccination in Egypt, Jordan, and Tunisia

The Impact of Regime Type, State Capacity, and International Politics

Renu Singh and Scott Williamson

During the COVID-19 pandemic, much of the Middle East followed a similar trajectory to other parts of the developing world. Initial lockdowns kept the pandemic at bay in its opening months, while China, Europe, and the United States were ravaged. However, by the summer of 2020, the economic costs of pandemic-related restrictions were beginning to erode public and government support for these measures, and significant outbreaks began to affect several countries in the region. As the pandemic proceeded into 2021, hotspots in the Middle East became more common, and the importance of the new vaccines for controlling COVID-19's spread in Arab countries increased substantially.

Some of the wealthier countries in the Arab world—specifically, the Gulf monarchies rich in natural resources like the United Arab Emirates (UAE) and Saudi Arabia—had little problem paying to secure vaccines for their populations. These countries also tended to have relatively stronger state capacity facilitated by their resource wealth, which enabled them to distribute the vaccines relatively quickly by global standards (Reuters 2021a). However, other countries in the region, ranging from low-income and conflict-beset countries such as Yemen and Syria to lower- and upper-middle-income countries like Egypt and Jordan, resembled much of the rest of the developing world in facing significant difficulties in acquiring enough vaccines in a timely manner. With strained budgets and little capacity for domestic production, they were highly dependent on international mechanisms—including COVAX and bilateral foreign aid—to gain vaccines (Kavanagh and Singh 2023). They also faced significant challenges in implementation, ranging from weak state capacity and corruption to widespread misinformation fueled by distrust of the authorities.

This chapter focuses on the vaccination politics of three such countries in the Arab world: Egypt, Jordan, and Tunisia. It explains how these three countries acquired vaccines, the challenges they faced in distributing them to their populations, and the political factors that help to explain these outcomes.

Though all three countries faced similar challenges in many regards, Egypt, Jordan, and Tunisia experienced rather different trajectories with vaccination that were rooted in their specific political circumstances. With weak state capacity and a corrupt political system, Egypt struggled to get its vaccination campaign off the ground, lagging behind the others for all of 2021 even as it developed the capacity to produce its own domestic supply of the Sinovac vaccine. Jordan was an early success story in the region, as it leveraged its strategic importance in international affairs to acquire large shipments of vaccines and deployed its relatively effective health system to distribute them quickly. However, distrust of the vaccines resulted in an early plateau in distribution that the government struggled to overcome. Meanwhile, in Tunisia, the fractured and divided democratic political system struggled to acquire enough vaccines or to develop a successful implementation strategy. Government infighting and popular anger fueled by the pandemic triggered a presidential coup in the summer of 2021 that ended the country's fledgling democracy. In the aftermath of the coup, however, the international rush to gain influence with the new regime resulted in large donations of vaccines that kick-started the country's vaccination drive.

Though their trajectories differed, these countries also experienced similar shortcomings and challenges in their ability to vaccinate their populations. Corrupt political systems combined with weak states contributed to the unequal distribution of the vaccines, and conservative cultures reduced access for women relative to men in Egypt and Jordan. A lack of trust fueled by ineffective and authoritarian governments may also have contributed to the spread of misinformation that undermined the public's willingness to take the vaccine. We draw on survey data from the seventh wave of the Arab Barometer surveys to explore evidence for some of these dynamics.

The chapter proceeds as follows. We first review efforts by all three countries to acquire vaccines. Next, we explain their strategies for administering vaccines and what happened when those strategies were faced with actual implementation. We then analyze the survey data and draw conclusions about vaccination politics in Egypt, Jordan, and Tunisia.

Vaccine Acquisition

International support heavily shaped the ability of Egypt, Jordan, and Tunisia to acquire vaccines for COVID-19. This support included acquisition facilitated by the World Health Organization's COVAX initiative, in addition to bilateral aid distributed from wealthier countries. The three countries benefited from their strategic importance in international affairs, with efforts by Western as well as regional powers to sustain existing relationships or gain favor by increasing access to vaccines. However,

the extent of this beneficence, as well as the identity of the donors, reflected the relative importance of the three countries to regional and global politics.

EGYPT: Egypt's strategic importance stems from the power it wields as the largest country in the Arab world, with a population of 109 million as of 2021, as well as its control of the Suez Canal. Politically, however, the country has been relatively peripheral to international affairs in the Arab world since the 1980s, in part because of its stagnant economy and early peace agreement with Israel. Its military-led authoritarian regime has been a close regional partner of the United States for decades, but tensions occur over its human rights record, and the Egyptian government has often tried to engage with Russia and China as potential counterweights to the United States (Gbadamosi 2023). Egypt's current regime is also part of the counterrevolutionary coalition led by Saudi Arabia and the UAE since the Arab Spring uprisings of 2011 and 2012, but its economic difficulties have made it dependent on the Gulf states, and thus a junior partner (Fenton-Harvey 2019).

Egypt's position as a peripherally important regional player was apparent in its ability to acquire vaccines. The country did receive substantial promises of assistance, but the deliveries were relatively slow in arriving. As of early March 2021, Egypt had received only 400,000 vaccines, including 350,000 doses of Sinopharm donated by the UAE and China, as well as 50,000 doses of AstraZeneca (Human Rights Watch 2021). By the end of March, Egypt had received another one million doses of AstraZeneca, whose delivery was facilitated by COVAX (US Embassy Egypt 2021). Two more COVAX deliveries of AstraZeneca arrived by the end of August, each bringing a few million more doses (World Health Organization 2021). Other shipments also arrived with vaccines made by Sinopharm, Sputnik, Sinovac, and Johnson & Johnson (Reuters 2021b). While these deliveries were important for kick-starting Egypt's ability to distribute vaccinations, they were not enough to quickly cover Egypt's large population.

Faced with the relatively slow pace of acquisition, the Egyptian government attempted to develop its own production capacity. The government company for producing vaccines, Vacsera, negotiated an agreement with Sinovac to produce doses locally that could then be distributed within Egypt and across Africa (Abu Zaid 2021). One million doses had been distributed within Egypt by the end of August 2021 (Reuters 2021b). The locally produced doses continued to play a role in the country's vaccination campaign through 2022, and international donations also ramped up through late 2021 and early 2022. By June 2022, the government claimed to have more than 57 million vaccine doses on hand and was able to distribute booster shots to several million Egyptians, though some of these doses were reportedly expired (Mada Masr 2022).

JORDAN: The Jordanian government found itself in a better position than Egypt to acquire vaccines for its approximately 10 million residents. The country has a particularly close relationship with the United States, which views the kingdom as a key partner for issues related to counterterrorism and Israel. Jordan's large Syrian refugee population has also been a driver of international support over the past decade. These factors meant that Jordan began receiving shipments of vaccines covering a meaningful share of its (admittedly smaller) population relatively early by global standards. The Jordanian government concluded an agreement with Pfizer in January 2021 to purchase 1 million doses and to receive another 2 million doses through COVAX (Reuters 2021c), and the first shots from the company arrived that month (Associated Press 2021). By late February, 150,000 Jordanians had received their first vaccination (Al-Khalidi 2021). A first COVAX shipment of AstraZeneca vaccines arrived by mid-March, providing another 140,000 doses (ReliefWeb 2021a).

Shipments ramped up throughout the spring and summer. By mid-July 2021, Jordan had reportedly secured 11.5 million vaccine doses. This supply included a donation of half a million doses of the Pfizer vaccine that had been announced by the US government in early June. Illustrating the relevance of Jordan's strategic international position, the US embassy's announcement of the donation explicitly mentioned that "Jordan was prioritized in its vaccine distribution campaign to show the importance of the two countries' strategic relations" (Khasawneh 2021).

TUNISIA: Though Tunisia has been less relevant to international powers historically, its revolution in 2011 brought greater attention from foreign powers as well as attempts to acquire influence over its elected political leaders. The country was slower than Jordan to acquire vaccines in early 2021, though it did receive COVAX donations of approximately 93,000 Pfizer doses by mid-March (ReliefWeb 2021b). However, acquisitions and delivery lagged through the first half of the year (Amnesty International 2021a).

The situation began to change following the self-coup of Tunisia's president, Kais Saied, when he sacked the prime minister, shuttered the parliament, and began to rule through decree on July 25. The decision marked the end of Tunisia's decade-old democracy, and it fueled what seemed to be a race for influence with the new regime among foreign powers (*The Economist* 2021). On August 1, Italy sent 1.5 million vaccines, and the United States sent another 1 million. The next day, China sent several hundred thousand Sinovac vaccines, and the UAE and Egypt likewise sent additional medical supplies (Grewal 2021). France sent 800,000 doses as well (Guesmi 2021). While these vaccines arrived during a particularly severe wave of infections, the fact that they were promised shortly after Saied's coup and one month into the explosion of cases suggests the dona-

tions were motivated by geopolitical opportunity. Vaccines provided a way to build favor with the newly empowered president, who justified his coup based largely on the government's ineffective pandemic response, and Tunisia benefited through the rapid acquisition of millions of doses.

Vaccine Distribution

If vaccine acquisition was shaped heavily by international affairs, the challenges faced in distribution were rooted more in the domestic politics of Egypt, Jordan, and Tunisia. Heavy-handed authoritarianism combined with a fragmented state resulted in a slow, inefficient, and corrupt distribution process in Egypt; Jordan's more competent authoritarian regime performed more effectively but still struggled to win over the public's trust; and Tunisia's weak democratic government failed to overcome internal political struggles to develop an effective vaccination strategy, ultimately contributing to the democracy's collapse as Tunisia experienced a severe COVID-19 wave during the summer of 2021.

EGYPT: As mentioned above, Egypt is governed by a military-led authoritarian regime. With the exception of a brief and unstable democratic interlude in 2012 and 2013, the country has been governed by military-aligned, strongman presidents since the 1950s (Williamson 2021). Egypt's authoritarian governance has often been highly repressive, but the sprawling bureaucracy is also difficult to control, with various ministries and security forces acting as their own fiefdoms and looking after their own members (Brown 2013). This system is rife with corruption and is typically inefficient when it comes to policy implementation. These features are reflected in the country's health system, which is underfunded and has long struggled to address key health challenges for much of the Egyptian public (Brooke 2013).

In this context, it is perhaps unsurprising that the government was slow to distribute vaccines during the pandemic, and the vaccination campaign was defined by significant inequalities. On paper, Egypt's strategy resembled the approach adopted by many other countries, with priority given to health-care professionals, older people, and those with preexisting conditions who were most at risk from COVID-19 (Kandeel et al. 2023). These Egyptians were able to register for vaccination on February 28. However, only one week later, registration opened for the general public, well before many vulnerable Egyptians were able to receive appointments (Amnesty International 2021b). Initially, Egyptians were also expected to pay for their vaccines, and the system for requesting a financial waiver was left opaque (Human Rights Watch 2021). Meanwhile, the government failed to develop a coherent national communication strategy to explain

its approach to the public, lacking any media presence or clear instructions for how to register. This absence is particularly noteworthy given the government's heavy-handed control of media content (Johannisson 2021).

The vaccination campaign was also marred by corruption and favoritism within Egypt's fragmented, authoritarian state. Members of Parliament received early access, as well as a choice between vaccine types, in a manner that was nontransparent and outside the official priority system. This access was also extended to government ministries. The Health Ministry reportedly allocated vaccines to local offices of other ministries within each of Egypt's governorates, allowing these local offices to distribute the doses as they wanted to their employees. Priority was given first to the Interior Ministry, the Defense Ministry, the Foreign Ministry, and the Finance Ministry—ministries that wield substantial power within the state. The program was then expanded to several other ministries, including Justice, Tourism and Antiquities, and Higher Education. Wealthy Egyptians likewise were able to jump the queue by turning to mobile vaccination centers that were intended to assist the elderly but instead became sites for distributing to more privileged individuals (Mamdouh 2021).

While those with connections to important centers of power within the regime were able to receive the vaccine early, the government also withheld the vaccine from its tens of thousands of political prisoners (Amnesty International 2021b). Several political prisoners died of COVID-19 in the early months of the outbreak (Human Rights Watch 2020), and the Egyptian government is known for withholding medical treatment from prisoners as a form of abuse (Amnesty International 2021c).

With little government communication about the vaccination process, inequitable distribution, and a shortage of vaccines, progress toward vaccinating a majority of the public was slow throughout 2021. By May, less than 1% of the country's population had been vaccinated, according to official statistics (Johannisson 2021). By November, only 16% of the country was partially vaccinated, lagging behind other countries in the Middle East and North Africa (El-Sawy 2021). The slow progress was worsened by widespread misinformation, likely fueled by distrust in the authorities. In response, the government began mandating that individuals in certain sectors be vaccinated or face financial penalties. Teachers, government employees, university students, and anyone wanting to access government services needed to show proof of vaccination by late 2021; otherwise, they would be required to pay for expensive PCR tests or face disciplinary action (Rashwan 2021). By the end of the year, the mandate was extended to all Egyptians aged 18 and older. Vaccine-skeptical Egyptians reportedly turned to bribery to evade the mandate, with the problem common enough to earn a rebuke from the prime minister (Middle East Eye 2022). However, the pace of vaccination gradually picked up into 2022, eventually reaching approximately half of the country's population.

JORDAN: The government in Jordan is also authoritarian, with the Hashemite monarchy ruling the country since the early 1900s. Compared to Egypt, however, Jordan's political system is typically more effective, less corrupt, and less repressive (Williamson 2024). These features are reflected in its health system, which performs well by regional metrics and already possessed a proven track record of vaccinating the population (Al-Shaikh et al. 2021). As a result, the government was relatively well positioned to distribute COVID-19 vaccines to the country's residents.

The country developed and then began to implement its vaccination strategy early, with registrations opening in December 2020. As with many other countries, the strategy prioritized health-care workers, older residents, those with chronic illnesses, and essential workers. Technical implementation was led by the Ministry of Health, but the efforts were overseen by a national committee with representatives from various ministries as well as the private sector (Al-Shaikh et al. 2021).

The Jordanian government emphasized equity in its approach. In early January, the government's lead official on the pandemic's response made a point of stressing that nepotism would not be tolerated in the vaccination campaign (Roya News 2021), though it is difficult to know in practice how well this was upheld given the influence of personal connections in many interactions between Jordanians and the state (Al-Hiari 2022). The government also made vaccination free of charge to all residents, including refugees and expatriates. Jordan was reportedly the first country in the world to begin vaccinating refugees. The government is adept at using its refugee hosting status to acquire international goodwill (Alrababa'h et al. 2021), and the approach drew praise from the UN High Commissioner for Refugees (UNHCR) (Wolters and Abir 2022). Data from UNHCR in February 2022 suggests that refugee vaccination rates generally reflected those of the broader adult population (UNHCR 2022).

Despite its relatively effective and equitable strategy, Jordan did face significant issues with public trust in the vaccine. By some accounts, Jordan demonstrated some of the highest rates of vaccine hesitancy in the world throughout 2021 and into 2022, with many people expressing skepticism about side effects and efficacy, as well as believing conspiracy theories about the vaccine's purpose (Sallam et al. 2021). A clear explanation for the intensity of the problem in Jordan is lacking, though it may have been driven in part by high rates of misinformation online. However, faced with several waves of the coronavirus and persistent government messaging campaigns, uptake increased again through 2022 (Wolters and Abir 2022). The government also began mandating that university students take the vaccine or be barred from attending classes (Weldali 2022). By the end of 2022, the government claimed that more than 75% of the population had received at least one dose (*Jordan Times* 2023).

TUNISIA: Unlike Egypt and Jordan, Tunisia was governed democratically at the time the pandemic broke out in 2020. The Tunisian revolution of 2011 had ended the decades-long, authoritarian presidency of Zinedine Ben Ali, ushering in a new era of democratic politics. Though political freedoms improved dramatically under the new system, successive elected governments had struggled to address the country's entrenched economic and social problems. The major political players also prioritized consensus among elected politicians over pushing far-reaching changes, with the goal of minimizing the intensity of polarization that had contributed to the failure of the Egyptian revolution by 2013. Though advantageous in some ways, this approach further undermined the ability of elected political leaders to address major challenges (Jouini and Ben Akal 2022), and a significant part of the Tunisian public had become alienated from the democratic political system by the time the pandemic began (Yerkes and Ben Yahmed 2019).

The government's ineffectiveness at confronting major issues was reflected in its approach to the pandemic, and especially with regard to vaccines. The government's strategy was published in January 2021, but the rollout that began in March was undermined by "a lack of transparency, political interference, delays in vaccine shipments, and a failure to take into consideration human rights vulnerabilities in selection of priority groups" (Amnesty International 2021a). The strategy did follow other countries in prioritizing health workers and older people, but it did not consider chronic health conditions and other vulnerabilities. Furthermore, politicians were allowed early access to the vaccines, and the revelation that government ministers had jumped the queue further contributed to perceptions that the government was self-serving in its approach to the pandemic (Amnesty International 2021a).

By July 2021, Tunisia had one of the highest COVID-19 infection rates in Africa, the vaccination rate was lagging, and public anger had mounted notably. In late July, the government attempted to run a national vaccination day, but the event proceeded chaotically, with supplies running out and few people able to receive the vaccination despite waiting for hours. Following the failure, President Saied put the military in charge of vaccinations. The failure also provided the justification that Saied used to launch his coup: following anti-government protests motivated by the chaotic response, he fired the prime minister and cabinet and closed Parliament (Abidellaoui 2021). Though much of the public initially appeared to support Saied's seizure of power, it should be noted that the government's lackluster response to the pandemic had been undermined in part by infighting between Saied and Prime Minister Hichem Mechichi, with delays in ordering vaccines and inconsistent lockdown policies caused in part by the internal conflict between the two factions (Grewal 2021).

After Saied's power grab, the distribution of vaccines appeared to

improve. As already discussed, the international implications of the coup meant a quick surge in the number of doses available to the government. The authorities also succeeded in implementing two more national vaccine days that proceeded much more effectively than the first failed attempt (Grewal 2021).

Though the vaccination rate accelerated after Saied's coup, the government still was unable to address Tunisia's persistent regional inequalities that have often left poorer, interior provinces underserved by the state. This inequality was heavily reflected in vaccination rates, with significant disparities observable by April 2022. Less than 40% of the local population was vaccinated in the governorates of Tataouine and Kairouan by this time, whereas more than 60% of the population had been vaccinated in some of the wealthier, coastal governorates (Amnesty International 2022).

With the vaccination rate just under 50% at the end of 2021, the government imposed a mandate requiring Tunisians to be vaccinated to enter public spaces. Without the vaccine, Tunisians would not be allowed to enter businesses, use public transport, go to cafés and restaurants, or access religious and sports facilities. Workers in both the state and private sectors would be suspended without a vaccination certificate (Ben Bouazza 2021). Faced with further outbreaks along with these penalties, the vaccination rate increased steadily through 2022.

Who Was Vaccinated and Why Did Some Hesitate?

The above discussion suggests several explanations for why vaccination proceeded slowly and why some people were less likely to acquire or accept the vaccine in Egypt, Jordan, and Tunisia. Nationally representative survey data from the seventh wave of the Arab Barometer survey includes information about access to and attitudes toward COVID-19 vaccines in these countries, and in what follows, we use this data to develop further insights into the politics of distributing the vaccines in these places. The Egypt sample includes 2,044 Egyptians and was collected in January 2022; the Jordan sample includes 2,399 Jordanians and was gathered from February to April 2022; and the Tunisian sample includes 2,400 Tunisians and was acquired in October and November 2021.

We first report results from regression models indicating which respondents were less likely to be vaccinated across the three countries, and we then consider the reasons given for vaccine hesitancy among respondents who had reported not yet receiving the vaccine. This analysis can shed light on the extent to which inequities and biases reported in the section above are reflected in self-reported vaccination in late 2021 or early 2022. Across the three countries, we assess whether respondents were more likely to report being vaccinated if they had attended university, lived in an urban area, or worked for the public sector. These respon-

dents were most likely to be privileged and therefore able to acquire vaccines, and they were also the most likely to face mandates requiring that they get vaccinated. In addition, we analyze whether older respondents were more likely to be vaccinated, in line with the priorities identified in the strategic plans of the three countries, and if women were less likely to be vaccinated because of their social marginalization, particularly in Egypt and Jordan.

We look at the correlation between vaccination and attitudes toward the government as well, including whether respondents are satisfied with the local health-care system and whether they view the government as legitimate. Supporters of the government could have better access and may also have trusted the authorities more. Finally, we assess whether internet users and religious respondents were less likely to be vaccinated, perhaps because these groups would be more exposed to misinformation or more likely to develop beliefs against the vaccines. Along these lines, we also incorporate a variable for anti-American attitudes, since distrust or dislike of the West could fuel vaccine skepticism (this data was not available in Egypt).

The results are reported in figure 29.1. Several interesting patterns are apparent. First, in all three countries, public sector workers are substantially more likely to report being vaccinated. This relationship is especially large in Egypt, with those in the public sector 21 percentage points more likely to say they had received the vaccine. In Jordan and Tunisia, the numbers are 12 and 11 percentage points, respectively. These differences likely reflect the imposition of mandates, but they may also indicate greater access for those with direct connections to the state, especially in Egypt where ministries had direct control over distribution to their employees early in the vaccination campaign. Having a university education was also associated with a higher likelihood of reporting vaccination, with an increase of 12 percentage points in Tunisia, 7 percentage points in Egypt, and 6 percentage points in Jordan. Likewise, urban residents in Jordan and Tunisia were approximately 5 percentage points more likely to report being vaccinated. These patterns could also reflect higher exposure to mandates alongside greater access to vaccination centers and registration.

Somewhat surprisingly, respondents aged 60 years or older in Egypt and Jordan were only marginally more likely to report being vaccinated, with statistically insignificant increases of 5 and 4 percentage points, respectively. In Tunisia, however, these older respondents were 27 percentage points more likely to say they had been vaccinated. These patterns could reflect Tunisia's greater emphasis on age-based eligibility, Egypt's struggles to prioritize older people in practice despite the formal emphasis on age, and Jordan's relatively high reported vaccination rate across all age groups by the time the survey had been implemented.

In both Egypt and Jordan, women were much less likely than men to

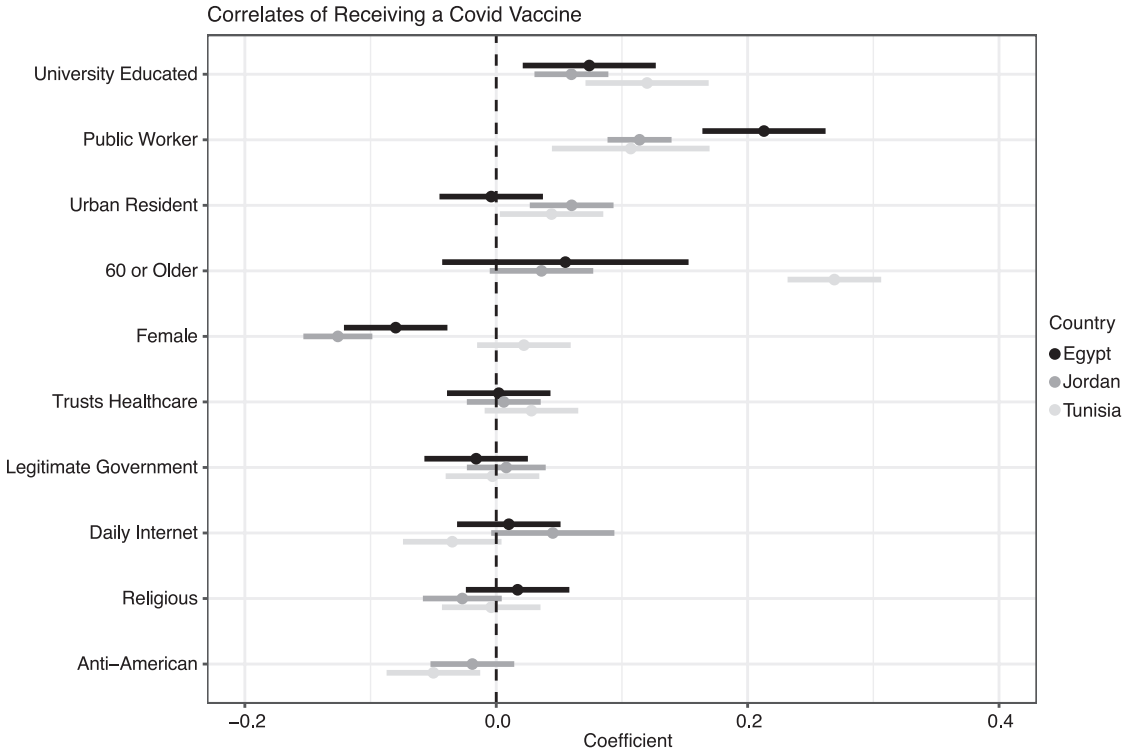

Fig. 29.1. Coefficients from regression models in each country with binary outcome for vaccinated or not

say they had been vaccinated, with 8 and 13 percentage point reductions, respectively. In Tunisia, by contrast, women were marginally more likely to have received the vaccine. These patterns reflect gender dynamics more broadly in these countries, with widespread patriarchal values in Egypt and Jordan likely limiting the ability of women to access the vaccine (Barnett et al. 2020; Saafan and Shams El-Din 2022) and with relatively greater equality in Tunisia facilitating more equal access (Youssef 2023).

In none of the three countries did self-expressed attitudes toward the government or the health-care system correlate strongly with reported vaccination. Respondents were generally as likely to say they had received the vaccine whether they expressed trust in the health-care system or the belief that citizens should obey the government no matter what. At least by the end of 2021 and early 2022, these results suggest that distrust in the political system or the state was not actively impeding vaccination in Egypt, Jordan, and Tunisia anymore.

In Tunisia, anti-American respondents were somewhat less likely to report being vaccinated, perhaps indicating distrust of Western-produced vaccines in line with President Saied's anti-foreign rhetoric. The coefficient was also negative in Jordan but smaller and statistically insignificant. Daily use of the internet also had an inconsistent relationship with vac-

cination across the three countries. Tunisians who used the internet frequently were somewhat less likely to be vaccinated, but in Jordan daily internet usage was somewhat associated with a higher likelihood of vaccination, and in Egypt there was little difference between frequent and nonfrequent internet users. These patterns suggest that online misinformation may not have been the predominant channel driving high rates of vaccine skepticism in the three countries. Likewise, the importance of religion in one's life demonstrates an inconsistent relationship with vaccination: in Jordan there is a small negative association that is marginally significant, in Egypt there is a positive but statistically insignificant coefficient, and in Tunisia the relationship is near zero. As such, religiosity appears to have little link to the likelihood of vaccination in these countries.

Among Egyptians, Jordanians, and Tunisians who had not yet received the vaccine at the time the surveys were implemented, how many were open to receiving it if it became available to them, and how many were refusing outright? In Egypt, approximately 43% of unvaccinated respondents said they were "somewhat unlikely" or "very unlikely" to take the vaccine if it was available to them. In Jordan, it was approximately 57% of unvaccinated respondents who answered in this way, and in Tunisia it was approximately 38%. As a percentage of total respondents in each sample, these vaccine refusers constituted 13% of Egyptians, 9% of Jordanians, and 11% of Tunisians. These numbers suggest that vaccine skepticism was not so high in these countries as the pandemic entered into 2022, though it is possible that social desirability bias reduced how many respondents were willing to admit that they would not get vaccinated.

For respondents who did say they would refuse the vaccine, their explanations varied. In Egypt, 55% said they were motivated by negative side effects, while only 15% alleged the vaccine would be ineffective and 10% said it was linked to religious beliefs. In Jordan, by contrast, 39% said they would refuse because the vaccine was ineffective, while 30% pointed to side effects and 16% to religious beliefs. Religion was a more prominent explanation in Tunisia, with 35% saying they would refuse the vaccine because of their beliefs. Another 30% said it was because the vaccine would be ineffective, with 18% reporting they were motivated by negative side effects.

Overall, the survey data highlights both strengths and weaknesses in the vaccination campaigns of Egypt, Jordan, and Tunisia. In general, older people were somewhat more likely to be vaccinated, as were groups mandated to take the vaccine, suggesting some success of government policy. At the same time, as with many other countries, marginalized groups were less likely to have been vaccinated even late in the pandemic. These groups included individuals living in rural environments with less education, those without connections to the state through their employment, and women, though there were some variations across the countries. The

survey data also suggests that commonly cited sources of misinformation or distrust in the vaccine, including attitudes toward the government, use of the internet, and religiosity, had relatively little correlation with reported vaccine uptake. These results should be taken with a grain of salt, since they rely on self-reporting and may be affected by social desirability bias. However, the results are consistent with the idea that government policy about how to distribute the vaccines and who to target likely mattered more for patterns of vaccination in these countries than misinformation or resistance by individuals.

Conclusion

In acquiring and distributing COVID-19 vaccines to their residents, Egypt, Jordan, and Tunisia faced many of the challenges that were common in developing countries around the world. They did not have the capacity to purchase large quantities of vaccines themselves and instead needed to depend on foreign financing and donations for much of their supply. Weak state capacity, corruption and favoritism, and public hesitancy fueled by misinformation also created problems for distribution once the vaccines arrived.

However, the extent of these problems varied across the three cases because of differences in their international and domestic political situations. Jordan, as a key regional partner of the United States and an important host country for Syrian refugees, was able to leverage its international position to acquire relatively larger and faster vaccine shipments. Egypt, as an important but less central regional actor, lagged behind and attempted to develop its own domestic production. Tunisia also struggled to secure shipments until after the self-coup by President Saied, at which point several countries quickly provided supplies in an attempt to gain influence over the new regime.

As the vaccines arrived, Jordan developed a relatively effective and equitable strategy for distribution that reflected its more competent health system and reasonably strong state capacity. As a result, vaccines were distributed quickly by regional standards until plateauing in late 2021 in the face of vaccine hesitancy. Egypt's fragmented, authoritarian government failed to develop a transparent, equitable, or efficient strategy for distribution, and those with connections to the state apparatus proved far more likely to acquire the vaccine, especially in the opening months of its availability. Tunisia likewise faced major problems of distribution, as the factional infighting of the democratic system undermined a coherent response. After the president seized power, the pace of vaccinations increased, though it is important to note that he was a key contributor to the internal conflicts that paralyzed the country's initial distribution. The differences across these three countries suggest that regime type may

have played a role in the ability of countries to vaccinate effectively, but not in the way traditionally posited by research on public health (Kavanagh and Singh 2020). Jordan's relative advantage also suggests that better state capacity combined with greater government coherency may help to explain why some countries with similar levels of economic development within the same region experienced more successful efforts to vaccinate quickly than others.

In all three countries, vaccine hesitancy was a potent force. This skepticism may have been exacerbated by distrust of weak states and authoritarian political systems. Nonetheless, analysis of nationally representative survey data from the cases suggests that resistance had become more muted by the end of 2021 and early 2022. Egypt, Jordan, and Tunisia all imposed strict vaccine mandates, at least on paper, and they experienced large waves of infections and deaths during this period as well. In the face of these incentives, vaccination rates continued to rise through 2022, gradually contributing to the diminishment of the pandemic's local effects.

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30 | COVID-19 Vaccination in Israel

Leadership, Trust, and Solidarity

Udi Sommer and Amir Freund

Placed first worldwide by various standards of vaccination rates, Israel achieved outstanding outcomes in its COVID-19 vaccination campaign. The country led the world in youth vaccination rates (ages 12–15), was the first to implement a Green Pass incentive program, and provided publicly available scientific results concerning short- and long-term effectiveness.

The country's small territory and relatively small population, its centralized unitary system of government, the unique infrastructure of the four healthcare organizations that administered the vaccines, and an Israeli public that showed relatively high levels of solidarity during the crisis were all instrumental in the success of the vaccination campaign (Glied 2021; Levin-Zamir 2021). Yet, the country faced significant challenges. The pandemic found Israel deeply unprepared. Years of budget cuts affected the Ministry of Health (MoH) and the basic operational abilities of the public healthcare system in managing a crisis of that magnitude. The lack of trust in the political leadership and the challenges concerning political instability and political minorities also had significant consequences (Murciano 2020; Sommer and Rappel-Kroyzer 2021a, 2021b).

Israel had relatively little experience with civil crises. Decades of ongoing national security emergencies established a government mindset in which crisis management should be handled by the national security apparatus, with its distinctive conceptions and frameworks. Furthermore, COVID-19 coincided with a time when levels of political instability ran high as the country went through four election cycles within half as many years. Of those, two election rounds took place in critical periods during the pandemic, namely March 2020 and March 2021. Such chaotic political circumstances meant that the government failed to pass a budget over two years, challenging its capacity to address surging healthcare costs and acquire the required vaccines. The government also faced the complex task of convincing two minority groups—Orthodox religious Jews and the Arab minority—to collaborate with pandemic measures, and in particular with the vaccination campaign (Barak et al. 2021).

Israel was one of the first countries to administer the vaccine (two shots) and later the boosters. The early mass supply of vaccines in late

2020 and early 2021, unparalleled in any other country, stemmed from a government decision to enter into a strategic agreement with Pfizer. As a part of this Real-World Epidemiological Evidence Collaboration Agreement, Israel agreed to serve as a last-stage testing ground for the pharmaceutical. The deal, which provided Israel with the necessary doses, was quickly implemented. By March 2021, more than 50% of the population had been vaccinated, drastically dropping COVID-19 cases. The vaccination campaigns reduced hospitalizations by approximately two-thirds and deaths in Israel by the same amount (Haas et al. 2022). Consequently, hospital overflooding by COVID-19 patients was prevented, and the healthcare system could properly function.

In this chapter, we capitalize on key themes in the fields of political science and public administration to analyze Israel's successful vaccination campaign: political institutions allowing agility in decision-making and quick response time; public administration supporting data-driven and efficient deployment of the vaccines; political behavior based on trust in the healthcare system allowing mass vaccination; government capacity overcoming political instability; and hesitant minorities joining the vaccination campaign.

Vaccines

Early in 2020, the MoH started an ongoing effort to ensure the availability of sufficient vaccine doses as quickly as possible. Before regulatory approval for the vaccines, the government took a risk and signed advance purchase agreements with Moderna, Pfizer, and AstraZeneca. In parallel, the government established an internal project to develop a COVID-19 vaccine named BriLife.

The government's determination to secure early access to a COVID-19 vaccine influenced the decisions of the pharmaceutical companies to give Israel a higher priority. AstraZeneca Israel CEO Ohad Goldberg explained: "The country showed seriousness. It ordered a large number of vaccinations, and this demonstrated its belief in the vision of the concept of the vaccination" (Weinreb 2020).

In general, the MoH makes decisions on vaccination based on the recommendations of an advisory committee for infectious diseases and vaccines, whose members are professionals in medicine, nursing, bacteriology, and virology. The ministry approves most of the committee's recommendations, but implementing recommendations with budgetary significance is postponed until the required budget is achieved. The advisory committee recommended, and the MoH approved, the emergency use of COVID-19 vaccines mainly based on the US Food and Drug Administration (FDA) emergency use authorization.

Israel decided to use the Pfizer-BioNTech vaccine for mass deploy-

ment primarily. On November 13, 2020, the government announced an agreement with Pfizer for eight million vaccine shots to be administered to four million citizens. The MoH signed a deal with Pfizer titled Real-World Epidemiological Data Analyses Project. One of the goals was to analyze the effectiveness of the vaccine. Under the agreement, Israel was not to provide personally identifiable information about its citizens or to charge any payment for medical information supplied to Pfizer. The agreement did not make clear what additional information, on top of the general statistical data published by the MoH, Pfizer would receive other than stating that data would be segmented by age and other demographics. The MoH agreed to provide Pfizer with an estimate of the direct cost averted due to administering the vaccines (Israel MoH 2021a). The agreement with Pfizer was vital to Israel's ability to overcome later waves of the pandemic, having a relatively low number of deaths and no highly extended lockdowns.

Prime Minister Benjamin Netanyahu made a risky (and potentially controversial) decision to make Israel a testing ground for Pfizer while personally guiding the negotiation process. The vaccine procurement process marked a departure from standard procedures of democratic governance in Israel. In a 2024 report from the state comptroller of Israel (appointed by Netanyahu himself), the primary concern highlighted was that the prime minister failed to disclose his verbal agreement with Pfizer's CEO to the Corona Cabinet or to the government. Given the gravity of the decision and the range of risks involved, decisions of this magnitude require formal government approval, which failed to happen in this case. Albert Bourla, Pfizer's CEO, told the *Financial Times*: "[Netanyahu] called me 30 times, asking: 'What about young people? (. . .) What are you doing about the South African variant?' I'm sure he was doing it for his people, but I'm also sure he was thinking: 'It could help me politically" (Jerusalem Post Staff 2021).

The government and the health system were required to invest additional resources to protect the health system and improve its functioning. About NIS 17 billion (approximately USD 5 billion) was allocated to the issue, of which about NIS 4 billion (USD 1.15 billion) was allocated directly to the health system.

By the end of 2020, Israel purchased 10 million vaccines from Pfizer at an average cost of approximately USD 24 per shot (Dyer 2021), spending about USD 350 million on the first vaccination campaign. The economic cost of three days of lockdown would have been more significant.[1] In April 2021, Israel signed a second agreement with Pfizer to purchase an additional 9 million doses to last until the end of the following year, with an estimated total budget of USD 300–450 million. Overall, the state of Israel paid NIS 3.4 billion (approximately USD 1 billion) for the procurement of COVID-19 vaccines (including options for vaccine purchases) as of October 2022. As of October 2022, 29 million vaccine doses were supplied, with

the BioNTech/Pfizer vaccine representing 90% of the doses administered. In late 2021, Israel made the AstraZeneca vaccine available for those unable to receive the other two types of mRNA-based shots (Times of Israel Staff 2021).

By mid-2021, more than a million Moderna and Pfizer vaccines at Israel's disposal had expired. Pfizer refused to authorize an extension. Consequently, Israel negotiated an agreement with the Palestinian Authority to provide 1 million doses in return for later delivery of new Pfizer vaccines ordered by the Palestinians. After this negotiation failed, Israel negotiated similar agreements with other countries. In July 2021, for instance, Israel signed a deal with South Korea to exchange 700,000 Pfizer vaccines about to expire (Jaffe-Hoffman 2021a).

Vaccinations

Chronology

In late 2020, Israel launched the Return to Life campaign. The campaign encouraged vaccination by creating a set of incentives, such as allocating a green tag that allowed access to public venues like shopping malls, museums, and restaurants. Within a month, the country had inoculated a third of its population of 9 million people; 80% of those aged 60 years and older got the vaccine. The campaign included the administration of two Pfizer-BioNTech vaccine (BNT162b2) shots, administered first to the elderly (aged 60 years and older) and medical staff, followed by teachers, and then gradually the rest of the population. By the end of March 2021, Israel had administered 116 vaccine doses[2] per 100 citizens (of any age)—far more than any other Organization for Economic Cooperation and Development country (Rosen et al. 2021). The vaccination campaign proved to be highly effective in the containment of the third wave of COVID-19, estimated to prevent approximately 158,000 cases of infection, 24,000 hospitalizations (of which about 17,000 hospitalizations would have been due to severe illness), and 5,500 deaths (Haas et al. 2022). By the time the Delta variant emerged, immunity levels in Israel had waned due to the relatively long period since the previous vaccinations (Goldberg et al. 2021; Levin et al. 2021). Indeed, the decision of the MoH on July 30, 2021, to approve a third dose (booster) to people vaccinated more than five months before was driven by the rapid spread of Delta. While the first two vaccines were administered only after FDA approval, Israel introduced and approved the booster shot as part of its vaccination rollout, even before the FDA approval (Bar-On, Goldberg, Mandel, Bodenheimer, Freedman, Kalkstein, et al. 2021). Israel was the first country to administer the booster, which proved highly effective for older people and other age groups. The booster shot reduced the risk of infection by up to 90% as well

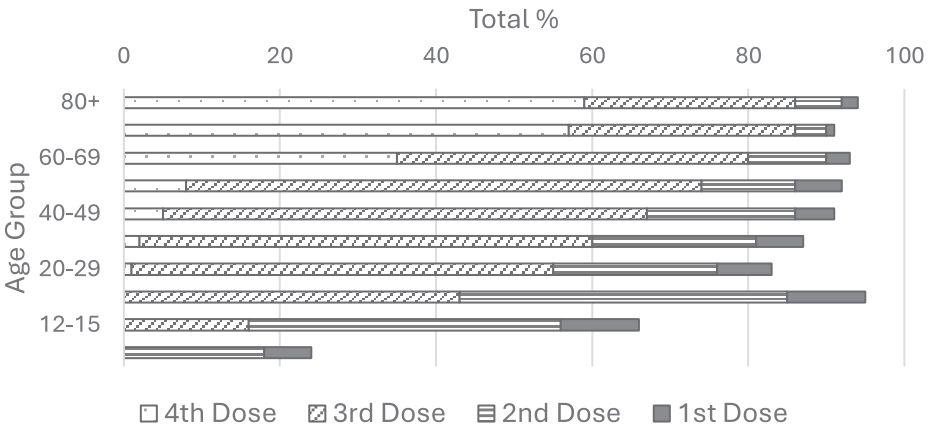

Fig. 30.1. Vaccination percentage by age group, October 2022

as significantly brought down the number of COVID-19-induced hospitalizations and deaths (Bar-On, Goldberg, Mandel, Bodenheimer, Freedman, Alroy-Preis, et al. 2021; Muhsen, Maimon, Mizrahi, Bodenheimer, et al. 2022; Patalon et al. 2022).

In December 2021, Israel was the first country to recommend a second booster (a fourth dose of the vaccine). The target population included older people (aged 60 years and older) who had received the third dose at least four months earlier. The primary goal was to increase COVID-19 immunity in light of the rapid infection rate caused by the Omicron strain. The second booster proved efficient among the elderly population, although less so than the first (Bar-On et al. 2022; Gazit et al. 2022; Magen et al. 2022; Muhsen, Maimon, Mizrahi, Boltyansky, et al. 2022).

Figure 30.1 breaks down the administered vaccine doses by population age group. Close to 60% of the 60 and older population received four doses; 30% received three doses. The vast majority of the rest of the grown-up population received at least two doses, and over 50% of the children aged 12 or older received at least two doses of the vaccine.

The effectiveness of the vaccination campaign in Israel, particularly with the vulnerable elderly population, is demonstrated in figure 30.2. Infection rates among people aged 60 and older are plotted over time for those vaccinated (blue), those with expired vaccination certificates (black), and those who were unvaccinated (red). At the peak of the COVID-19 Delta wave (in September 2021), mortality rates among the vaccinated elderly were 3.2% of overall elderly daily mortality (vaccinated: 0.4 daily deaths per 100,000; unvaccinated: 12.5 per 100,000). At the peak of the Omicron wave (in February 2022), the mortality rate among those vaccinated was 6.5% of the overall daily mortality rate (vaccinated, expired, and unvaccinated, respectively, had 1.9, 6.9, and 21.1 daily deaths per 100,000).

Israel's fifth vaccination campaign started in September 2022, administering Pfizer vaccines (booster) adapted against all Omicron variants. As

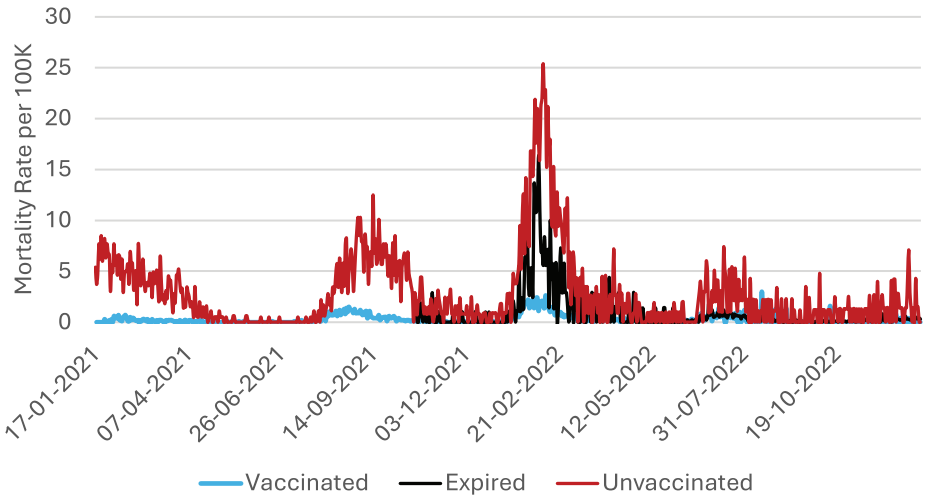

Fig. 30.2. Vaccination effectiveness: Death rate for those aged 60 and over

in earlier campaigns, priority was given to citizens aged 65 or older, pregnant women, healthcare workers, teachers, and other at-risk groups. Guided by risk-benefit considerations, the MoH recommended vaccinating children (5–11 years old), particularly in neighborhoods with high infection rates. Yet, only a quarter of eligible parents vaccinated their children (Myers et al. 2022).

Government Incentives

Under Israeli law, the government can issue compulsory vaccination in health emergencies (Israeli Law 2022). Yet, using such emergency powers proved unnecessary. The centralized political structure in Israel enables the chief executive to approve and establish the vaccination campaign rapidly. In February 2021, the Israeli MoH introduced a Green Pass program targeting the vaccination of 95% of the population to reach herd immunity. The incentives included access to public events (social, cultural, and sporting), universities, gyms, hotels, and restaurants reserved for individuals with immunity, whether based on recovery from COVID-19 or being fully vaccinated within the previous six months. Presentation of a negative PCR or antigen test result was offered as an alternative. The Green Pass granted an exemption from quarantine due to contact with a confirmed COVID-19 case or upon returning from international travel. Green Pass forgery became a criminal offense punishable by fines or incarceration.

The Green Pass program led to increased demand for vaccination in areas with low vaccination rates, such as minority neighborhoods. Mobile vaccination units were deployed to Bnei-Brak, an ultra-Orthodox Jewish city, to central nightlife areas in Tel Aviv, and to geographically remote

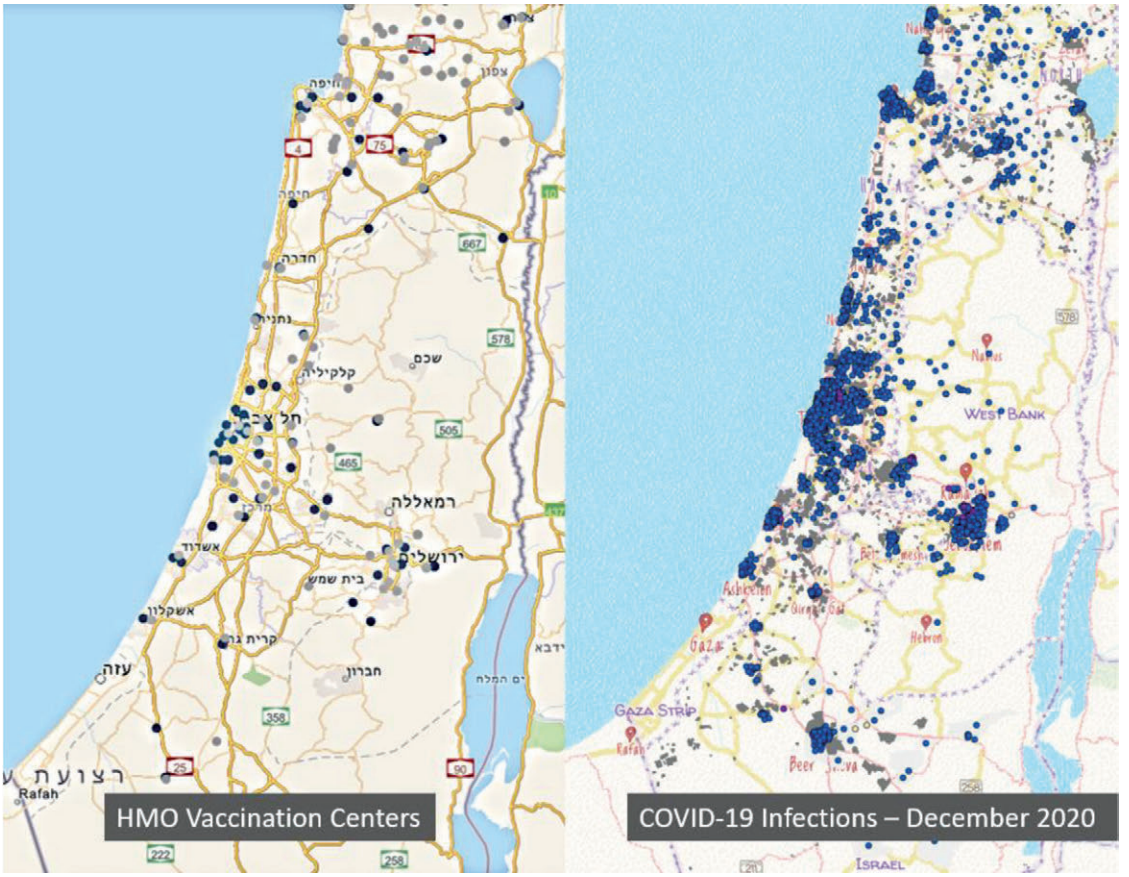

Fig. 30.3. HMOs' COVID-19 vaccination centers

Arab villages (Wilf-Miron et al. 2021). Opposition to the Green Pass program claimed it was illegal and unethical, creating discrimination based on vaccination status. Such claims pertained to discrimination against families with children below the minimum age for vaccination and people with preexisting health conditions that prevented them from being vaccinated.

Israel's national health insurance system provides universal coverage through four competing, nonprofit health maintenance organizations (HMOs). The HMOs offer a broad range of health services via centers nationwide and cover inpatient care provided by public hospitals. The HMOs keep detailed electronic health records for each patient and maintain continuous communication with their members.

MoH officials supervised the HMOs, which led the vaccination campaign. Taking advantage of their nationwide coverage, availability of experienced healthcare personnel, and computerized infrastructure, the HMOs provided the government with the capacity to deploy the vaccines quickly. Figure 30.3 demonstrates how well the coverage of the HMOs'

centers matched the need for vaccination. On the right side of the figure is the geographical distribution of Israeli COVID-19 infections in December 2020. On the left side are the locations of the main centers providing COVID-19 vaccinations. During the critical weeks of the pandemic, the centers worked around the clock, providing accessible and efficient service. The HMOs' mobile apps supported booking appointments. The second largest HMO in the country (Maccabi) deployed drive-in vaccination sites in major cities and recorded videos showing people rolling up their sleeves to take the vaccine without unbuckling their seatbelts. This orchestrated effort allowed quick mass vaccination (Muhsen and Cohen 2021; Sommer and Rappel-Kroyzer 2023). Electronically collected data enabled real-time monitoring of vaccine uptake. Immunization data became available immediately to MoH officials, serving as the basis for policy decisions, for the allocation of vaccination-related resources, and for targeted media campaigns.

Challenges

Israel's main challenges during the vaccination campaign had to do with convincing hesitant minority groups to take the jab and with fighting fake news. The two most prominent and well-defined minority groups are the ultra-Orthodox Jewish community and the Arab population. Approximately 74% of the population in Israel is Jewish, of which nearly 12% are ultra-Orthodox ("Haredi"). In addition, 21% are Arabs (with the remaining 5% of other denominations). The risk of infection in both the Arab and the ultra-Orthodox populations was higher than in the general Jewish population. Yet, the vaccine uptake was lower among those two groups (Muhsen et al. 2021; Shkalim Zemer et al. 2022). One explanation for low levels of compliance among Israeli Arabs was the lack of resources and information campaigns customized to these groups (Kamin-Friedman 2021).

For various reasons, including the poor handling of the COVID-19 crisis in Arab cities, towns, and villages, there was a lack of trust among the Arab population in the healthcare system and state institutions more broadly. As the median age among Arabs is one of the lowest in Israel, the priority for the elderly in receiving the vaccine was rendered less crucial. The elderly Arab population had limited access to digital media. Such low levels of information availability made setting up vaccination appointments highly difficult. Longer physical distance from the vaccination centers created an additional barrier (Boxerman 2020, 2021). A third of the people who said they had not been vaccinated, including 54% of the Haredi and 38% of Arabs, stated it was because they had already contracted the virus and thus felt protected (Jaffe-Hoffman 2021b). A significant part of the ultra-Orthodox population was under the age of 16 and, hence, not eligible for vaccination. Unfounded claims about vaccines hurting women's fertil-

ity also influenced ultra-Orthodox women, for whom reproduction is a religiously sanctioned obligation (Goldenberg 2021).

Using targeted interventions, the MoH worked hand in hand with the HMOs to shrink the gap in vaccination rates between minority groups and the rest of the population. Engaging local government, addressing community leaders, and involving Arab and ultra-Orthodox medical personnel in the decision-making process and the operation of the immunization campaign proved to be transformative. Various media channels were used to provide COVID-19 culturally adapted content in Arabic and Yiddish. Additional effort was made to deploy mobile clinics, enhancing access to the vaccine (Muhsen and Cohen 2021). With time, key holdouts of vaccine hesitancy remained only within low socioeconomic groups (Saban et al. 2021) due to individual perspectives on the COVID-19 pandemic, mainly due to general suspicion about vaccines (Heller et al. 2022).

Equity

All Israeli citizens were eligible to receive the vaccine free of charge. While at a lower priority, foreign workers and asylum seekers enjoyed the same privileges. The first to receive the vaccines were healthcare workers, older people in assisted living facilities, and employees who worked in those facilities. The second priority was given to people 60–65 years old and people with preexisting medical conditions such as obesity, diabetes, and transplants. Next were teachers, soldiers, and the rest of the population, in decreasing age groups. In general, vaccination centers were flexible in that those patients who eventually arrived at the centers were likely to get a shot, their age and status notwithstanding. Eligibility criteria were clear, simple, easy to follow, and flexible enough to prevent loss of vaccine doses.

Early in the campaign, controversies emerged around the country's implementation of the eligibility policy. The minister of health stopped the vaccine supply at a Tel Aviv hospital that was administering doses to teachers who did not meet eligibility criteria. The Prime Minister's Office also came under fire when all its employees, regardless of age and health, were vaccinated. Criticism emerged over access to vaccines for Palestinians living in the West Bank. The Palestinian Authority, which controls the West Bank, is responsible for delivering medical care in its territories, according to the Oslo Accords signed in 1993. Although the Palestinian Authority refused to receive vaccines from Israel, in early March 2021, the Israeli government started vaccinating Palestinian workers with valid work and residence permits. Vaccines were free at eight land border crossings (Israel MoH 2021b). The vaccination campaign in the Israeli-occupied territories has been slow to get off the ground. By the end of March 2021, Israel had vaccinated over 100,000 Palestinians who worked in Israel and West Bank settlements (Ben Zion 2021).

Why?

Prime Minister Netanyahu's need to maintain his grip on power, coupled with the prevailing political instability in Israel, explains many of the government's decisions during the vaccination campaign rollout. Forming a robust centralized crisis management operation was critical to prevent high casualties. Among the key priorities was ensuring access to adequate vaccine supplies and curbing the anti-vaccination movement, which was closely tied to broader anti-Netanyahu public sentiment.

Crisis Management

Prime Minister Netanyahu initially struggled to manage the contingency. The Israeli health system had suffered budget cuts for several decades before the pandemic. Despite significant population growth, the public health budget remained stagnant, leading to a decline in both the wages and the status of healthcare workers. Recruiting professionals to the health system became increasingly complicated, diminishing preparedness for future crises. When the pandemic started, Israel's first response was handled by the security community: The National Security Council under the Prime Minister's Office was the first to be in charge, and the Israel Defense Forces oversaw lockdowns and epidemiological investigations. Israel's Institute for Intelligence and Special Tasks (Mossad) was responsible for sourcing and procuring essential medical equipment, while the General Security Service (Shabak) was tasked with notifying citizens who had been in close contact with infected individuals (Waitzberg 2022). The government military-type approach to the COVID-19 civilian crisis resulted from the health system's weakness and the mindset of the leadership (and the public) created through a long history of wars and national security challenges (Murciano 2020). Managing the crisis using the security community proved to be suboptimal mainly because of the lack of professional knowledge and experience. The need for horizontal collaboration between various government ministries, municipalities, HMOs, hospitals, and worker unions has generated conflicts stemming from the hierarchal nature of national security institutions.

The involvement of intelligence units and various tracking technologies limited public transparency and deteriorated trust in government. Consequently, in May 2020, the government established a Corona Cabinet of 15 ministers headed by the prime minister. The mandate was granted to coordinate between government bodies fighting the pandemic, develop an exit strategy, and prepare for a second wave. The cabinet was ineffective, as it required government approval. In July 2020, the government appointed a COVID czar. Underlying this decision was the recognition that gaining public trust necessitated the leadership of a credible public health

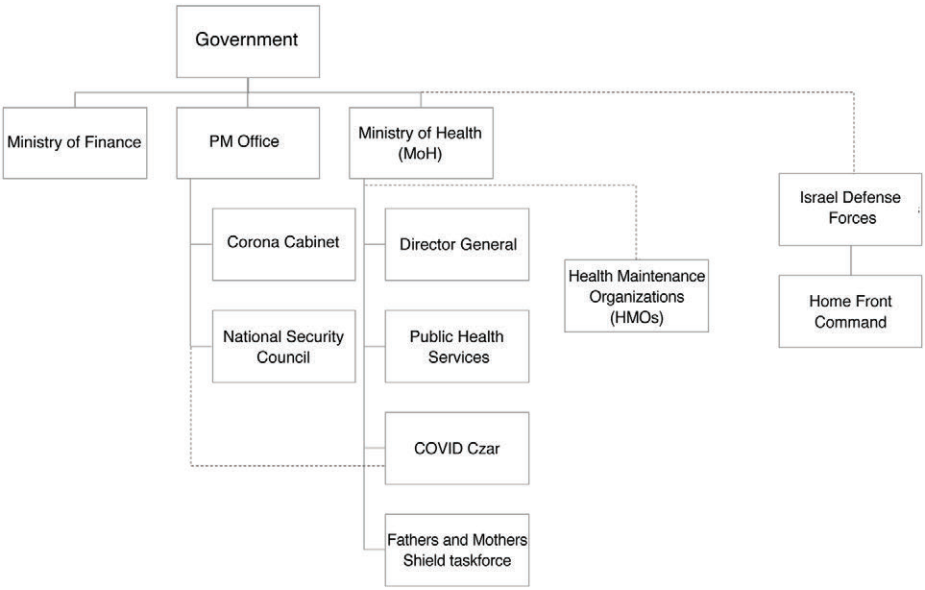

Fig. 30.4. National institutions involved in the COVID-19 crisis

official. This shift from a generic crisis management approach to a specialized one meant that by the time the vaccination campaign was underway, a COVID czar had been appointed. All three officials serving as COVID czars were medical doctors who had previously held prominent public health roles. Figure 30.4 outlines the leading national institutions managing the crisis during the campaign.

Political Instability

Since 2019, Israel has suffered high levels of political instability, with four elections held within about two years (2019–21). The first two elections, in April and September 2019, failed to produce a governing coalition. The election in March 2020 involved a constitutional crisis, requiring the Supreme Court to step in. At this point, Israel suffered from a high rate of COVID-19 infections, leading to negotiations for a national emergency government. Finally, a unity government was formed based on a rotation agreement between Benjamin Netanyahu and Benny Gantz. However, the new coalition was so feeble that it could not pass the budgetary vote required to finance vaccines. Amendments in temporary governmental orders, referred to as "financial boxes," were used. The process to approve these temporary instructions caused a delay in procuring the vaccines, making them available in sufficient quantities only at the beginning of 2021. In December 2020, Israel entered a third lockdown, and January 2021 was the deadliest month with 1,433 deaths. Netanyahu had been

under police investigation for several allegations since December 2016. He had been officially indicted for breach of trust, acceptance of bribes, and fraud in November 2019, and his trial started in May 2020.

Indeed, many Israelis felt that the crisis was handled according to Netanyahu's political considerations (Schwartz 2021). Netanyahu was counting on a successful vaccination campaign to help his reelection effort. This might explain why Israel, which had additional deals with Moderna and AstraZeneca, was ready to pay soaring prices for the vaccines, agreed to become a testbed for Pfizer, and was even running its own national vaccine development project.

In an effort to improve his political fortunes, Netanyahu took primary credit for the success of the vaccination campaign, shifting his election strategy from a war narrative to a sports-focused storyline. Israel was to achieve a world record in vaccination rates, hoping that portraying Netanyahu as the one making Israel the world's leading country in pandemic response would render the government's failures during the first and second waves less consequential. This would lend the Likud (Netanyahu's party) the electoral edge it needed.

However, Netanyahu stepped down after losing the elections in March 2021 and was replaced by Naftali Bennett. One of Bennett's first decisions after assuming office was to administer a third dose of the Pfizer-BioNTech vaccine. This was a tough decision because there was no regulatory approval for the safety or efficacy of a third dose. The World Health Organization urged countries not to go ahead with boosters before less-developed countries vaccinated most of their populations with a first dose. All of this took place amid a contentious political debate between Netanyahu and Bennett, with each claiming credit for the booster decision and both arguing over whether Bennett's action had been delayed, potentially leading to more COVID-related deaths. Israel's decision to become the first country to offer a third vaccine dose on a broad scale played a key role in overcoming the Delta variant early, allowing the economy to reopen ahead of many other nations.

The decisions by both Netanyahu and Bennett to aggressively deploy vaccinations counted on high levels of trust in the healthcare system and on the willingness of people to embrace vaccinations, which is generally true in Israel. Multiple vaccines in Israel are routinely administered to babies and children, including against diphtheria-tetanus, polio, and hepatitis (Israel MoH 2022). The MoH recommends vaccinating the entire population against Influenza annually, starting at six months of age, with relatively broad compliance. Eight years before the pandemic, several hundred people were diagnosed with polio, and approximately one million children opted to be vaccinated, quickly removing the threat.

Development of an Israeli Vaccine

Following the outbreak, the Israeli government decided to develop a COVID-19 vaccine at the Institute for Biological Research (IIBR), which operates under the Prime Minister's Office and works closely with the Ministry of Defense. Most of the work carried out by the IIBR is secretive. IIBR is in charge of multiple research projects on pharmaceuticals, vaccines, medical treatments, and antibodies, all aimed at protecting Israeli civilians from chemical and biological weapons. Before the pandemic, government decisions led to budgetary cuts at the IIBR, reducing the number of employees and closing the vaccine development operation. Yet, as early as February 2020, Prime Minister Netanyahu instructed the institute to focus on medical solutions for the pandemic, allocating a special budget of NIS 175 million (USD 50 million) to support this effort.

The IIBR vaccine, BriLife, was based on a previous FDA-approved vaccine platform further optimized for COVID-19. As it was a live virus vaccine, the industrial scale-up and manufacturing were expected to be rapid and affordable. Public opinion and the media were supportive as well (Melman 2022). Only a few in the medical and scientific community expressed skepticism regarding the feasibility of the project and the ability of the institute to accomplish the task. The IIBR received approval from the MoH and the Helsinki Committee to begin testing its vaccine, BriLife, against the SARS-CoV-2 coronavirus on November 1, 2020.

However, the Israeli initiative failed to advance after Pfizer, Moderna, AstraZeneca, and Johnson & Johnson, as well as Russian and Chinese companies, developed vaccines with demonstrated effectiveness. With difficulty recruiting subjects, no progress was made beyond the second stage of clinical trials. In July 2021, the operation was sold to US-based NRx Pharmaceuticals, which, less than a year later in April 2022, announced that it had decided to drop its COVID-19 BriLife vaccine initiative.

In many ways, the project was doomed to fail. Israel lacked the necessary experience and knowledge; the allocated budget was negligible compared to the USD 3 billion invested in the Pfizer vaccine; and the selected institute was a military one, not civilian, employing only 300 workers, many of them with skills not entirely fitting the task. In hindsight, the critical upshots of the BriLife initiative were serving the government's and the premier's political goals and saving the IIBR from further cuts in budget and workforce.

Opposition to the Vaccine

Political behavior in Israel is typically characterized by trust in healthcare institutions, which accounts for why fake vaccine news had little effect on the general public (Hermann and Plesner 2021; Kagya et al. 2021). However, the lack of transparency around the agreement with Pfizer and the

missing information regarding the long-term effects of the vaccines created distrust and left room for the spread of misinformation. The most consequential piece of fake news was that the vaccine was not approved for use and that it altered the DNA and caused more mortality than COVID-19 itself. Among the ultra-Orthodox, social media was ripe with disinformation concerning the link between the vaccine and infertility. Among the Arab constituency, false news suggested that expired vaccines were administered to Arabs (Kamin-Friedman 2021). The MoH's effort to fight fake news included the appointment of social media analysts to detect untruthful posts and the use of well-known medical experts and doctors to address any concerns publicly.

The anti-vaccine movement in Israel also struggled to gain traction. Those holding street rallies constituted an ideological camp mostly from secular Jewish backgrounds. Many were former opponents of Prime Minister Netanyahu, thus combining the "anti-Bibi"[3] movement with anti-vaccine goals. Once the vaccination campaign was underway, its impact was not instantaneous, and the number of infection cases grew. This enabled anti-vaxxers to gain some public support. Yet, by April 2021, the number of cases went down drastically from 10,000 new daily cases in January to less than 10, which rendered anti-vaccine messages irrelevant. In addition to protests opposing lockdowns, mandatory vaccines, government restrictions, and vaccinations, the anti-vaccine movement threatened leaders of the vaccination campaign. Most prominently, Dr. Sharon Alroy-Preis, a top bureaucrat heading the MoH's public services who was viewed as the public face of the national inoculation effort, was repeatedly threatened. The committee in charge of child vaccination, combining health officials and experts, had to convene behind closed doors to enable its members to speak freely in light of aggressive anti-vax rhetoric. At the end of November 2021, MoH officials approached Rabbi Chaim Kanievsky, one of Israel's top Haredi rabbinical authorities, to support the child vaccination campaign. Rabbi Kanievsky accepted the request and called on his followers to vaccinate their children. Shortly after that, the rabbi and his family were assigned a police escort to protect their lives. In contrast to the anti-vaccine movement, high levels of trust in the healthcare system in the general public allowed the government to focus on the main challenge of vaccination hesitancy among Arab and Jewish Orthodox minorities.

Conclusions

Israel entered the COVID-19 national emergency with unfavorable conditions: Political instability limited the government's capacity to pass laws, including the budget; the government did not have experience in managing a health crisis of such magnitude; the healthcare system had been

deprived of adequate funding for several decades; and no sound plans had been made in advance. Nevertheless, due to its successful vaccination campaign, Israel became one of the first countries worldwide to overcome the pandemic.

This success should be attributed mainly to political and administrative-structural factors, Israeli experience with national emergencies, and specific, unique characteristics of the Israeli citizenry. The unitary and centralized system of government permitted both prime ministers, Netanyahu and Bennett, to personally push for swift vaccination campaigns (Elhadad and Sommer 2022). Signing the agreement with Pfizer, making Israel a testing ground for the vaccines without the need for a lengthy legislative process, provided Israel with an invaluable advantage (Sommer and Rappel-Kroyzer 2023). However, the way the agreement was signed came at the expense of disregarding standard administrative law procedures, undermining fundamental democratic principles in Israel, as highlighted by a 2024 report from the state comptroller. Prime Minister Bennett's involvement enabled the fast deployment of the third vaccine (the booster) early on in the Delta variant.

The healthcare system and the close cooperation between the HMOs and the MoH facilitated the quick administration of the vaccines. Their geographical coverage of the country, the availability of trained medical staff, and their constant and effective communication with the public made the HMOs the operational and logistical backbone of the vaccination campaign. The broad digitization of healthcare services and infrastructure allowed the government, specifically the MoH, to manage the campaign and monitor its effectiveness in real time. What is still not fully known is how the collected data served Pfizer in developing vaccines for the benefit of the rest of the world.

Another critical factor was the high levels of trust that Israelis had in the healthcare system. The public is used to national crises (although mainly of the national security sort) and consistently exhibited high levels of solidarity under such circumstances. This explains both the high vaccination rates and the limited traction of the anti-vaccine movement.

Early on in the campaign, there were low levels of compliance among the two key minority groups, the Arab population and the Jewish ultra-Orthodox (Barak et al. 2021). Dr. Ronni Gamzu, Israel's first COVID czar, said: "I was surprised—and still am—by the vast diversity and gap between communities in Israel, a diversity that influences our resilience as a nation" (Alcorn and Bollyky 2021). The government's approach of collaborating with local municipalities and incorporating the leaders of these communities to support the campaign proved successful.

Although these political, administrative, and social factors are not exclusive to Israel, their combination, synergy, and the outcome of a successful vaccination campaign render the Israeli case unique.

NOTES

1. The Bank of Israel estimated a cost of NIS 3.2 billion per one week of lockdown during October 2020, https://www.boi.org.il/he/NewsAndPublications/PressReleases/Pages/06-1-21.aspx
2. Counting the first and the second (two weeks apart) separately.
3. "Bibi" is a common nickname for Benjamin Netanyahu.

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31 | Conclusion

The Comparative Politics and Political Economy of Vaccines and Vaccinations

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By any reasonable indicator, the story of COVID-19 vaccines and vaccinations is a world-historic triumph. A virus that was first identified at the end of December 2020 had been sequenced within months, and nearly a dozen vaccines were under development before it had even spread to every country in the world (Pennington 2022).[1] In less than a year, enormously effective vaccines were authorized to appear on the market and mass-produced. Within three years, a majority of our species were vaccinated.

Contrast this with HIV, the last major pandemic. We do not know when it first arose. It was first identified, by the US Centers for Disease Control and Prevention (CDC), in 1981. It was arguably first sequenced (by the French Institut Pasteur) in 1985 (Vahlne 2009). Highly active antiretroviral therapy was first introduced in 1995 (Berger 1996). Despite decades of research and development, there is still no vaccine, though HIV is a much more complex virus than COVID-19. It changes rapidly, hides in the body, and attacks the immune system itself, making it very hard to target with a vaccine.

Then go back before that. Influenza caused perhaps 50 million deaths in 1918–19, but medical science was at best aware that it was viral. Public health measures were restricted to controlling gatherings and masking, first-line approaches that were as effective and politically contentious then as now. The existence of viruses at all had only been discovered in 1892, after all. While the basic concept of vaccination was developed by Edmund Jenner in the early 18th century, an improvement on far older Chinese and African concepts of variolation, identification of the actual mechanisms behind immunization, such that vaccines could be safely distributed across society, took another century and a half.

Look back before that. Previous scourges such as malaria, plagues, smallpox, or polio remained with humans for millennia, with little or no understanding of their mechanisms or management, still less the Promethean power of a vaccine. In other words, COVID-19 went from a scary new threat to a known disease with powerful and widely distributed vaccines in a blink of an eye.

While humanity might have reasonably given itself a pat on the back, that was not exactly what happened. There were legitimate criticisms of vaccine development, procurement, allocation, and administration. Globally, all the inequalities of the world were reproduced with depressing fidelity. Big countries with money did best; small countries with money and big countries without money could make their way if lucky and well governed; small countries without money worked with what others chose to give them. Vaccine diplomacy, a concept introduced with the intent of improving relations and avoiding health threats (Hotez 2021), rapidly came to mean use of vaccine supply for diplomatic ends. Exciting collective action ideas, globally or regionally, disappointed, with the exception of the European Union (EU) and (against headwinds) the African Union (Greer, chap. 6, this vol.; Balogun and Amaya, chap. 26, this vol.). A senior US Food and Drug Administration (FDA) official compared the global allocation of vaccines to oxygen masks dropping inside a depressurizing airplane: "You put on your own first, and then we want to help others as quickly as possible" (Blume and Mezza 2021: 205). Of course, the logic of putting on your own oxygen mask in an aviation emergency is that you cannot help others if you black out first. That was not the logic with vaccines. The political, as against moral or epidemiological, logic of vaccine allocation is simply that it is impossible to be generous until one has been successfully selfish.

There were some plausible criticisms. In many countries, there was cause to criticize the acquisition of vaccines, since high-speed, high-stakes acquisition of products from the highly profitable and closed-mouth pharmaceutical industry did indeed produce grounds for complaint about prices, liabilities, transparency of negotiations, and delivery dates. Speedily produced Russian and Chinese vaccines did not go through the same regulatory processes as Western vaccines, raising questions about their trials and side effects. Once vaccines were available, government actions also came in for all sorts of legitimate discussions: Were vaccination campaigns well run, were prioritization schemes just and justly administered, were vulnerable populations getting effective and equitable outreach? There were even some side effects, notably the ones that meant the Oxford University–AstraZeneca vaccine lost popularity, though remaining a mainstay of decentralized, at-cost, production and a core element of COVAX. Notwithstanding, had it been the only vaccine available, the risks associated with it would still have been far outweighed by the harms COVID-19 was doing.

Then, there were scientifically nonsensical but politically and socially powerful criticisms. The pandemic and reaction against public health measures meant some countries already had diverse and dynamic COVID-19 denialist movements, as well as questionable and even harmful measures billed as preventative or curative, and strange political movements (e.g., around the Great Barrington Declaration) that called on governments to ignore or even propagate COVID-19 (for the sordid US story, some of whose protagonists went on to prominence in Donald Trump's second

government, see Howard 2023). US leaders of these critical movements were among Trump's nominees for top health policy positions in government when he regained power in the United States in 2025. In Brazil, former President Jair Bolsonaro (2019–22) repeatedly downplayed the severity of COVID-19, promoted unproven treatments like hydroxychloroquine, and discouraged vaccination efforts, framing public health measures as threats to personal freedoms rather than necessary protections.

What do we learn from all of this? In a previous edited book, *Coronavirus Politics* (Greer, King, et al. 2021), we often saw how what seemed like an epoch-making shock to politics and societies often produced strangely little change. Just as with the 1919 pandemic, the effects were mostly below the surface and hard to identify. On the surface, elections after 2021 were won and lost, mostly, on the familiar terrain of inflation and economic growth, not success or failure at public health policy. With *Vaccination Politics,* authors looked at vaccination campaigns, explaining variation in how they worked and what they told us about politics and societies. This conclusion draws out some patterns, as understood by the editors, and some lessons for a future for vaccines that is politically very uncertain.

Meanings of Capacity and Meanings of Trust

Perhaps the two most common concepts in the discussion of vaccination campaigns are capacity and trust. This is reasonable. State capacity, in particular, refers to the ability of the state to execute its plans. It is a combination of resourcing, the fungibility of resources (e.g., the ability to use the army to administer vaccinations), and the responsiveness of the state overall. It explains, for example, much of the good performance of Jordan relative to Egypt or Tunisia (Singh and Williamson, chap. 29, this vol.) or the internal variation in Indian vaccination campaigns, which reflects different states' capacity. A focus on state capacity draws on at least a century of theories about the modern state, but just underneath lie many questions. For example, many governments' capacity turned out to lie in the broader public sector, in universities, social partners, civil society organizations, and such. Many governments augmented their capacity, for better or for worse, with public-private partnerships. These included pharmaceutical companies, obviously, but also a host of outsourcing firms and consultants (Jarman et al. 2022, 2024; Rozenblum, chap. 8, this vol.). What looked like whole of government exercises turned out, upon investigation, to be whole of society exercises and therefore complex and filled with contradictory motivations and incentives.

Understanding state capacity therefore has the problem that the capacity of the state's principals to give a direct order (e.g., to the army) is different from mobilizing bureaucracies in a crisis; is different from changing

long-standing bureaucratic procedure (Greer and Lillvis 2014); is different from intelligently mobilizing the private sector (e.g., get good value from consultants or outsourcing firms); is different from collaborating with subnational governments (e.g., coordinating policy implementation across different levels of government); and is different from collaborating with the diverse organizations in civil society (e.g., outreach efforts to vulnerable populations) (Greer et al. 2017; Greer, Falkenbach, et al. 2024).

Perhaps predictably, the result was a series of pleasant surprises born of the "residual capacity" Asante identifies (chap. 27, this vol.). Argentina, for example, was facing tremendous challenges unrelated to the pandemic but showed an impressive level of coordination capacity across sectors (Bortz et al., chap. 16, this vol.). The legendarily inept Italian state delivered vaccines effectively to a population that had suffered a great deal (Falkenbach and Guicciardi, chap. 7, this vol.), while a Chilean state that was just emerging from a political crisis (Méndez et al. 2020) also showed high capacity (Méndez, chap. 17, this vol.). Even states in serious trouble, or states known for poor coordinating capacities, turned out to have people within them who were capable of improvising effective responses (Rich et al. 2024).

Building state capacity, at a minimum, tends to mean enhanced policy capacity (though management consulting firms compete with governments' own civil services, often very effectively) and basic integrity so the state is not hopelessly corrupted. It requires a balance between being embedded in society and autonomous from it that is always hard to maintain amid conflicting incentives (Evans 1995; Jarman et al. 2024). But beyond that, state capacity's fungibility and conceptual boundaries are extremely variable and start to be interpenetrated with other social values, such as trust: Do subnational governments trust the advice of their country's government? Does the government trust advice from researchers or international organizations? Or, related, is capacity altered by a sense of crisis and emergency, which, as disaster researchers repeatedly find, can produce an immediate burst of pro-social energy that works wonders but generally curdles into particularly low morale a year later (Greer, Rozenblum, et al. 2022)?

Trust is therefore an obviously important issue, not just for discussions of capacity but also for discussions of the acceptability of any public health campaign or functional health-care system (McKee et al. 2024). Trust is so necessary to effective action that it might almost be a part of state capacity (Falkenbach and Willison 2022). It is probably especially important for vaccination campaigns (Adhikari et al. 2022; Jennings et al. 2023; Rozek et al. 2021). Vaccines are less likely to be discretionary choices, are often administered to people who cannot fully consent (children), are endorsed by governments, and are administered in such huge numbers to healthy people that even rare side effects might be ethically and politically intolerable. They have to rest on a firm foundation of trust. Do you trust the people who are urging you to introduce something into your bloodstream

or that of your children? This is a problem given the accumulating evidence that trust in institutions and others has been deteriorating for decades around the world (Levi and Stoker 2000; Norris 2022).

Generalized measurements of trust within a society are complex to conduct and difficult to understand or use (Warren 2018). For example, asking people if they trust their government to do the right thing is actually asking two things at once: whether they trust their *state* and whether they trust the current *government*. It is entirely possible to have a basic trust in one's state and detest the current people in charge. It is also possible, in authoritarian regimes but not only in authoritarian regimes, that people do not answer direct questions honestly. This difficulty leads researchers to use complex inferential strategies. More specific questions have more use, such as asking whether street police are trustworthy (a strong proxy for trust in street-level bureaucrats and therefore social services administration overall) (Blair et al. 2022), but they are still hard to validate for any one use, particularly in cross-national comparison. People's actions also vary from their stated views; in many countries, they can combine overall skepticism about institutions, expressed in surveys, with day-to-day actions that show they expect institutions to play by predictable and broadly just rules. The core problem facing this kind of research is that trust is highly contextual; you might trust police or doctors in your city but not elsewhere, and even if you do trust their advice you might get vaccinated anyway (e.g., out of social pressure) or not get vaccinated (we are all busy). Or, as with the People's Republic of China, different measures of trust produce high but very different levels of trust in the government, but those must be contrasted with low trust in the vaccines that the state is advocating (Seligsohn, chap. 18, this vol.). For another example, consider the challenges in Hong Kong, where weak trust in vaccines coincided with plummeting trust in government as the People's Republic of China subordinated the territory (Burns, chap. 19, this vol.). Context matters.

The obvious solution is to lower the ambition of trust studies. For example, it is fairly clear from many studies using different methods that worse health leads to less political participation and more interest in voting for the populist radical right (Kavanagh 2021; Galofré-Vilà et al. 2021, 2022; Kavanagh and Menon 2024). The mechanism here can be tested and is well supported: ill health leads to extensive interactions with healthcare and other institutions, which can easily fail or insult users, who then have less trust in broader systems. That story, which might be especially interesting in the context of a pandemic disease with potential long effects, is far more useful as policy and testable as scholarship than a correlation between vaccination rates and trust in traffic police. Vague correlations do not establish clear causal mechanisms and are often influenced by multiple confounding factors, making them less useful for developing targeted policies or theoretical advancements than a clear argument that links health status and politics via trust.

More broadly, taking context and specific trust mechanisms into account offers a more useful way to understand manifestations of trust, kinds of trust, and when trust happens or changes over time. Banerjee and Holmes (2020), for example, address the problem by urging scholars to refocus trust studies on specific instances, such as times when people are asked to follow rules, and attention to the consequences of inequality (e.g., when violent demonstrations or flouting public health rules are or are not punished within a society). Charles Tilly focused on its variation in relation to social networks, arguing that democracy depends on expanding trust from private networks into trust in the broader state (2004, 2005).

The short-term result is that this book, collectively, problematizes both capacity and trust as concepts while demonstrating their importance and potential value as scholarly tools. They both clearly matter but are under very different specifications amenable to very different research methods.

Playing by the Rules: The Governance of Vaccine Acquisition

One of the interesting dimensions of the COVID-19 pandemic is something that did not happen, namely, a large-scale challenge to the basic structure of intellectual property (IP) rights and production in the pharmaceutical industry worldwide. One might have imagined that the scale and suddenness of COVID-19, combined with the speed of sequencing and vaccine development, might have created a stronger coalition for waivers of IP rights or at least some of the legal structures that protect the existing pharmaceuticals industry (Ibata-Arens 2021). A Trade Related Aspects of Intellectual Property Rights (TRIPS) waiver was supported by the World Health Organization (WHO) (Ghebreyesus 2021), and multiple governments, including the United States (Siripurapu 2021), as well as activists, researchers, and nongovernmental organizations, argued as much early in the pandemic (Baker 2021). Policymakers in low- and middle-income countries were certainly aware of their situation. But overwhelmingly, the actors with agency and some options, above all powerful governments, philanthropies, and international organizations, chose to play within the basic rules of intellectual property. The basic governance of vaccine innovation and production, with its advantages and disadvantages, remained in place.

Broadly, from the 1980s onward, technological and regulatory changes had combined with neoliberalism (a preference for market mechanisms and private sector delivery) to make older methods of smaller scale, often state-owned, vaccine production nonviable. Regulatory changes, notably tighter Good Manufacturing Practice (GMP) standards, increased the costs of production and led to many producers dropping out of markets. Technological development such as recombinant DNA and then mRNA meth-

ods created both new IP rights and, connected, manufacturing challenges that required IP licensing, specialist equipment, and esoteric skills (older vaccine technologies were out of patent or were not patented) (Blume and Baylac-Pauly 2022). The result is that vaccine development and manufacturing were concentrated in a relatively small number of countries, firms, and production sites relative to, for example, the situation in 1980. This more oligopolistic market structure was protected by *both* the technological challenges of scaling up production of costly and exotic new technologies to a suitable level of quality *and* IP rules that made accessing the knowledge and technology difficult (Shadlen 2020). Accounts that emphasize only the IP issues (e.g., treating a TRIPS waiver as a cure-all) or only the technological issues and GMP might be interesting polemics or political interventions but do not capture the actual nature of the problem (Shadlen and de Menezes, chap. 2, this vol.).

Innovation, where it was found, was often in seeking ways to operate more effectively within existing global governance. There were innovations in advance purchase agreements, market authorization (Massard da Fonseca, chap. 3, this vol.), and industrial policy such as the United States' Operation Warp Speed. The African Union (Balogun and Amaya, chap. 26, this vol.) and the EU both showed that regional international organizations could be important players, with the EU in particular taking on a new role negotiating on behalf of its member states (Greer, chap. 6, this vol.) as part of a broader transformation of its role in health (Della Corte 2024; Anderson et al. 2021; Forman and Mossialos 2021; Martinsen and Goetz 2022; Quaglia and Verdun 2023; Truchlewski et al. 2021; Citi and de la Porte 2022). South Africa showed that it could produce mRNA vaccines as a proof of concept, if not at scale, while producers in countries with more established pharmaceutical industries such as India and Brazil produced substantial quantities. The People's Republic of China, which was overtly using vaccine production as a way to advance its pharmaceutical industry, was almost too successful, with popular and effective vaccines using older technology adopted worldwide while its mRNA technology, developed later, was effectively irrelevant (Seligsohn, chap. 18, this vol.).

Developing vaccines is different and just as hard as producing them. While production requires industrial capacity, supply chains, and regulatory approval, vaccine development demands cutting-edge scientific expertise, deep research capacity, and long-term investment in innovation. Creating technologically capable producers who can access the IP by some mechanism and produce at economic scale has been a proposed solution, for example, with efforts to create advance vaccine production in Africa, but the political, financial, and technological challenges are impressive, and they require both domestic capacity building and a measure of supportive international collective action that becomes steadily harder to guarantee in the climate of the 2020s.

Even in places with the financial wherewithal, efforts to build a more resilient (read: localized) production capacity run up against decades of movement toward concentrated just-in-time production. Australia, a wealthy country with considerable scientific infrastructure, attempted a local development approach and failed (de Leeuw et al., chap. 25, this vol.). Brazil disappointed the expectations of many (Flynn and Fonseca 2023), while Thailand's local production efforts foundered (Harris, chap. 24, this vol.). Meanwhile the most successful Chinese vaccines were not the ones at the technological frontier (Seligsohn, chap. 18, this vol.).

Even the EU and United States, among the world's largest economies, faced challenges born of complex supply chains when they attempted to repatriate production. Despite these setbacks, a lasting legacy of the pandemic may be a new interest in local vaccine development and production capacity as a component of both industrial policy and effective sovereignty (Park, chap. 21, this vol.). The pandemic underscored a crucial reality: While expanding vaccine production is an expensive and logistically complex challenge, the real bottleneck is development—turning new scientific discoveries into viable, scalable vaccines. Countries as different as Australia, Argentina, Brazil, Thailand, and South Korea came to appreciate these realities. Another solution is simply to use older vaccine production technology and pay less attention to the standards and preferences of countries where the vaccine is unlikely to appear anyway. Cuba, for example, produced a vaccine pointedly called "Soberana" (sovereign) and sold it to another country, Iran, that also was at odds with the United States. These vaccines did not benefit from the support of globally influential regulators such as the European Medicines Agency (EMA) and the FDA or the capacity to scale their production. There were more of these vaccines that might be remembered.

COVAX and ACT-A, the global vaccination schemes (Perroud, chap. 4, this vol.), were in their way innovative. They faced the problem that richer and larger countries had massive incentives to defect. Richer and larger countries simply did not need to join with the rest of the world to procure effective vaccines, and they had little incentive to accept the constraints of these schemes in order to do so. It is easy to see why none of the larger or richer governments chose to accept a model in which 20% of the world had to be vaccinated before more than 20% of their population could be vaccinated. Once the global ambition of COVAX was shown to be impossible, the scheme turned into something that is not at all new in global health politics: an underfunded form of charity with a particularly large EU component.

Where a challenge was visible, it was launched by non-Western powers. Russia, China, and India capitalized on the shortages through vaccine diplomacy, embedding their products within strategic alliances and shifting the balance of global health aid, as seen in the case of Malawi and Pakistan (Ferree et al., chap. 28, this vol.; Khalid et al., chap. 23, this vol.).

The most prominent of these was probably the Russian vaccine, the pointedly named Sputnik V, which was an effective and quickly produced vaccine (not accepted by the EMA or FDA but accepted by more than 30 countries by early 2021) that Russia used effectively in its vaccine diplomacy. China, with its Sinopharm and Sinovac, was also eager to sell to countries that lacked the resources, Western favor, or trust in the West to acquire the vaccines from the United States and the EU. Cuba's Soberana, of course, was the product of a country that not only is long isolated from US favor but also has made an improbable ideological and economic export product out of public health and health care. This vaccine diplomacy perhaps stood out more because vaccine development is more concentrated. Fifty years ago, countries such as Yugoslavia and Romania were active as vendors of vaccines, seeking both prestige and profits, but now vaccine diplomacy, like most vaccines, is the property of great powers. Cuba is the principal remaining exponent of that older model, and it was marginal in the COVID-19 response.

It is not hard or unjustified to criticize these rules or the players. The science was exceptional, given that a variety of innovative vaccines were approved within a year of the recognition that there was a novel coronavirus in China. Market authorization and pharmaceuticals regulation are understudied, particularly outside the EU and the United States, but they collectively assured safety and quality of the globally significant vaccines (Massard da Fonseca, chap. 3, this vol.; Massard da Fonseca et al. 2021). The production did lead to large-scale vaccinations in most countries over subsequent years, though with all the international inequalities that one might expect. The competition between producers and different models—for example, the "Western" approach and the Russian, Chinese, or Cuban approaches—imaginably might have helped to discipline producers and governments alike. But the pandemic, which came alongside and accelerated international geopolitical tension, also made clear how geographically concentrated vaccine development and profits had become. Ultimately, only 5 out of 32 vaccines were widely used, and they were from the "usual suspects": AstraZeneca, Pfizer-BioNTech, Sinovac, Moderna, and Sinopharm (King 2024).

The reason there were so many state-run vaccine institutions a hundred years earlier was that national self-reliance was an important value (Blume and Baylac-Pauly 2022). Fragile supply chains and deteriorating international relations are once again making it look like a goal. In the European Union or the United States, this might mean support for keeping entire supply chains on their territory, but what it means for smaller countries without the resources or powerful allies remains to be seen.

The "grid" that helped to guide global health thinking about vaccine development and production in the 1990s (Batson et al. 1994) might help to understand or even develop predictions in this new world. Conceptually, it is a two-dimensional scatterplot of market size and wealth. A large

and wealthy market such as the United States or the EU can almost certainly develop or buy vaccines; a small but wealthy market such as Israel or Bahrain will need to buy vaccines, potentially at high cost; a large and poor market can probably produce vaccines if it can get the technology and resources; and a small and poor market needs help. Patterns of international alliances, winners, and losers might emerge from this logic, with particular threats to the smaller and poor markets, whose governments lack political power.

Vaccination Campaigns as Social Policy

Once countries began acquiring vaccines, they also faced the problem of vaccination. If vaccines are a problem of international political economy—research funding, intellectual property, supply chains, and international inequality—then vaccination campaigns are a problem of social policy. Social policies, in Titmuss's definition, are health and economic policies that have beneficent, redistributive, and economic goals (Alcock and Glennerster 2001; Greer, Jarman, et al. 2021). The public good, redistribution, and economic goals are mixed together as both objectives and constraints, and that is very true in vaccination campaigns that are costly, redistributive, and vastly good for most of the economy as well as the population.

In most middle- and high-income countries, vaccination is primarily concentrated in children and, to a lesser extent, in the elderly population, with seasonal influenza vaccination as the main vaccination campaign aimed at working-age adults (now, presumably, to be joined by seasonal COVID-19 vaccination). It is conducted through primary care, whether doctors' offices or pharmacies, and often supplemented for specific sectors who do not have access to steady and trusted primary care (e.g., schools and universities offering vaccinations to their students or outreach to vulnerable groups such as the unhoused or migrant workers).

In the context of COVID-19, such a system had an obvious stock and flow problem. A vaccination system set up to serve a few cohorts (children of a given age, adults of a given age, people who wanted a particular vaccine such as influenza) was not adequate to quickly vaccinate an entire population with, in most cases, a two-shot course. Thus, many countries addressed the problem by creating large-scale vaccination events that would reduce the stock of unvaccinated people. The large scale of these events involved resources such as stadiums, shopping malls, and military units that were not commonly found in public health or primary care and made vaccination more interesting and visible than it might otherwise be. In the United States in 2021, it was possible for citizens to be vaccinated by the "Guardians" of Space Force, the military arm dedicated to extraplanetary conflict, in the festive atmosphere of a sports stadium. Such

initiatives allowed the Biden administration to achieve the remarkable—and now often forgotten—feat of administering 200 million vaccines in 100 days (Blumenthal and Morone 2026). Meanwhile, many countries also used more targeted and low-key approaches such as school vaccinations, increased use of pharmacists (Rozenblum, chap. 8, this vol.), or mobile units (e.g., at festivals or nursing homes). Failure or inability to conduct targeted outreach contributed to low vaccination rates, as in large parts of India (Dey et al., chap. 22, this vol.).

The issues and the adaptiveness of countries varied. Vaccination campaigns and epidemic preparedness are a central focus of many African countries' health policies, giving them a readiness and expertise that some other countries lacked (see in this volume, Asante, chap. 27, Ferree et al., chap. 28, and Balogun and Amaya, chap. 26). Particular success at managing COVID-19 could induce complacency, notably in Hong Kong (Burns, chap. 19, this vol.), or continued adherence, as in Japan (Ibata-Arens, chap. 20, this vol.). As time wore on and demand for vaccines diminished because the stock of unvaccinated people diminished, it became possible to return the flow of COVID-19 vaccinations to the health system, perhaps with some modifications (e.g., permanent changes in the ability of pharmacies to vaccinate).

The stock and flow problem might be hard to bring back to memory from a few years later, but it shaped the politics of 2021 when most countries' vaccination campaigns were most intense. Consider the slogan attached to the Italian campaign (Falkenbach and Guicciardi, chap. 7, this vol.): "Wait your turn." How were authorities to allocate vaccines? In most countries, there were grids, sometimes several in succession or operated by different governments, of priority populations: health-care workers usually came in first, then older and medically vulnerable populations, then some combination of broad at-risk categories (e.g., adults, by progressively lowering age thresholds), occupational categories such as teachers, and finally the general population and young people. Decisions about children varied greatly.

Eligibility was also interwoven with actual priority. For example, it is a commonplace of health care that people with money, education, and stable social situations tend to access health care more easily. They face fewer barriers and are able to better overcome them. They are also often better able to avoid exposure in the first place. White-collar workers could more easily work from home in a pandemic than could cooks or hospital porters. In the context of 2021, many well-off middle-class people wanted vaccinations and received them as soon as they were offered (it is at such groups that mass vaccination events are aimed), but other groups required different kinds of effort that only happened when authorities prioritized them.

In the United States, for example, some states tried to allocate vaccines to particular organizations (e.g., health-care systems) based on a CDC-created "Social Vulnerability Index" (SVI), which identified geographic

areas with populations at greater risk of both health problems and lack of service. Part of the logic of interventions such as the SVI, in the United States but also in other countries with politicized racial or ethnic relations, is that they allow authorities to direct vaccines to particular populations without explicitly acting on racial grounds, which would be legally and politically contentious (Moore-Petinak et al., chap. 14, this vol.). Beyond such broad interventions, there were also efforts to reach out to particular populations, often unprivileged ethnic, racial, and linguistic minorities. In the UK, for example, a very successful initial campaign looked less successful as it petered out in minority communities that were harder to persuade and serve (Jarman, chap. 12, this vol.).

As social policy literature always assumes, any distributive program taken at scale will create different hardships, anxieties, and political tensions. For example, obesity was widely accepted as a risk factor for worse COVID-19 outcomes and a potential reason for vaccination, but if people above a given body mass index were to receive vaccines alongside more obviously at-risk populations, the result would be both a stress on vaccine supplies and a great deal of day-to-day injustice as portly middle-class workers with stay-at-home work options vied with people whose health conditions seemed more intuitively severe. At the scale of a large organization, let alone a country, the result was a difficult set of standards that were often left to frontline workers to implement (e.g., does a person who is obese but otherwise apparently healthy deserve a vaccine in the context of today's supplies and clientele?). These small-scale injustices were spread throughout any system that attempted to prioritize when health-care workers were taken to include stay-at-home data entry staff and managers or when different organizations and workers interpreted rules differently. Prioritization schemes could become extremely contentious, especially when there was already political contestation about the speed of vaccination campaigns (Kurzer and Laible, chap. 11, this vol.; Mätzke, chap. 9, this vol.) or when there were accusations of favoritism (e.g., Bortz et al., chap. 16, this vol.).

The social policy of vaccination involved different operative units than vaccine acquisition and market authorization. Divergence and coordination issues between governments are a feature of federations, and COVID-19 vaccination was no exception (Greer, Béland, et al. 2022; Greer et al. 2023). Central governments led vaccine acquisition in federations, but in no federation discussed did they have the capacity to run vaccination campaigns (Trowbridge and Fafard, chap. 13, this vol.; Massard da Fonseca and Rich, chap. 15, this vol.; Moore-Petinak et al., chap. 14, this vol.; Dey et al., chap. 22, this vol.; de Leeuw et al., chap. 25, this vol.; Mätzke, chap. 9, this vol.). The largely successful advance purchase schemes run by the EU and the US federal government meant only that vaccines were turned over to other governments and actors who were actually to run the campaign. Once a pallet of vaccines was shipped, the political and technical problems of its distribution belonged to member states and federal states, which created coordination problems and in some cases competition. Even in

Brazil, a country with a strong tradition of centralized vaccination policy, poor coordination at the Ministry of Health meant that vaccine administration varied widely, exacerbating existing regional disparities. Partisanship of governments played a major role in different vaccine access and prioritization, making it harder to comment on overall outcomes.

Types of vaccine also played a role in 2021, even in wealthy countries that had acquired a variety of vaccines. AstraZeneca's vaccine had been a favored candidate for many governments (with beneficial financial terms as a result of the company's desire to break into a new market and Oxford University's involvement and because of less demanding cold chain requirements than the mRNA vaccines). Unfortunately, it turned out to be associated with slightly higher likelihood of heart problems in younger male populations. This news, coming amid confusing initial data reports and interventions by politicians, led to its being limited as an option and losing popularity. Elsewhere in the world, reports surfaced that some vaccines (especially the mRNA vaccines) or developers (US and European sources) were preferred to Russian, Chinese, or other vaccines (Kurzer and Laible, chap. 11, this vol.; Schwarzinger et al. 2021). The fact that richer countries redirected unused vaccines, bilaterally or through COVAX, also highlighted global inequalities, as unpopular vaccines were shipped from richer to poorer countries, sometimes too close to expiry dates to do much good.

In almost every country, demand for vaccinations also started to fall off after the first round. In *Coronavirus Politics* we noted that there would be a tremendous demand for forgetfulness as the pandemic ended (regardless of the actual toll of the virus), and vaccination rates were a casualty of this (Greer, King, et al. 2021). In most cases, including chapters in this book, the key vaccination metric reported is the share of the population that had the initial two-course set of vaccinations (or, for a few one-shot vaccinations such as Janssen/Johnson & Johnson, the single vaccination). In most cases, if we look beyond that, the data becomes less available and comparable, but it is clear that many people did not receive additional vaccines. Given that COVID-19 continues to evolve such that protection requires additional vaccinations, this means that the old binary distinction between vaccinated and unvaccinated no longer works.

Mandates were a logical and almost inevitable topic in vaccination debates. Historically and in comparative perspective, outbreaks lead to vaccination mandates (Vanderslott and Marks 2021). Should vaccine mandates be required for some parts of the population? For everybody? For everybody who wanted to engage in a given activity (e.g., by showing a vaccine passport before being allowed into a bar or airplane)? The politics of mandates and mandate acceptance varied wildly across countries examined in this book. Pakistan opted for mandates *because* of low trust in the state (Khalid et al., chap. 23, this vol.). The Japanese experience constitutes a case of vaccine mandates being accepted and effective and

having no downstream negative impact (Ibata-Arens, chap. 20, this vol.), while the chapter on Austria (Czypionka et al., chap. 10, this vol.) is subtitled "How to Polarize a Society." The Austrian experience, in which there were no population-wide mandates but a terrible political fallout, is unfortunately more representative (Mätzke, chap. 9, this vol.; Serrano-Alarcón et al. 2023).

The immediate acceptability and effectiveness of any vaccine mandate and the downstream political effects for party voting and social movements are two different things. The French experience, of mandates apparently being effective as a vaccination policy (Rozenblum, chap. 8, this vol.; Deruelle 2025), might have contributed to the ongoing growth of their populist radical right party and the renewed strength of their right-wing middle-class tradition of aggrieved social movements (e.g., Poujadiste and Gilets Jaunes in history). For another example, in the United States, COVID-19 was a major cause of fatalities among police (Boydstun and Wells 2023), but police officers and departments often resisted mandates. Implementation of such mandates would have presumably helped both police and the people with whom they interacted while also identifying and removing police officers who refused orders on ideological grounds. Such a lustration might have been useful, given the role of the police in US politics (Banerjee et al. 2024; Farris and Holman 2024).

Vaccine Reluctance and Vaccine Resistance: Supply and Demand

In early 2021, the social policy of vaccination was similar to that of many services: some people wanted a scarce good, and the problem was prioritization, while some specific, often vulnerable, groups needed some more outreach (Majid et al. 2022). But soon a new problem became impossible to ignore: active resistance. One of the dramatic effects of the COVID-19 experience is a resurgence of resistance to vaccination. It has already affected politics and health in some countries, though in ways that are complex and entwined with existing partisan and electoral dynamics. It is spilling over to affect not just the potential interest of future governments in future vaccines but also to increasing political opposition to regular immunization.

It is common in public health circles to intentionally avoid the language of "vaccine resistance" or "anti-vaccination" activism. Public health researchers will instead opt for discussions of "vaccine hesitancy" or "vaccine reluctance." The given reason is that such language avoids demonizing people who do not want vaccines or taking their stance as unchangeable. If people are actually rationalizing a fear of needles with misinformation about vaccines, then public health organizations might rightly view them as "reluctant" and try to address that challenge as one of needles more than misinformation.

The problem is that this nonjudgmental conceptual framework might be valuable in service of a vaccination campaign, but it obscures the fact that there are real, organized forces in politics that resist vaccines' legitimacy and vaccination campaigns. Preexisting hesitations about vaccination or preexisting trust relations might seem like plausible explanations of the outcomes of vaccination campaigns, but they clearly do not explain it all. Consider the relative success of French vaccination, which would have been hard to predict (Rozenblum, chap. 8, this vol.). Neither do they explain the passion, resources, and popular support of anti-vaccination movements after the pandemic in what had been relatively pro-vaccination countries, such as Austria and the United States (Czypionka et al., chap. 10, this vol.; Moore-Petinak et al., chap. 14, this vol.). These movements, supplying anti-vaccination material and often echoing past anti-vaccination movements, are part of the explanation for vaccine hesitancy (Blume 2017). During the pandemic, they rose to new prominence. What happened and what might it mean?

We might think of vaccine resistance and reluctance in terms of supply and demand for vaccine-negative messages (Vissapragada, chap. 5, this vol.). The demand side has been the focus of much research, trying to identify the reasons why particular populations want to be vaccinated, don't want to be vaccinated, or want to hear anti-vaccine information. This research addresses the immediate needs of public health agencies and has to be conducted at many sites around the world because there will always be big contextual differences in the nature of reluctance or resistance in different subgroups of different populations in different countries.

What WHO called an "infodemic" of misinformation and disinformation (Vissapragada, chap. 5, this vol.; *The Lancet Infectious Diseases* 2020) has drawn attention to something else though—a surge of bad information about vaccinations and vaccinators that is put forth quite intentionally and with an eye to recruiting people who might not otherwise have had reservations about vaccinations. It is here that a supply-side theory is valuable. Who is activating, in fact cultivating, fear and distrust of one of history's most beneficial technologies (Steven and Charles 2020; Purba et al. 2024; Abbasi 2025; Carpiano et al. 2023)?

One source of supply is what is often politely called the complementary and alternative health sector, or the wellness industry. This is a vast category of activity that runs from acupuncture to chiropractic to homeopathic to "natural" medicine to water therapy to unlicensed mental health practice to yoga to unusual diets to supplements. Its relationship with the formal health-care sector varies enormously along two axes: whether it is regulated as health care, and whether it is financed as health care or restricted to out-of-pocket expenditures. In some countries, such as China and India, there are powerful and deeply rooted traditional medicines that compete and sometimes complement allopathic medicine for popular loyalty and government support (Palmer 2007). Some of its leaders, such

as Andrew Wakefield (originator of the fraudulent claim that vaccines cause autism) and Robert F. Kennedy Jr. (Donald Trump's nominee for US health secretary) had direct business interests in creating theories of vaccine harm in return for a share of any winnings in lawsuits against vaccine providers or investments in alternative therapies (Deer 2020; Barnes 2025). Alternative medicine also encompasses an enormous spectrum along with people and practitioners can move; there is a big distance between somebody who does a few yoga exercises and somebody who refuses allopathic medicine entirely, or between somebody who takes vitamins and somebody who refuses vaccines.

Nonetheless, the alternative health sector often has incentives, and advocates, for opposition to public health and medical science. Insofar as its practitioners compete with allopathic medicine, which is endorsed by governments, public health agencies, and clinicians, they have incentive to denigrate their competition. That means not just asking potential clients to compare the logic and offerings of alternative medicine with those of allopathic medicine. It can also mean denigrating the "establishment" of researchers, companies, health-care organizations, regulators and governments that stand behind allopathic medicine. The elective affinity between skepticism about vaccines and skepticism about the governments that offer them is clear and it seems there is a pipeline between the two skepticisms.

A second source of supply would be political activists. There is not much literature on the politics of anti-vaccination activists, and much of it is concentrated in the United States (Kirkland 2023). Anti-vaccinationism activism in other countries would be a valuable object of study. Its origins vary, from people who were left unsatisfied by their treatment by conventional health-care organizations (whether out of lack of resources, diagnostic failure, prejudice, lack of access, or something else) to people whose ventures outside the health-care system made them feel empowered to take it on more broadly (as with the people who turned the experience of a successful natural birth into a warrant to decide whether to vaccinate the babies thus born) (Reich 2016). Many of them are directly or indirectly linked to the alternative health industries. At a low point in the history of anti-vaccinationist organization in the United States, their principal organization was financially rescued by chiropractors, presumably out of a shared hostility to public health, medical, and scientific authorities as well as business development opportunities (Kirkland 2012). The supplements industry is a core source of financing for COVID-19 vaccine disinformation promoters, a small group with remarkable reach (Center for Countering Digital Hate 2021). Entertainment figures who promote anti-vaccinationism in the US sell supplements and other questionable products directly (as with Alex Jones's Infowars businesses) or indirectly (via advertising). Those commercial determinants of health can spill over into unlikely combinations such as Democrat Oprah Winfrey's support of

various figures who later turned to populist politics and alternative medicine. Tracking these businesses, influences, and social movements outside the US context would be especially novel and valuable, and might require attention to specifically transnational connections and actors that promote these ideas in different contexts.

A third source of supply can be populist leaders. In particular, there seems to be an elective affinity between politicians of the populist radical right (PRR) and vaccine skepticism if not outright anti-vaccinationism. Such an affinity is almost definitional, if we start with a definition of a PRR politician or movement as one that is anti-pluralist and anti-elitist, ideologically empty but oppositional towards "elites" and positive about "common sense" (Falkenbach and Greer 2021; Mudde 2013; Rooduijn 2014; Judis 2016; Müller 2016; Falkenbach et al. 2019; Rinaldi and Bekker 2020). These parties found themselves wrong-footed early in the pandemic, when a topic (health) for which they have little issue ownership was suddenly extremely salient. Their initial efforts were to downplay the pandemic and change the topic (e.g. away from pandemic management at home and towards blaming China). As the pandemic continued, they refocused in many countries on opposition to public health measures such as business closures, a stance that resonated with core beliefs and much of a social base concentrated among people like small business owners. The result was that parties which often express hostility to government and science were, by the time vaccines arrived, often deep into a politically effective rhetoric of pandemic denialism, alternative therapies, and hostility to the public health and medical authorities that were calling for vaccination in addition to earlier polarizing measures such as masking. In some countries, the PRR is essentially absent, which might be part of why the global evaluation of mandates in Japan is so positive, but in others, such as Germany, Austria, and the US, vaccination mandates clearly became part of the broader populist radical right and entwined with both extreme conspiracy theories (e.g., QAnon) (Ball 2023) and leaders of "mainstream" parties that had fully embraced what had once been a fringe (e.g. Donald Trump). We see the result, for example, in increasing partisan polarization around trust in health care, with Republicans in the United States showing relatively lower and declining trust in health authorities and doctors (Washington and Hagere 2025) as an outgrowth of their party's opposition to many public health policies and ideas (Gadarian et al. 2022; Offit 2024).

A fourth source of supply might be foreign actors. It is difficult to track specifics, but it is clear that there have been organized Russian and Chinese efforts, in particular, to sow division and anti-American, or anti-Western, sentiment in many different countries. This is sometimes overt, as when we see Russian funding to European political parties such as the French National Rally (RN), but often seems to take the form of disinformation networks such as bot farms, payments to influencers, and use of

media organs. There might be no specific interest in vaccination behind these campaigns, but if they sow division and mistrust they might seem like good value investments. Very small countries (under 1 million in population) might be particularly susceptible to what the WHO called the infodemic, simply because so little commercially produced material is tailored to them but a misinformation campaign would be a tiny cost and potential big benefit relative to the budget of a great power (Greer et al. 2025). As a rule of thumb, effective foreign intervention requires domestic confederates (Greer and Wai 2019), so a foreign power cannot divide a country on its own. In the 2020s, though, passionate divisions and merchants of polarization are plentiful around the world and many obviously accepted, or turned a blind eye to, foreign help.

Focusing on supply of anti-vaccination sentiment is important because we cannot understand vaccination politics or the outcomes of vaccination campaigns with a purely demand-side approach. Sensible explainers published by public health agencies will not convince people whose political identities are mobilized around anti-vaccination activism or whose theories of health are driven by alternative health practitioners who will often claim that their products confer health without vaccines' putative problems. People are all bundles of fears and hopes, but something has to activate those fears and hopes. That is why supply-side explanations of politics and the investigation of the political economy of those suppliers are so crucial. The political science of social movements (Blume 2006), political communication, and interest groups and parties, in particular, should offer us insight.

Nor can we understand post-COVID-19 politics without attention to the effect of anti-vaccination mobilization and politics. On the one hand, pervasive disenchantment and lack of trust in many different contexts might be exacerbated by specific, targeted efforts to question the safety of vaccines and the motivations of those who research, produce, regulate, and administer them (though this argument might not be very strong, given secular declines in trust in most contexts that might be the background for anti-vaccination activism) (Valgarðsson et al. 2025).

On the other hand, if populist radical right politicians have adopted anti-vaccinationism, perhaps as part of a broader suspicion of public health, then the next few years might be very difficult for public health campaigns and outcomes. Incumbent governments fared very poorly in 2024, the year in which the most people in human history to date were able to vote in relatively free elections. Most political scientists would simply suggest that this was because of marginal voters' disgust with inflation and perhaps austerity. But if the demand among voters in countries as different as Argentina and the United States was for a change, the supply in many places was met by parties and politicians of the populist radical right. Not only are the appointees of Donald Trump explicitly anti-vaccinationists, given charge of a vaccination system built on the

assumption of good faith actors, but the interaction of political polarization and vaccine attitudes has become so strong that *pet owners* are declining to vaccinate their animals. Republican Party affiliation reduces their willingness to vaccinate a dog or cat against diseases such as rabies (Haeder 2023).

A whole host of factors and political institutions shape the impact of populist radical right politicians. Understanding voters' motivations is rightfully a different field of political science from understanding the actions of politicians in power in particular institutional contexts. In particular, concentrated power that can be won by a mere plurality of voters is dangerous. In the United States, France, and other presidentialist systems, the presidency constitutes a massive point of potential failure (Greer, Fonseca, et al. 2024), which is why presidentialist regimes have a tendency toward instability and erratic policy (Linz 1990; Elgie 2005). They create a two-party competition (by design in the French two-round system and by result of the party system in the United States, but also because there can only be one president while there can be many forms of multiparty parliament). If the opposition party is anti-vaccination, then an electorate that fires an incumbent out of discontent with inflation has, among other things, hired a government that will undermine public health. That happened in the United States in 2024 and remains a risk to presidentialist governments tarred with incumbency during post-COVID-19 inflation. If voters have only two options in the aftermath of COVID-19 and inflation, and one is incumbent and one is anti-vaccine, voters are likely to choose an anti-vaccination government. That will shape policy and public health beyond just COVID-19 vaccination policies.

Lessons for the Future

The unprecedented global demand for COVID-19 vaccines not only underscored existing inequalities but also reconfigured them along starkly geopolitical lines. Wealthier nations, leveraging advance purchase agreements, monopolized early vaccine supplies, securing doses months ahead of low-income countries, whose access depended mainly on donations or delayed deliveries (Glassman et al. 2022). The result was not merely a reflection of economic power but a reshaping of international alliances, where vaccines were as much about access to health as they were about consolidating political influence. This complex interplay of demand and power ultimately revealed the fragility of global health solidarity, as distribution channels strained under pressure, exposing the need for more resilient, diversified supply chains—a lesson that, in the political calculus of a pandemic, was learned too late.

For political purposes, the COVID-19 pandemic is over. Politicians, voters, and interest groups alike have lost interest in the topic. The impact of

the pandemic, like the virus itself, nonetheless continues to affect society. Its economic consequences, especially inflation, hurt incumbent governments around the world in 2024 and seem to have durably inflected the growth trajectories of major powers. The fallout from COVID-19 and long COVID, while difficult to measure, remains considerable—but the costs of lost productivity, happiness, and lives are less to many governments than the political costs of discussing the issue or even paying for booster vaccinations. Moreover, the effects of COVID-19 vaccination campaigns continue to reverberate. The supply-side theory of vaccine resistance and hesitancy suggested here and by Vissapragada (chap. 5, this vol.) carries the important implication that the whole supply side of politics is now affected by actors empowered or diminished by COVID-19. Vaccines have acquired newly bitter, wealthy, and effective enemies in some places, some of them entrenched much closer to power than they were before 2021. Organizations that question one vaccine are likely to question others and will have gained strength from their political and popular salience during the COVID-19 years. Vaccination politics show us the consequences of life in newly fragmented informational environments and oligarchic media structures, but they are unfortunately only one of many opportunities to view the operation and effects of such political regimes.

It is certain, though, that COVID-19 will not be the last pandemic that humans face. Climate change, habitat loss, and increasing interconnectedness all suggest that, if anything, there will be more pandemics in our future (Carlson et al. 2025). The Promethean promise of vaccines, as close to magic as any other technology humans have mastered, has shown that it is capable of preserving lives and societies from many of these menaces. But it is also under attack, whether from assaults on the international scientific collaboration that made its technology possible or by an anti-vaccination alliance of political and economic actors that was paradoxically strengthened by the world-historic success of COVID-19 vaccine production.

This book took a step toward offering a better comparative understanding of the politics, social policy, and political economy of vaccination policies, showing the importance and complexity of some issues such as trust and state capacity, highlighting the durability of challenges to the existing international political economy as well as the many pressures on it, and underlining the transnational importance of anti-vaccination movements. It still opens up many questions, from the practical (how can we combat misinformation?) to the descriptive (how does market authorization actually work in most countries?) to the theoretical (what is trust?). Vaccines are an astounding technology that allows humans to seize control of their own fate, but human societies have not always used such technologies wisely or well. Perhaps more scholarship will enrich not just public health and social science scholarship but also our collective prospects of defeating the next pandemic—for there certainly will come one.

NOTE

1. The Moderna vaccine started in human trials in July 2020. The last country in the world to report COVID-19 cases was Tonga, which recorded its first case at the end of October 2021.

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