How COVID-19 Took Over the World

Lessons for the Future

Edited by Christine Loh

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Introduction

Christine Loh and Judith Mackay

COVID-19 provided a unique opportunity for the world to pull together in fighting a common enemy but it was squandered by bickering and sometimes violent disagreements among people, between people and their governments, and among governments. Moreover, it brought to light and called into question gross inequalities, styles of leadership, the favouring of hospital services while disregarding and undervaluing home-care services, the moral and social positioning favouring health over wealth or vice versa, individualism versus collective responsibility, the disregard of science amid changing public sentiments the unseemly rush to queue up for the not-yet-available vaccine, and the disproportionate economic burden upon the poor. As this book went to press at the end of 2022, COVID-19 still lingered in many parts of the world and was spreading in a major wave in China.

Yet some light of good shone through, with so many examples of people getting it close to right, of humanitarianism, of selfless devotion to duty, of families coming closer, and of the environment taking a breather—skies clearing and birds singing—albeit for a relatively short period.

COVID-19 was the most acute mortality shock since World War II. In 2020, it took the world seven months to record the first million COVID-19 fatalities. Within another five months, another million people died from the disease. Since then, a million people have died from the disease approximately every three months. The global death count reached five million at the end of October 2021. By the end of September 2022, the global confirmed death toll from COVID-19 had pushed pass 6.5 million people. Experts believe the true number of fatalities was probably much higher—an estimated 18 million died as a result of COVID-19 by end-2021.[1] There are at least three reasons for the discrepancy: jurisdictions counted COVID-19 deaths in different ways; there was a lack of testing for COVID-19 in many places; and record keeping, and death registrations were inadequate in some jurisdictions.

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1. David Adam, 'COVID's True Death Toll: Much Higher Than Official Records', *Nature*, 10 March 2022.

These numbers, while large, cannot convey the many forms of suffering people from all walks of life experienced, starting with the dread of themselves or a family member catching COVID-19. Losing a family member is one of the most traumatic experiences one can have—COVID-19 deaths changed the lives of very many people all over the world. 'Long COVID' continues to affect some survivors of the infection. The sense of fear, loss of control, and helplessness amid lockdowns, massive business closures and lay-offs, and social isolation affected mental health on an incalculably large scale. School closures stunted the education of children all around the world, especially those from low-income households. In late February 2022, cases spiked in places that had previously managed to control the disease, reminding the world that the pandemic was not over after three years. Moreover, COVID-19 exacerbated the suffering of those who were poor and vulnerable, highlighting the depth of socio-economic inequalities around the world. One area of inequality was the availability of vaccines. Vaccines became available in rich economies by early 2021. By the end of May 2022, while nearly 66 per cent of the world population had received at least one dose of a COVID-19 vaccine, representing nearly 12 billion doses, but only 16.2 per cent of people in low-income countries had received at least one dose.[2]

Governance in the Time of Pandemic

Governance is of paramount importance in fighting pandemics. The COVID-19 crisis had enormous social and economic repercussions. It became clear that public governance mattered immensely. Governance arrangements played a critical role in how countries responded, and they remain crucial in the recovery process and in strengthening resilience against future epidemics and pandemics.

Trust in government was probably the single greatest identifiable factor for jurisdictions that performed better. The role of government in promoting confidence through clear, consistent, and compelling communication, as well as public trust in the government's ability to organise society to fight the pandemic, including getting people vaccinated when vaccines became available, was essential to success, which was by no means easy as there were several 'waves' of outbreaks and troublesome variants to deal with. Each jurisdiction evolved its own formula—there was a diversity of global responses to the same disease—that reflected their respective attitudes, basic public health practices, and local systems and cultures. What COVID-19 showed was that controlling an infectious disease was as much a socio-political undertaking as a scientific one, and missteps were costly not only in terms of public health, but also in social, economic, and political terms.

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2.   Our World in Data, 'Coronavirus (COVID-19) Vaccinations', https://ourworldindata.org/covid-vaccinations.

Global Pandemic Unpreparedness

SARS-CoV-2, a highly transmissible virus of relatively low virulence, was enough to cause enormous global havoc for an extended period of time that had not ended when this book went to press. Had it been more lethal, the world would have been in greater trouble still. The WHO and health experts had warned continuously that governments needed to be prepared for a pandemic because it was just a matter of time before the world would face a highly transmissible and virulent disease. There were many scary forerunners—SARS, Ebola, Zika and MERS were recent epidemics. In 2009–2010, the swine flu, or H1N1, did become a pandemic, and subsequent studies over the years suggested that between 151,700 to 575,400 people globally may have died from it. Together, these recent outbreaks should have highlighted the need for effective national and international preparedness, but they may have contributed to a sense of complacency as the epidemics were controlled, and the H1N1 pandemic was considered manageable.

Dealing with outbreaks

While COVID-19 is not influenza, it has influenza-like transmissibility characteristics. The basics of dealing with influenza-like outbreaks are well-known. Information and good public messaging are crucial, because the authorities and the public need to cooperate to fight contagion. Containment measures to cut transmission consist of ramping up testing and contact tracing to find out where and how the virus is circulating, isolating those infected, and quarantining contacts. Mitigation measures, also referred to as public health and social measures—wearing face masks, social distancing, frequent handwashing, closing schools and businesses, work-from-home rules, and lockdowns—help to slow the spread and require public cooperation. When an infectious disease has ballooned, the ability to increase surge capacity to treat those needing hospital care becomes vital. Those working in healthcare need to be adequately protected from infection, with adequate supplies of protective gear such as gloves, gowns, shoe covers, head covers, masks, respirators, eye protection, face shields, and goggles. The higher the number of infections, even if mild, the greater the need for care, as there will be an increased number of severe cases. Fatalities rise if the hospital system is overwhelmed. Effective pharmaceutical interventions—vaccines and drugs—result in fewer infected people becoming very ill, but they cannot eradicate the pathogen. Before vaccines and drugs are available, containment and mitigation measures are what it takes to deal with the disease. Even with pharmaceuticals, those measures are still needed for various reasons: vulnerable groups (the elderly and those who are immunologically compromised) need protection, the disease may wane and wax again, pharmaceuticals are effective only for a limited period of time, and pharmaceuticals may not be widely distributed and used. COVID-19 tested every jurisdiction on how they managed outbreaks. Moreover, the single-minded effort needed to fight a pandemic means other

illnesses have to wait to be treated, and deaths from those illnesses because patients could not access healthcare are part of the overall public health burden.

Understanding COVID-19

Infectious diseases differ greatly. The threats of a new disease are not immediately knowable. SARS-CoV-2, the new coronavirus that became known as the disease COVID-19, was particularly confounding as it had many manifestations. It humbled even renowned experts. It took time for it to reveal itself—its relatively low virulence, high transmissibility, victims of preference, symptomatic and asymptomatic natures, variable incubation periods, lengthy persistence, re-infections, and 'long-haul' impact on many patients were all part of its distinctive character. Animals were not spared. In late 2020, outbreaks of COVID-19 in people in Denmark and the Netherlands were linked to farmed mink, resulting in mass culls. In 2021, pet hamsters in Hong Kong were found to carry the virus.

There was a lot to discover about COVID-19, and more will unfold in time. As SARS-CoV-2 continued to spread, it evolved, which helped it to survive and gave rise to variants that were more or less transmissible and more or less deadly. Just to complicate things further, variants have subvariants, and some were more able to evade vaccines and antiviral drugs. The Omicron variant that emerged in late 2021, for example, has many sub-lineages—BA.1, BA.1.1, BA.2, BA.2.12.1, BA.2.75, BA.2.75.2, BA.3, BA.4, BA.4.6, BA.5, BA.5.1.7, BF.7, XBB, BQ1 and BQ1.1 and there could be new descendants. The Delta variant was more transmissible than the ancestral strain, and the subvariant BA.2 was a further 30 per cent to 60 per cent more transmissible than Delta, albeit less deadly.

While the emergence of variants is not surprising in populations with high levels of immunity from vaccinations and prior infections, the speed at which variants have evolved has surprised some. There is much more about COVID-19's evolution and the implications for protection from vaccination or previous infections that still needs to be discovered. New variants waves could still come and are a reason for caution. COVID-19 may eventually become 'endemic' and cause periodic outbreaks, like the seasonal flu, but when this book went to press, it had yet to become predictably endemic. Moreover, endemicity does not necessarily mean a disease is mild. What drives the evolution of viruses is transmission, and the variants that infect more people will thrive. Vaccinated, asymptomatic individuals can still carry a high viral load and therefore spread the virus. Experts warn that because most COVID-19 transmission happens while people have no or few symptoms, severity is not a driver of evolution, but instead a byproduct of whichever mutations improve transmission and how they interact with existing levels of immunity. For the Alpha and Delta variants that came before Omicron, it led to greater severity, while Omicron had less severity, but this was an evolutionary accident. The next variant could easily be more severe again.

The desire and need to understand COVID-19 were strong. Its emergence led to a torrent of studies and publications. Scientists, mathematicians, clinicians, medical doctors, economists, and other scholars published what they learnt as quickly as possible to help each other understand the many aspects of the virus, as well as to help authorities deal with the disease. The body of work on COVID-19 is very large. The earliest studies were on treating patients in hospitals and mortality in China. Other early studies focused on how SARS-CoV-2 spread in confined spaces and outdoor environments. There were studies using modelling to make predictions that could help control spread. There were also many studies on diagnostics and testing, the effectiveness of various mitigation measures, impacts on mental health and social and ethnic aspects, the impact on the economy, and much more. Scientific research traced the virus's path around the world. Publications from authors in mainland China and Hong Kong peaked first, and as the virus caused havoc in Italy, the number of papers from scientists there increased. One of the first and most cited papers about COVID-19 was the 24 January 2020 publication in *The Lancet* reporting on about 41 people hospitalised in Wuhan. The paper should have warned health authorities around the world that the new coronavirus was going to be challenging and ought not be dismissed as 'just like the flu'.

According to the scientific publication *Nature*, around 4 per cent of the world's research output was devoted to COVID-19 in 2020. London's Royal College of Physicians noted there were 125,000 articles published in the first ten months of the pandemic on COVID-19, of which 30,000 (around 25 per cent) were in online pre-print form that had not yet gone through a formal peer-review process. There was a sharp rise in sharing advanced outputs through pre-prints, as the scientific community felt there was great urgency to understand COVID-19. Experts also created online portals to keep track of data relating to COVID-19 cases and fatalities for each country, apart from the WHO dashboard, the best-known being the Johns Hopkins Coronavirus Resource Center.

One issue that remains unsettled is the origin of SARS-CoV-2. The definitive answer may not be known for a long time, considering that the origin of the 2003 SARS coronavirus has still not been definitively determined, although it is believed to have come from bats, most likely through an intermediate wild animal species such as the civet cat that was sold for human consumption in wet markets in China. The hunt for SARS-CoV-2's origin will continue, as knowledge is important to help head off future diseases. There are competing narratives. It has a close similarity to some bat coronaviruses, and there could have been other intermediate animals before the virus spilled over to humans. The spill-over may have happened in Huanan Seafood Market in Wuhan, which housed all kinds of wildlife. Scientists are continuing to investigate and publish their research. The second hypothesis is that the virus leaked from the Wuhan Institute of Virology, which is one of the few high-biosecurity laboratories in the world that collects and studies bat coronaviruses to identify those that might pose a pandemic threat. The second hypothesis has raised wider questions about how bio-laboratories

that work on vaccine research or even bioweapons are managed, not just in China, but elsewhere in the world including the United States. A variation of the second hypothesis is that the virus resulted from laboratory research and experimentation, and it was likely created in the United States with American biotechnology and know-how that had been made available to researchers in China.[3] As both versions of the second hypothesis relate to a laboratory leak, and China had also suggested that the virus could have come from the United States, the origin of COVID-19 has become a part of the wider conflict between the United States and China in their power contest. In other words, the pursuit of science in this case has been unhelpfully mixed with politics. We will have to wait for further research and debate for greater clarity.

Phases of COVID-19

From the initially reported outbreak at the end of 2019 in the city of Wuhan in China to the summer of 2022, the world had to deal with phases of containment and relaxation, with waves of re-infections and the emergence of variants, and with vaccinations and 'living with COVID', each of which proved extremely challenging for decision-makers. The authorities' responses varied in the early months of outbreaks. Despite the severity of the outbreak in China, some acted aggressively right from the start, while others took considerable time to get organised, notably the United States and the United Kingdom. Some jurisdictions did better in the earlier phases of the pandemic—for example, Hong Kong, Taiwan, South Korea, Australia, and New Zealand—but the highly transmissible Omicron variant that emerged in late 2021 resulted in explosions of cases in the first half of 2022 in those previously low-infection jurisdictions, even as cases eased in North America and Europe (although COVID cases started to rise again from the summer of 2022; and by the end of the year, they faced a 'tripledemic' alongside influenza and other respiratory infections). By November 2022, mainland China saw a massive explosion of Omicron. It is doubtful whether any jurisdiction may be said to have gotten every step correct—a sobering thought. There is no place for politicising and moralising public health or pointing fingers at others—there are many lessons for collective learning.

Living with COVID

It is premature to speculate on what 'living with COVID' will entail, as the future path of the epidemic is unknown. Some major historical epidemics, such as the Black Death in the Middle Ages, burnt out within five or so years, but then periodically resurfaced over the next few centuries, killing large numbers of people with each wave. Some epidemics, such as smallpox, were eradicated by vaccines, but primarily because there was

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3.   Neil L. Harrison and Jeffrey D. Sachs, 'Did US Biotechnology Help to Create COVID 19?', Project Syndicate, 27 May 2022.

no animal reservoir—one reason it is extraordinarily difficult to eradicate rabies, which is endemic in wildlife populations. Polio is on the verge of eradication by vaccination but not gone. Cholera has been eradicated in higher-income regions, but is still a persistent killer in low-income countries lacking adequate sewage treatment and access to clean drinking water. Transmission of HIV/AIDS has been reduced by barrier methods of sexual behaviour, and by ensuring uncontaminated blood transfusions; deaths have been reduced by treatment protocols. Influenza continues to sweep the world annually, and twice each year, vaccine authorities have to make educated guesses as to what the upcoming strains will be and produce a vaccine to target them.

There are different definitions of the transition from the pandemic to the endemic phase, and eliminating the disease is not feasible for any country with open borders.[4] The WHO has yet to declare an end to the 'emergency phase' of COVID-19. In March 2022, the International Health Regulations Emergency Committee on COVID-19, looking at the criteria needed to declare the public health emergency of international concern as terminated, noted that: 'As of now, we are not there yet.'[5] It is unknown where COVID-19 will be in a year's time, never mind in ten or 100 years. It does not bode well for the hope of total eradication that this virus, like the flu virus, rapidly mutates and has been detected in non-human animals. The best hope is that 'living with COVID' will most resemble 'living with the flu' and require only occasional public health interventions during the largest outbreaks.

Potential vs. performance

The Global Health Security Index (GHSI), first published in October 2019, warned the world was poorly prepared for epidemics and pandemics. The GHSI was the result of a partnership among Johns Hopkins Center for Health Security, the Nuclear Threat Initiative, and The Economist Intelligence Unit, and was funded by several philanthropic foundations to create 'a comprehensive assessment of countries' health security and considers the broader context for biological risks within each country, including a country's geopolitical considerations and health system and whether it has tested its capabilities to contain outbreaks'.[6] It uses six categories, 34 indicators, and 85 subindicators, covering prevention, detection and reporting, rapid response, health system robustness (including equipping healthcare workers with personal protective equipment or PPE), compliance with international norms, and risk environment. The GHSI surveyed and assessed 195 countries and ranked them in each of the six categories, and

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4. Sarun Charumilind, Matt Craven, Jessica Lamb, Adam Sabow, Shubham Singhal, and Matt Wilson, 'When Will the COVID-19 Pandemic End?', McKinsey, 1 March 2022, https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/when-will-the-covid-19-pandemic-end.

5. Thomas Mulier, Andy Hoffman, and John Lauerman, 'WHO Exploring When and How to Declare End of Covid Emergency', *Bloomberg Asia Edition*, 12 March 2022, https://www.bloomberg.com/news/articles/2022-03-11/who-is-exploring-when-and-how-to-declare-end-of-covid-emergency.

6. GHS Index 2019, https://www.ghsindex.org/wp-content/uploads/2019/10/2019-Global-Health-Security-Index.pdf.

then gave an overall score to each country before ranking them according to it. The overall picture was highly concerning—'no country is fully prepared', and only 19 per cent of countries scored well on detection and reporting capabilities, whereas fewer than 5 per cent had the ability to rapidly respond and mitigate. The average global score was only 40.2 out of 100; and even for high-income countries, the average score was only 51.9.[7]

The GHSI 2019 was right that the world was unprepared. In the GHSI 2021 report, the global preparedness average score fell from 40.2 out of 100 in 2019 to 38.9, in the light of COVID-19. What was confusing about the GHSI was that the rankings did not reflect what happened on the ground. The United States had the best overall score among all the countries in 2019 with 83.5, followed by the United Kingdom with 77.9. The surprise was the strengths of the United States and the United Kingdom proved superficial when put to the test by the pandemic. They both had extremely high infections and fatalities. The GHSI 2021 report acknowledged their performance was poor. Nevertheless, it continued to rank the United States at the top position, while the United Kingdom dropped to seventh place. New Zealand's rank improved from 39th in 2019 to 13th in 2021 due to its quick decision to close its border in 2020. However, cases skyrocketed in February 2022 after the rankings were published. Likewise, South Korea, which did well to control COVID-19 in 2020, also saw record cases in early 2022. The same thing happened in Hong Kong, an autonomous sub-national part of China that was not covered by the GHSI. China is an outlier among countries in terms of how it mobilised resources to fight the outbreak domestically. It seems the GHSI categorisation system cannot account for China's efforts, which were very different but succeeded in keeping cases and fatalities relatively low.

The GHSI 2021 report explained its ranking system as follows:

> Even as many countries proved they could ramp up new capacities during the emergency—including setting up labs and creating cohorts of contact tracers to follow the spread of COVID-19—some responses were crippled by long-unaddressed weaknesses, such as lack of healthcare surge capacity and critical medical supplies. *Some countries found that even a foundation for preparedness did not necessarily translate into successfully protecting against the consequences of the disease because they failed to also adequately address high levels of public distrust in government and other political risk factors that hindered their response. Further, some countries had the capacity to minimize the spread of disease, but political leaders opted not to use it, choosing short-term political expediency or populism* over quickly and decisively moving to head off virus transmission.
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> Those factors do not excuse but may explain why countries that received some of the top marks in the 2019 GHS Index responded poorly during the COVID-19 pandemic. As a measure of health security, *the Index assigns the highest scores to countries with the most extensive capacities to prevent and respond to epidemics and pandemics.* With its vast wealth and scientific capacities, the United States was ranked first in the 2019 GHS Index and again in the 2021 edition, although in both cases, the highest position

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7.   Ibid.

Table 1.1: GSHI rankings and scores in 2019 and 2021 (selected countries)

Country	2019 Overall GHSI Rank and Score	2021 Overall GHSI Rank and Score
United States	1 (83.5/100)	1 (75.9/100)
United Kingdom	2 (77.9/100)	7 (67.2/100)
Australia	4 (75.5/100)	2 (71.1/100)
Canada	5 (75.3/100)	4 (69/8/100)
Thailand	6 (73.2/100)	5 (68.2/100)
Sweden	7 (72.1/100)	10 (64/9/100)
South Korea	9 (70.2/100)	9 (65.4/100)
France	11 (68.2/100)	14 (61.9/100)
Germany	14 (66.0/100)	8 (65.5/100)
Japan	21 (59.8/100)	18 (60.5/100)
Singapore	24 (58.7/100)	24 (57.4/100)
Italy	31 (56.2/100)	41 (51.9/100)
New Zealand	35 (54.0/100)	13 (62.5/100)
Vietnam	50 (49.1/100)	65 (42.9/100)
China	51 (48.2/100)	52 (47.5/100)

was still measured to have critical weaknesses. Despite its ranking, the United States has reported the greatest number of COVID-19 cases, and its response to the pandemic has generally been viewed as extremely poor. *The result highlights that although the GHS Index can identify preparedness resources and capacities available in a country, it cannot predict whether or how well a country will use them in a crisis.* The GHS Index cannot anticipate, for example, how a country's political leaders will respond to recommendations from science and health experts or whether they will make good use of available tools or effectively coordinate within their government. The Index does, however, provide evidence of the tools that countries have and the risks they need to address to protect their communities. Countries that fail to use those tools or address those risks to thereby enable an effective response should be held accountable.[8]

In other words, the GHSI ranked countries against each other according to their potential capacities—not performance—in preparedness. The discrepancy between potential versus reality arises from a scoring system based on assessing technical infrastructure and universalised templates, which naturally favoured high-income developed economies. Scholars had criticised the GHSI's scoring system as being biased because

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8. Italics added for emphasis. GHS Index 2021, https://www.ghsindex.org/wp-content/uploads/2021/12/2021_GHSindexFullReport_Final.pdf.

it equates capacity with a country's wealth rather than the quality of decision-making.[9] The response to COVID-19 showed the importance of political and social features, as individual countries drew on their unique capabilities to create their responses when facing a fast-moving public health emergency, with China being a good case study. It may make more sense to change the GHSI to assess changes over time for an individual country rather than ranking them against each other, to avoid misperception between potential and actual performance.

Contagion Politics

The GHSI 2019 report noted that knowing the risk was not enough, and that 'political will is needed to protect people from the consequences of epidemics, to take action to save lives, and to build a safer and more secure world'. The 2021 report, quoted above, reemphasised this point. COVID-19 showed the importance of the political and social features of a jurisdiction, as each had to draw on its capabilities and capacities to respond to the contagion.

Trust in government and society

While the GHSI cannot predict how well a country would do in an epidemic or pandemic because it does not account for the consequences of poor leadership and dysfunctional political environments, other research suggests trust was possibly the most useful predictor of performance. A study published in *The Lancet* pulled together data from 177 countries and territories from January 2020 to September 2021 and found that trust in government and society stood out as the best predictor of how a country performed against the spread of infections.[10] Other factors, such as systems of government, governance styles, availability of universal healthcare, extent of inequality, belief in science, and even the degree of pandemic preparedness did not show a strong linkage to performance. The identification of trust as a key factor goes some way towards explaining why high-income countries such as the United States and the United Kingdom did poorly, as trust in government and among citizens in those jurisdictions were at an all-time low when COVID-19 struck. In other high-income societies, such as the Scandinavian countries, trust in government and among citizens was high, as was also the case with China,[11] Thailand, Vietnam, and Singapore. On the whole, Asia-

9.   Matthew M. Kavanagh and Renu Singh, 'Democracy, Capacity, and Coercion in Pandemic Response: COVID-19 in Comparative Political Perspective', *Journal of Health Politics Policy and Law* 45, no. 6 (2020): 997–1012.

10. COVID-19 National Preparedness Collaborators, 'Pandemic Preparedness and COVID-19: An Exploratory Analysis of Infection and Fatality Rates, and Contextual Factors Associated with Preparedness in 177 Countries, from Jan 1, 2020, to Sept 30, 2021', *The Lancet* 399, no. 10334 (2022): 1489–14512, https://doi.org/10.1016/S0140-6736(22)00172-6.

11. In China, the trust level in the central authorities is high. Chapter 10 notes trust level among citizens is considered low, however.

Pacific jurisdictions were performing better than Western ones in terms of cases and fatalities as of the time this book went to press. Trust in government and in society appeared to determine people's willingness to follow government guidance and rules in observing mitigation measures, such as masking, social distancing, and vaccination.

The vaccines that became available by early 2021 in developed economies using the new Messenger RMA (mRNA) and viral vector technologies have been shown to be highly effective in preventing severe illness and death. While initially appearing to have lower effectiveness against infection, inactivated vaccines have also proved to confer a high level of protection against severe disease. Nevertheless, sizable numbers of people in jurisdictions where those vaccines were available and free of charge—such as the United States and Hong Kong—chose not to get vaccinated. As COVID-19 vaccines were rolled out, research showed the roles that trust, belief in conspiracy theories, and the spread of misinformation through social media played in impacting vaccine hesitancy.[12] In the United States, where trust was low, the choice to get vaccinated also appeared to be driven by a partisan divide rooted in party politics and political ideology. A key factor for the high fatalities in Hong Kong when the Omicron variant broke through in 2022 was the result of its failure to get the elderly vaccinated (which led to high death rates among them). Moreover, general complacency because the city had been previously successful in containing COVID-19, extremely dense living conditions, and also low trust in government that affected people's decision to get vaccinated were also factors. The experience makes it clear that governments must focus on vulnerable groups as a priority.

The Lancet's findings on trust can be examined alongside surveys from other organisations that carried out periodic trust scoring. Of the countries noted in Table 1.1, eleven were part of the annual 28 countries surveyed by the Edelman Trust Barometer,[13] as shown in Table 1.2. The barometer surveyed how the general population felt about their government, business, media, and NGOs. A score below 50 denotes low trust, a score between 50 and 60 indicates that the population is neutral on trust, and a score above 60 reveals high trust. The results of the OECD 2020 survey on trust in government among its member countries correlated with the Edelman barometer for the Organisation for Economic Co-operation and Development (OECD) countries. It showed that the level of trust in government was high in Sweden (above 70) and New Zealand (above 60), but scores for the United Kingdom, France, Italy, the United States, and Australia were all below 50. Japan was an outlier here, as cases and fatalities were relatively low despite having low trust in government.[14]

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12. Jeffrey V. Lazarus, Scott C. Ratzan, Adam Palayew, Lawrence O. Gostin, Heidi J. Larson, Kenneth Rabin, Spencer Kimball, and Ayman El-Mohandes 'A Global Survey of Potential Acceptance of a COVID-19 Vaccine', *Nature Medicine* 27 (2021): 225–228; and Will Jennings, Gerry Stoker, Hannah Bunting, Viktor Orri Valgarðsson, Jennifer Gaskell, Daniel Devine, et al., 'Lack of Trust, Conspiracy Beliefs, and Social Media Use Predict COVID-19 Vaccine Hesitancy', *MDPI* 9, no. 593 (2021): 1–14.

13. Edelman is a public relations and marketing consultancy that has conducted trust surveys for 22 years. The 2022 report surveyed more than 36,000 respondents with at least 1,150 respondents per country.

14. OECD, 'Trust in Government', 2022, https://data.oecd.org/gga/trust-in-government.htm.

Table 1.2: Edelman Trust Barometer 2021 and 2022

Country	2021 Trust Level General Population	2022 Trust Level General Population
China	72/100	83/100
Singapore	68/100	66/100
Thailand	61/100	66/100
Australia	59/100	53/100
Canada	56/100	54/100
Germany	53/100	46/100
Italy	52/100	53/100
France	48/100	50/100
United States	48/100	43/100
South Korea	47/100	42/100
United Kingdom	45/100	44/100
Japan	40/100	40/100

Public trust in the media provides yet another lens to look at trust in society. The Reuters Institute Survey of 46 countries in 2021 found that people turned to trusted news organisations to get information during the pandemic, but there was a great diversity in the level of media trust across countries. Not surprisingly, trust was higher in well-known news media versus social media. The level of trust in media among Scandinavian countries was relatively high at 50–65 per cent. France had one of the lowest trust levels among European countries. In Asia, Thailand and Singapore had the highest levels of media trust. Canada's media trust level was 45 per cent, but the United States had the lowest level at 29 per cent among the countries surveyed. China and Italy were not included in that survey.[15]

'Infodemic', Sensationalism, and Conspiracies

The COVID-19 pandemic has been accompanied by an 'infodemic'—an overabundance of information—both online and offline, some accurate and some not, that made it hard for people to find trustworthy sources. While technology and social media played a vital role in keeping people informed, sharing information, and taking collective action, 'misinformation' appeared alongside 'disinformation'. Misinformation applies to incorrect statements often spread unwittingly by people who may believe

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15. Nic Newman, Richard Fletcher, Anne Schulz, Simge Andı, Craig T. Robertson, and Rasmus Kleis Nielsen, 'Digital News Report 2021', Reuters Institute, https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2021-06/Digital_News_Report_2021_FINAL.pdf.

Table 1.3: Reuters Institute Survey 2021

Country	Media Trust Level (%)
Germany	53
Thailand	50
Singapore	45
Canada	45
Australia	43
Japan	43
United Kingdom	42
South Korea	32
France	30
United States	20

they are true. Disinformation, by contrast, involves deliberate falsehoods spread to manipulate behaviour and public opinion by sowing confusion and division. Both are harmful.

The WHO was explicit about the harm:

> Mis- and disinformation can be harmful to people's physical and mental health; increase stigmatisation; threaten precious health gains; and lead to poor observance of public health measures, thus reducing their effectiveness and endangering countries' ability to stop the pandemic.
>
> Misinformation costs lives. Without the appropriate trust and correct information, diagnostic tests go unused, immunisation campaigns (or campaigns to promote effective vaccines) will not meet their targets, and the virus will continue to thrive.
>
> Furthermore, disinformation is polarising public debate on topics related to COVID-19; amplifying hate speech; heightening the risk of conflict, violence and human rights violations; and threatening long-terms [*sic*] prospects for advancing democracy, human rights and social cohesion.[16]

Mis- and disinformation can be hard to distinguish, and falsehoods were spread by a whole host of people, including political leaders, media, well-known figures, and even health professionals. For example, a research team at Cornell University analysed 38 million English-language reports on the pandemic in 2020 and found US President Donald Trump (2017–2021), in the context of COVID-19 misinformation, made up

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16. See World Health Organization, 'Managing the COVID-19 Infodemic: Promoting Healthy Behaviours and Mitigating the Harm from Misinformation and Disinformation', Joint statement by WHO, UN, UNICEF, UNDP, UNESCO, UNAIDS, ITU, UN Global Pulse, and IFRC, 23 September 2020, https://www.who.int/news/item/23-09-2020-managing-the-COVID-19-infodemic-promoting-healthy-behaviours-and-mitigating-the-harm-from-misinformation-and-disinformation.

the largest single component of inaccurate information.[17] It was understandable that people had many questions about the disease, and experts needed time to understand the many manifestations of SARS-CoV-2. The WHO created the Information Network for Epidemics, an online portal, to provide updated information about COVID-19 in April 2020. The WHO and other public health institutions fought an uphill battle against mis- and disinformation in the 'fake news', 'post-truth', and 'alternative facts' era.

Worse, the global media's sensational reporting of COVID-19 sowed doubts, distrust, and division. Scholars have observed that contemporary opinion discourse in global media was often sensationalised and played a not inconsiderable role in stoking outrage, ridicule, mockery, insult, moral indignation, and *ad hominem* attacks on people with different views,[18] which spread like wildfire through social media.

Conspiracy theories proliferated during the pandemic, and their rapid spread through the press and social media among various segments of society all over the world jeopardised the public health response, for example by undermining people's motivation to socially distance and get vaccinated. At the heart of conspiracy theories is distrust. COVID-19 made people feel insecure and not in control, which in turn created the perfect circumstances for conspiracy theories. Scholars observe that most of the conspiracy theories stemmed from existing tensions between groups with different values and views, and as the pandemic continued, conspiracy theories further fuelled and deepened those tensions.[19]

The 'Freedom Convoy' protest provides a good illustration of the problem. In late January 2022, as Omicron was levelling off in Canada and COVID-19 measures were easing, large numbers of lorry drivers and others blocked roads and camped outside Parliament in Ottawa for over three weeks to oppose a vaccine mandate for lorry drivers. They also blocked US border crossings. While the Canadian government was preparing to get tough with protesters, certain segments of the Republican Party and sympathetic media organisations in the United States that were against COVID-19 restrictions threw their weight behind the truckers, describing them as 'heroes' fighting for freedom.[20] The Canadian protests were eventually curtailed when the Emergencies Act was invoked for the first time in Canada's history, allowing police to imprison the generally peaceful protesters and their supporters and freeze their bank accounts. The protests in Canada inspired convoys of vehicles in France, the Netherlands, and New Zealand to protest COVID-19 restrictions in their own countries. American lorry

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17. Cornell, Alliance for Science, 'Cornel Study Suggests President Trump Played Leading Role in the COVID Misinformation "Infodemic"', October 2020, https://allianceforscience.cornell.edu/wp-content/uploads/2020/10/Cornell-misinformation-studypresser.pdf.
18. Jeffrey M. Berry and Sarah Sobieraj, *The Outrage Industry: Political Opinion Media and the New Incivility* (New York: Oxford University Press, 2014).
19. Karen M. Douglas, 'COVID-19 Conspiracy Theories', *Group Processes & Intergroup Relations* 24, no. 2 (2021): 270–275, https://doi.org/10.1177/1368430220982068.
20. 'How American Right-Wing Funding for Canadian Trucker Protests Could Sway US Politics', *PBS*, 17 February 2022, https://www.pbs.org/newshour/world/how-american-right-wing-funding-for-canadian-trucker-protests-could-sway-u-s-politics.

drivers and others organised their own ..'People's Convoy' to drive to Washington DC to protest against COVID restrictions and vaccine mandates. Those protests pulled together many strands of distrust and discontent that coalesced into general resistance against COVID-19 measures and the authorities.

Social Contracts

There may be another factor alongside trust that is also important. Similar cultural influences may explain why the East and Southeast Asian jurisdictions did better on the whole than their Western counterparts in dealing with COVID-19, irrespective of their varying levels of trust in their respective governments (Japan and South Korea were found to have low trust by the Edelman Trust Barometer). This phenomenon has been described as a paradox.[21] A useful frame to understand these Asian cultures is through the lens of how they see the 'social contract' between the state and its people. The term 'social contract', a Western coinage, broadly involves an implicit agreement by the people to follow policies and rules set by the government because they are for the greater good of society.[22] East Asian cultures are influenced by Confucian thinking, which has a deep sense of people living together like within a family set-up with each member having separate roles. The sovereign and subjects relate to each other like in a family, each having their respective responsibilities. Laypeople regard political leaders and bureaucrats as parental officials who should care for them, and rulers commit to serving the people as their children (*zimin* 子民). These deep-rooted sentiments continue to also influence relationships within society—everyone has an obligation to others. This is best demonstrated by the willingness of Asians to wear facemasks and increase social distancing as part of collective social behaviour to beat an infectious disease. Therefore, whatever might be the level of trust the Japanese and South Korean public might have in their respective governments, they observed their social obligations within their societies.

Purpose of This Book

It is not possible for this book to cover the many socio-economic and political issues that arose from the COVID-19 pandemic. No one publication could do so, as the impacts were so wide. This book seeks to fill in gaps in the overall deliberation about COVID-19. This book has two segments. The first eight chapters focus on the general good governance conditions needed to manage infectious diseases. Governance impacts preparedness, as well as how efforts are sustained over time. This book starts at the multi-lateral level in discussing the role of the United Nations and its agencies,

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21. Yves Tiberghien, *The East Asian COVID-19 Paradox* (Cambridge: Cambridge University Press, 2021).

22. The idea of a social contract that binds individuals in a polity was developed during the Enlightenment by Thomas Hobbes (1588–1679) and others who articulated the social contract hypothesis in terms of individuals giving up their liberty to the sovereign on the condition that their lives were safeguarded by sovereign power.

especially the crucial role played by the WHO. Other publications have tended to focus on the response of specific countries, neglecting the multi-lateral efforts that have been so important, especially for low-income countries. Alongside governance at the international level was the opportunistic lobbying by certain industries, especially tobacco, for industry advantage, a topic that has so far not been covered in COVID-19 literature and is addressed in this book. Another important factor that has a governance perspective is vaccines. While there were important scientific and technological breakthroughs in the development of COVID-19 vaccines, questions about the risks and efficacy of the different vaccines played a role in people's unwillingness to get vaccinated. A contribution in this book shows all the vaccines created using different technologies are helpful and there is no reason to refuse any of them should they be available. However, making vaccines widely available around the world remained a challenge at the time this book went to press. An important factor influencing governance and how political leaders of different countries responded to COVID-19 had much to do with the nature of the respective social contracts in different countries. The use of the notion of the social contract as a frame in this book to assess the different COVID-19 responses is an original contribution to the overall deliberation about the pandemic. Governance involves not only how decisions were made about fighting the pandemic but also what to do about the collapsing economy. This first part of the book discusses in lay terms the mathematical concepts and modelling used to help governments think about their public health responses, as well as the decisions governments made to boost their economies. The final chapter of this part of the book includes a discussion about PPE—so important during any infectious disease outbreak—and the governance dimension related to good PPE supply chain management.

The second part of this book has four chapters with a geographical focus on specific countries and regions using the lens of good governance, political trust, and the social contract to compare their responses. The two major powers and largest economies (making up about 45 per cent of global Gross Domestic Product) are China and the United States. Their political, socio-economic, organisational, and cultural systems could not be more different. Their respective responses from the start of the COVID-19 outbreak to the summer of 2022 were also very different. This book provides a comparison of the influencing factors that resulted in these responses. Despite fatigue, grumbles, and protests in late 2022, the case of the Chinese people is unique in COVID literature during the pandemic in their overall response to lockdowns and stringent restrictions, which were influenced by their generally high trust in the central government, political values, and sense of obligation to obey regulations, how neighbourhoods are organised, and the impact of possible deterrence and sense of fairness. A discussion about China would not be complete without an account of the Greater China region, covering Hong Kong, Macao, and Taiwan. Singapore is also mentioned in this part of the book. A discussion about Europe helps to provide a fuller picture of the pandemic response of Western cultures, which had some similarities to that of the United States but were very different from the Asian response.

The authors have diverse expertise that includes public health, epidemiology, health policy, mathematics, economics and finance, business, supply chains, law, government institutions, and politics, which give this book a wide angle of interpretations. All but one of the authors are from Hong Kong or based in Hong Kong, and are also actively engaged internationally on the subjects they wrote about. They understand global conditions, and this perspective comes through in their writing about the pandemic. Chapter 13, the concluding chapter, is a collaboration of all the contributing authors, summarising their observations and recommendations.

Chapter 2 by Judith Mackay discusses the WHO. While the WHO (and many other UN agencies) played a critically important role internationally during the pandemic, there has yet to be a deeper reflection on that role, and in general on how wide the scope of the WHO should be in the future. Should there be an international treaty on pandemics; stronger, more reliable funding with less reliance on private funding; sanctions against countries that fail to comply with a WHO mandate; or more open governance of the WHO itself? This chapter opens up these debates.

Chapter 3 by Judith Mackay deals with the negative influence of commercial determinants of health upon government health policies during COVID-19. Remarkably little has been written about the influence of unhealthy commodity industries, such as Big Tobacco, Big Food, Big Soda, Big Alcohol, and others—all of which contribute to the global burden of non-communicable diseases, which in turn influence COVID-19 outcomes. These industries have taken advantage of COVID-19 to attempt to influence governments, politicians, and the media, and to position themselves as health partners.

Chapter 4 by Benjamin J. Cowling reviews the rapid development and deployment of COVID-19 vaccines and their effectiveness against infection and severe disease. While high-income countries had rapid access to vaccines from early 2021, there was a lack of equitable distribution to lower-income locations. The emergence of variants alongside observations of waning immunity led to the rollout of booster doses. This chapter also explores the future of COVID-19 vaccines and vaccine strategies.

Chapter 5 by Michael Edesess discusses the mathematics related to COVID-19. Understanding the spread of COVID-19 was particularly important in 2020, as experts and governments tried to devise plans to fight the new virus. The power of exponential spread was not always well-understood—many decision-makers acted too slowly—even though the concept is taught at the school level. Shockingly, COVID-19 fatalities decreased life expectancy in many countries. Chapter 5 provides an easy-to-read account of complex mathematical concepts and relates them to experiences readers may remember.

Chapter 6 by Renu Singh explains the theory behind and application of the notion of the 'social contract' to public health and healthcare policy, with a specific focus on COVID-19. Social contract theory centres on the relationship between individuals and society, with the exact definition varying among different regions, based on how they perceive the responsibilities and freedoms of individuals and of government.

Chapter 7 by Michael Edesess and Christine Loh discusses the economic and social consequences of COVID-19. The pandemic exacerbated inequalities around the world, with the most vulnerable bearing the biggest brunt. The authors reflect upon the enormous aid packages provided by the rich governments of the world in 2020 to demobilise economies, and the fact that those massive bailouts essentially enhanced the fortunes of the relatively well-off while doing too little to alleviate the suffering of the poor, while also privatising gains and socialising risks. The authors use the medical phenomenon of 'long COVID' to describe the lasting effects of the pandemic on the global economy as activity resumed in 2022, but they had to contend with rising geopolitical tensions between democracies and autocracies and the war between Russia and Ukraine, which further divide the world into two broad camps of rich and middle- and low-income economies with their very different interests – the latter want peace to pursue development.

Chapter 8 by Christopher S. Tang and ManMohan S. Sodhi discusses how COVID-19 affected the world as a public health crisis. Hospitals and the general public experienced severe shortages of medically necessary item including PPE and ventilators, revealing vulnerabilities in the supply chains of essential products. The authors identified the causes of the shortages and used the United States as the reference country to observe the challenges of managing PPE stockpiles.

Chapter 9 by Christine Loh compares how China and the United States dealt with COVID-19 at a time of increasing geopolitical rivalry. China is where the new coronavirus SARS-CoV-2 was first reported. China developed its own unique method to deal with the disease by calling upon the country's capacities and capabilities to mobilise resources on a massive scale. The chapter explains why China adopted the world's toughest containment and mitigation methods, and held onto them, and contrasts that with how the United States, considered the most advanced economy and considered the best-prepared for a pandemic, reacted to COVID-19. The contrast helps to explain fundamental differences in the governance structure, systems, cultures, and social contracts of the two jurisdictions. Chapter 9 should be read with Chapters 10 and 11 to gain a comprehensive picture of the COVID-19 response from Greater China.

Chapter 10 by Hualing Fu contains a detailed description of the neighbourhood structure and how it is managed in mainland Chinese cities, and the various roles played by local community units in fighting COVID-19. The ability and speed of the Chinese authorities to mobilise resources and manpower to contain outbreaks had much to do with the existence of that structure. China's anti-pandemic measures and 'stay at home' orders were enforced within neighbourhood structures all over the country. This chapter discusses how community mobilisation formed the core of the Chinese containment strategy and was the most crucial aspect of enabling China to contain COVID-19. The success, in turn, helped legitimise the existing social and political system. This localised governance system is in fact a unique public-private partnership under the leadership of the ruling party at the grassroots level, and while the poorly coordinated lockdown in Shanghai in April–May 2022 created widespread public complaints there, stretching

local governance to a near breaking point, the neighbourhood structure remained intact while the local authorities worked to mend relations with residents, often through the same neighbourhood organisations.

Chapter 11 by Richard Cullen reviews how Hong Kong has managed its response to COVID-19 and includes some comparative discussion of the other Greater China jurisdictions of mainland China, Macao, and Taiwan, as well as the predominantly Chinese polity of Singapore. Hong Kong succeeded in keeping COVID-19 at bay for two years, with low infections and fatalities. That changed swiftly and dramatically with the Omicron onslaught in February 2022. The Hong Kong government called upon the mainland authorities for assistance, which provided a fascinating glimpse of the interaction between the mainland Chinese and Hong Kong governance systems. This chapter also explains key aspects of the contrast between Hong Kong and Singapore in their handling of COVID-19.

Chapter 12 by Renu Singh unpacks the application of the social contract to public health and healthcare policy in the European context. Europe has a unique relationship between government and citizens, given the fact that most jurisdictions not only have relationships with and expectations of their own local and national governments, but also the European Union (whether or not they are members of the supranational organisation itself). Despite the harmonisation of a number of policies at the European Union level, in the context of COVID-19 and health policy, much of the response involved predominantly national-level decision-making, ranging from some of the most stringent policies administered by Italy in early 2020 to the more laissez-faire policies of the United Kingdom. Chapter 12 explores COVID-19 responses in these three cases – the European Union, Italy, and the United Kingdom – through this framework, discussing why certain policy approaches were adopted as well as the public's reaction to these measures.

Chapter 13, the concluding chapter, is an effort by all the authors to collectively summarise their observations and recommendations.

One of the most remarkable things—perhaps the most remarkable thing—about the COVID-19 experience was the disparity between the assumed and the actual performance of countries in the pandemic. The rich countries with established and expensive health systems were among the worst performers in the number of cases and fatalities, whereas a number of emerging economies did much better. Those who acted quickly and decisively made a difference. The political will to act reflected how the notion of the 'social contract' was understood in different countries and cultures. The ability to act showed the capacity and capability of a jurisdiction to mobilise resources to fight outbreaks. Research showed the degree of public trust in government and within society made a difference too. Those jurisdictions with higher political and/or social trust did better. On the whole, Asia-Pacific jurisdictions did better because of the higher focus on community wellbeing and lesser assertion of individualist preferences. The results show that controlling an infectious disease is at least as much a social undertaking as a scientific, medical, and capital-intensive one.

4

COVID-19 Vaccines and a Pathway out of the Pandemic

Benjamin J. Cowling

The development of COVID-19 vaccines occurred at lightning speed during the first year of the pandemic. Stringent public health and social measures had been used intermittently in most parts of the world in the first year of the pandemic, and vaccines represented a light at the end of the tunnel. That is because vaccines could be used to complement public health and social measures and reduce the impact of COVID-19 infections, with an expectation that they could eventually allow governments to relax all community-wide measures. However, expectations of vaccine performance had to be adjusted as the pandemic progressed and new SARS-CoV-2 variants emerged, while delays in the global sharing of vaccines led to discussions over equity. In the third year of the pandemic, it became clearer that repeated administration of COVID-19 vaccines will be key to protecting people, particularly older and more vulnerable individuals, as the disease continued to circulate globally into the summer of 2022.

A Brief History of Vaccines

Viruses such as SARS-CoV-2 require human or animal cells to reproduce and spread. When a person is infected with the SARS-CoV-2 virus, cells in their respiratory tract are invaded by the virus and used as virus-making factories to produce large numbers of copies of the virus. Those virus copies can then be emitted back out of the respiratory tract through breathing, talking, coughing, sneezing, vaping etc. and pass to another person. In this way, the virus propagates through a community.

Humans are born with an immune system that can fight off mild infections but can sometimes struggle to deal with more serious infections. Once the immune system notices that an infection is occurring, for example because cells are not performing their usual functions, an immune response is mounted with the aim of eliminating the virus from the body and repairing any damage that has occurred. A long-established observation in infectious diseases is that recovery from an infection can provide long-lasting immunity against re-infection. This long-lasting protection is due to the 'adaptive' component of our immune systems, including antibody-producing 'B cells' and

killer 'T cells' that can hunt down and eliminate viruses and virus-infected cells. During infection, these cells learn to recognise the infecting pathogen and commit that recognition to a type of memory. One of the most important responses to a viral infection is the production by B cells of antibodies to that virus in case it is encountered again. Antibodies are small proteins that attach to the receptors on a virus surface and prevent the virus from being able to infect cells, as well as marking the virus as an intruder for other parts of the immune system to react to.

While immunity to common pathogens is clearly advantageous, acquiring that immunity through infection can be dangerous. Smallpox—caused by the virus *variola major*—killed 30 per cent of the people it infected, a remarkably high fatality rate. In China, an approach called variolation was used for many centuries to reduce the public health impact of smallpox. The dried scabs from smallpox survivors were collected and ground into a powder, which was then insufflated, i.e., blown up the nose. Another variolation approach spread from Turkey into Western Europe in the seventeenth and eighteenth centuries, which involved making superficial scratches or cuts in the skin and then exposing these either to scabs or contaminated clothes from an infected individual. The infections that resulted from variolation tended to be milder, although not without risk.

In the late eighteenth century Edward Jenner and other scientists noted the observation that milkmaids who contracted cowpox—an animal infection that was much milder in humans than smallpox—seemed to be immune to smallpox. Edward Jenner then demonstrated that deliberate infection with cowpox provided immunity to smallpox, and was safer than variolation. Since the pathogen causing cowpox was called *variolae vaccinae* (*vacca* is Latin for cow), Jenner named his procedure 'vaccination'. Interestingly, opposition to Jenner's vaccine grew into a huge anti-vaccination movement in the nineteenth century.[1] Ultimately, however, the mass global use of cowpox infection in the skin as a smallpox vaccine ultimately led to the eradication of smallpox by 1980.

While inoculation of one virus to provide immunity to another, more serious infection was the first approach to vaccination, it is not the most common. More than 20 vaccines are used worldwide to prevent human diseases caused by viruses, and most of these are made from either inactive viruses or non-infectious components of viruses.[2] Infection with attenuated (weakened) viruses has also been used as an approach to vaccination, most notably for polio. In more recent years, a new approach has been developed that involves genetically modifying one virus (including removal of disease-causing genes) and inserting part of the genetic code of a second virus. The first virus

1.   Jess McHugh, 'The World's First Anti-Vaccination Movement Spread Fears of Half-Cow Babies', *Washington Post*, 14 November 2021, https://www.washingtonpost.com/history/2021/11/14/smallpox-anti-vaccine-england-jenner.

2.   Brian Greenwood, David Salisbury, and Adrian V. S. Hill, 'Vaccines and Global Health', *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 366, no. 1579 (2011): 2733–2742, https://doi.org/10.1098/rstb.2011.0076.

is then used as a vector to carry the genetic material of the target virus and train our immune system to respond to future exposures to viruses with the same components. Because the vector virus is designed to be able to infect cells, it can also stimulate a robust cellular response in addition to the production of antibodies.

Rapid Development of COVID Vaccines

From the early days of the COVID-19 pandemic, it was clear that infections were so severe that unmitigated epidemics would lead to considerable loss of life. The three major toolboxes for mitigating viral epidemics and pandemics include (1) public health and social measures, (2) antiviral drugs and associated therapeutics for the treatment of infections, and (3) biological vaccines and prophylactics to prevent infections. Given that antivirals and vaccines were not initially available, most governments around the world could only rely on public health and social measures to suppress transmission in the early months of the pandemic.

The vaccine development cycle typically takes many years because of the sequence of steps required. The pre-clinical development of a candidate vaccine involves identifying a formulation of virus or virus components that could stimulate a protective immune response, as well as other necessary ingredients such as stabilisers and preservatives. Some vaccines also include chemicals known as adjuvants that can help to stimulate a stronger immune response to the vaccine. The clinical development process typically includes a series of trials in humans, starting with small trials to measure the immune response and common side effects, followed by larger trials to determine the effectiveness of the vaccine in preventing the disease of interest.

For COVID-19 vaccines, this cycle was compressed into less than a year, by speeding up the pre-clinical process and by moving through clinical trials at a record pace. Vaccine developers moved faster than usual, often running multiple trials in parallel, and setting up the next round of clinical trials while waiting for the previous round to finish in the expectation (or hope) that those results would be positive. Regulators such as the United States Food and Drug Administration provided rapid evaluation and emergency approvals. Vaccine manufacturing was also scaled up, often before the availability of clinical trial results and regulatory approval, taking the risk that the vaccine might not ultimately be approved. The rapid development of vaccines and scaling up of manufacturing capacity were generally supported by public funds. For example, the vaccines developed by Moderna and Johnson & Johnson were aided by American government funding under Operation Warp Speed.[3] The development of the

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3. Lancet Commission on COVID-19 Vaccines and Therapeutics Task Force Members, 'Operation Warp Speed: Implications for Global Vaccine Security', *Lancet Global Health* 9, no. 7 (2021): E1017–E1021, https://doi.org/10.1016/S2214-109X(21)00140-6.

Oxford University/AstraZeneca vaccine was largely supported by funds from the UK government.[4]

Around 30 COVID-19 vaccines are being used around the world, from four major technology classes (Table 4.1). The mRNA vaccines developed by BioNTech/Pfizer/Fosun Pharma and Moderna could be considered the newest technology, since mRNA vaccines have never previously been used in mass vaccination campaigns, although mRNA vaccines for several other diseases have been tested in clinical trials.[5] This novel technology works by encoding the recipe for viral components, in this case, the spike protein of SARS-CoV-2, in mRNA form and using cellular machinery to adapt the recipe and produce spike proteins. In simple terms, injection with an mRNA vaccine allows our own cells to be used as factories for SARS-CoV-2 spike proteins, and our immune system can then mount an immune response to those spike proteins that will provide protection against future exposures. While live vaccines also use our own cells as factories to produce more viruses that our immune system can respond to, there is always a risk that a live virus vaccine might transmit infection between individuals, as has happened with the live oral poliovirus vaccine for example. Viral subunit vaccines such as the one produced by Novavax include individual viral spike proteins rather than complete viruses, and therefore do not infect cells but stimulate an immune response to those viral components.

The vaccines against COVID-19 provide two layers of defence in general. The first layer is protection against infection, mostly mediated by antibodies. The second layer is protection against severe disease, even if infection occurs. An infection in a vaccinated individual is sometimes called a 'breakthrough' infection, and breakthrough infections can tend to be milder in severity than infections in unvaccinated individuals because of this second layer of defence, mediated by T cells and other components of the immune system. Whereas SARS-CoV-2 variants have been able to escape the first layer of defence by evading antibodies against the original strain of the virus, the second layer of defence against severe disease has generally remained robust and provided sustained protection against severe COVID-19 in breakthrough infections.

There is a clear difference in the approaches taken in China, relying mostly on inactivated vaccines, compared to the approach in Europe and North America of using newer technologies to manufacture vaccines with higher efficacy against mild infection. All vaccine technologies were able to provide a high level of protection against severe COVID-19.

4.   Samuel Cross, Yeanuk Rho, Henna Reddy, Toby Pepperell, Florence Rodgers, Rhiannon Osborne, et al., 'Who Funded the Research behind the Oxford–AstraZeneca COVID-19 Vaccine?', *BMJ Global Health* (2021) 6: e007321, https://doi.org/10.1136/bmjgh-2021-007321.

5.   Norbert Pardi, Michael J. Hogan, Frederick W. Porter, and Drew Weissman, 'mRNA Vaccines—A New Era in Vaccinology', *Nature Reviews Drug Discovery* 17 (2018): 261–279, https://doi.org/10.1038/nrd.2017.243.

Table 4.1: Overview of COVID-19 vaccine technologies

	mRNA	Viral Sub-unit	Viral Vector	Inactivated Virus
Example vaccines by manufacturer	BioNTech (Pfizer), Moderna	Novavax	AstraZeneca, Johnson & Johnson, CanSino	Sinovac, Sinopharm, Covaxin
Doses required to be 'fully vaccinated'[a]	Two	Two	Two	Two (<60y) or Three (≥60y)
Advantages	Very strong immune response	Very strong immune response	Broader and more durable immune response (in theory)	More traditional manufacturing approach
Disadvantages	Complex to develop and manufacture, stronger side-effects	Complex to develop and manufacture	Complex to develop and manufacture	Weak and short-lived immune response
Initial efficacy estimates against symptomatic COVID-19 with ancestral strain in large clinical trials	90%–95%	96%	76%	51%–78%
Initial efficacy estimates against severe COVID-19 with ancestral strain in large clinical trials	>99%	>99%	>99%	>99%

a. The definition of 'fully vaccinated' varies in different locations, here we refer to the World Health Organization recommendations for primary vaccination series.

10

Pandemic Control in China's Gated Communities

Hualing Fu*

Introduction

A key global strategy to contain the coronavirus disease 2019 known as COVID-19 has been the implementation of social distancing measures (SDMs), in particular Stay-at-Home (SaH) orders. Given the epidemiological consensus at the time that social distancing significantly reduces transmission and that the ability of a country to contain the spread of infections depends on the degree to which SaH orders and other SDMs are enforced and complied with, few countries, if any, have not imposed lockdowns of sorts to some degree, in particular a range of SaH orders, placing a significant part of their population, if not all, under quarantine for various durations.[1] To a large degree, the success or failure of these measures has depended on citizens' willingness to change their behaviours to comply with SaH orders.

The existing literature indicates a range of factors, both subjective and objective, to explain compliance. Subjective factors include substantive support for the measures, trust in the government, political values, and obligations to obey regulations, broadly defined to include the impact of deterrence and the sense of fairness.[2] Some studies show that civic and moral education, and the appeal to altruism or a sense of solidarity, have some short-term positive impact on compliance with SDMs; an invocation of a degree of fear is also found to have more explanatory power in motivating behaviour

1. Minah Park, Alex R. Cook, Jue Tao Lim, Yinxiaohe Sun, and Borame L. Dickens, 'A Systematic Review of COVID-19 Epidemiology Based on Current Evidence', *Journal of Clinical Medicine* 9, no. 4 (2020): 967; Stella Talic, Holly Wild, Ashika Maharaj, Zanfina Ademi, Wei Xu, Evropi Theodoratou, et al., 'Effectiveness of Public Health Measures in Reducing the Incidence of Covid-19, SARS-Cov-2 Transmission, and Covid-19 Mortality: Systematic Review Ad Meta-analysis', *BMJ* (2021): 375.
2. Chris P. Reiders Folmer, Megan A. Brownlee, Adam D. Fine, Emmeke B. Kooistra, Malouke E. Kuiper, Elke H. Olthuis, et al., 'Social Distancing in America: Understanding Long-Term Adherence to Covid-19 Mitigation Recommendations', *PloS one* 16, no. 9 (2021), https://doi.org/10.1371/journal.pone.0257945.

change.[3] Others have pointed out that one's political views (Democrat or Republican in the American context) have some predictive power on whether or not one will adhere to SDMs.[4]

Compliance with SaH orders can hardly be achieved without coordinated action, effective enforcement, and adequate material and psychological support on the part of the government. In the United States, while people generally felt compelled to obey the law, supported the principle of social distancing, and were concerned with the consequences of non-compliance, 'only a minority of Americans indicate that they always follow social distancing measures'.[5] In Italy, public authorities struggled to deal with significant non-compliance with SaH rules.[6] Sheth and Wright reported significant violations of the SaH order in California, concluding that relying on risk aversion or altruism would not achieve compliance.[7] Even in Canada, where compliance was high across all provinces, there was still a substantial proportion of norm-breakers.[8]

In order to secure adequate compliance, objective factors also need to be factored in, including people's capacity to follow SaH orders, opportunities to violate the measures, costs and benefits of adherence, and social norms in terms of adherence, i.e., whether others around are also in compliance. A key factor is the practical capacity to adhere to SDMs—people do not follow rules that are hard, if not impossible, to follow. Effective implementation of SaH orders demands support for residents in isolation and monitoring to enforce the orders.

This chapter examines the unique role that grassroots residential social organisations in China have played in supporting and enforcing pandemic control measures. In explaining China's performance in containing the pandemic before the sudden reverse of the restrictive policy in November 2022 after a nationwide protest COVID restrictions,[9] commentators have attributed this to the Chinese Communist Party's

3.   Craig A. Harper, Liam P. Satchell, Dean Fido, and Robert D. Latzman, 'Functional Fear Predicts Public Health Compliance in the COVID-19 Pandemic', *International Journal of Mental Health and Addiction* 19, no. 5 (2021): 1875–1888; Janice Y. C. Lau and Shui-Shan Lee, 'Legal Provisions for Enforcing Social Distancing to Guard against COVID-19: The Case of Hong Kong', *Journal of Law and the Biosciences* 8, no. 1 (2021): 1–14.

4.   Marcus O. Painter and Tian Qiu, 'Political Beliefs affect Compliance with Government Mandates', *Journal of Economic Behavior and Organisation* 185 (2021): 688–701.

5.   Reiders Folmer et al., 'Social Distancing in America'.

6.   Briscese Guglielmo, Nicola Lacetera, Mario Macis, and Mirco Tonin, 'Compliance with COVID-19 Social-Distancing Measures in Italy: The Role of Expectations and Duration', National Bureau of Economic Research, IZA Discussion Papers no. 13092 (2020).

7.   K. Sheth and G. C. Wright, 'The Usual Suspects: Does Risk Tolerance, Altruism, and Health Predict the Response to COVID-19?', *Review of Economics of the Household* 18 (2020): 1041–1052.

8.   For the Canadian case, see Jean-Francois Daoust, Éric Bélanger, Ruth Dassonneville, Erick Lachapelle, and Richard Nadeau, 'Is the Unequal COVID–19 Burden in Canada Due to Unequal Levels of Citizen Discipline across Provinces?', *Canadian Public Policy* 48, no. 1 (2022): 124–143.

9.   China had been successful in reaching its zero COVID-19 goal. For example, prior to the outbreak of the Omicron variant, 'China has reported only 0.05% of the total number of global cases despite making up 19% of the world's population'; Jin-Ling Tang and Kamran Abbasi, 'What Can the World Learn from China's Response to Covid-19?', *BMJ* 375 (2021), https://www.bmj.com/content/375/bmj.n2806. For reports on China's anti-COVID restrictions protests in November 2022, see, for example, Helen Davidson, 'Covid Restrictions Lifted on Guangzhou and Chongqing after China Protests', https://www.theguardian.com/world/2022/

decisive move to lock down cities at a high social and economic cost and to the capacity both to mobilise human and material resources to build hospitals to isolate those infected with the virus, and to send medics and support to the most infected cities to treat patients. Another feature that has characterised the Chinese strategy and is receiving increasing attention is the broad societal participation and the ability of residential communities to enforce SDMs and, in particular, SaH orders, enabling residents to respond to the pandemic and to comply with pandemic control measures with resources and confidence.[10] In what was dubbed by the Party as the people's war against the COVID-19 pandemic, Chinese urban communities showcased the effectiveness of the unique governance style in inducing compliance under certain political conditions. What makes Chinese urbanites more willing to participate in pandemic control enforcement and more compliant with SaH orders? And when will the willingness to comply and participate be withdrawn?

Emergencies and Authoritarian Advantage

Chinese urban communities are part of the overall political system and need to be situated in that larger political context.[11] China's political system, with its democratic centralism, coupled with its ability to shape public opinion and exert discipline and control, is well-equipped to manage novel crises.[12] Chinese commentators have

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nov/30/us-and-canada-urge-china-not-to-harm-zero-covid-protesters-amid-calls-for-crackdown.

10. For a growing body of literature, see, for example, Qiulan Chen, Lance Rodewald, Shengjie Lai, and George F. Gao, 'Rapid and Sustained Containment of Covid-19 Is Achievable and Worthwhile: Implications for Pandemic Response', *BMJ* 375 (2021), https://www.bmj.com/content/bmj/375/BMJ-2021-066169.full.pdf; Jinghua Gao and Pengfei Zhang, 'China's Public Health Policies in Response to COVID-19: From an "Authoritarian" Perspective', *Frontiers in Public Health*, 15 December 2021, https://doi.org/10.3389/fpubh.2021.756677; Jue Jiang, 'A Question of Human Rights or Human Left?—The "People's War against COVID-19" under the "Gridded Management" System in China', *Journal of Contemporary China* 31 (2022): 491–504; Feng Xu and Qian Liu, 'China: Community Policing, High-Tech Surveillance, and Authoritarian Durability', in *COVID-19 in Asia: Law and Policy Context*, ed. Victor V. Ramraj (Oxford: Oxford University Press, 2021), 27–42; Xiaolin He, Ping Jiang, Qiong Wu, Xiaobin Lai, and Yan Liang, 'Governmental Inter-Sectoral Strategies to Prevent and Control COVID-19 in a Megacity: A Policy Brief from Shanghai, China', *Frontiers in Public Health* (2022), https://doi.org/10.3389/fpubh.2022.764847; and Guobin Yang, *The Wuhan Lockdown* (New York: Columbia University Press, 2022).

11. Article 21 of the PRC Constitution explicitly mentions these organisations ('neighbourhood organisations') in the context of public health. It states: 'To protect the people's health, the state shall develop medical and health care, develop modern medicine and traditional Chinese medicine, encourage and support the running of various medical and health facilities by rural collective economic organizations, state enterprises, public institutions and neighbourhood organizations, and promote public health activities.'

12. Jacques deLise and Shen Kui, 'Lessons from China's Response to COVID-19: Shortcomings, Successes, and Prospects for Reform in China's Regulatory State' *University of Pennsylvania Asian Law Review* 16, no. 66 (2020): 66. Jonathan Schwartz, 'Compensating for the "Authoritarian Advantage" in Crisis Response: A Comparative Case Study of SARS Pandemic Responses in China and Taiwan', *Journal of Chinese Political Science* 17, no. 3 (2012): 313–331; and Victor C. Shih, 'China's Leninist Response to COVID-19: From Information Repression to Total Mobilization', in *Coronavirus Politics: The Comparative Politics and Policy of COVID-19*, ed. Scott C. Greer, Elizabeth J. King, Elize Massard da Fonseca, and Andre Peralta-Santos (Ann Arbor: University of Michigan Press, 2021).

confidently and, nearly universally, pointed to that systemic advantage over liberal democracies. As Gao and Zhang put it:

> Because collectivist societies are supposed to cooperate more for the benefit of the majority, individual interests need to be sacrificed when necessary. Democracies, on the other hand, advocate for individual freedom, and governments must implement policies within the limits of what is legally permissible. Such institutional constraints inevitably cause numerous inconveniences in responding swiftly to disasters and crises.[13]

Regime type seems to have mattered less in shaping states' initial responses during the crisis as the pandemic has created a global authoritarian movement that witnessed a sudden surge of executive power and steady weakening of democratic accountability.[14] The traditional liberal states have scrambled to impose some emergency measures suitable to their respective constitutional traditions and made a turn in their governance towards authoritarianism.[15] In managing the pandemic, the differences between democracies and statist/authoritarian states have diminished. As Fukuyama points out:

> In the end, I don't believe that we will be able to reach broad conclusions about whether dictatorships or democracies are better able to survive a pandemic. What matters in the end is not regime type, but whether citizens trust their leaders, and whether those leaders preside over a competent and effective state.[16]

Yet, as liberal democracies learn to act uncomfortably and often awkwardly in authoritarian ways, they encounter formidable political, legal, and social resistance.[17] The legislature may refuse to endorse pandemic control legislative initiatives or act to dilute the expansion of executive power that may be needed to implement effective control. Similarly, the judiciary, holding the executive legally accountable, may review and invalidate some of the executive excesses. More importantly, citizens, frustrated by continuous lockdowns and SaH orders, may rebel through non-compliance and open protest, as has been widely observed in democracies.[18]

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13. Gao and Zhang, 'China's Public Health Policies in Response to COVID-19'.
14. Richard Horton, 'Offline: Is Democracy Good for Your Health?', *The Lancet* 398, no. 10316 (2021): 2060; David Gilbert, 'These 30 Regimes Are Using Coronavirus to Repress Their Citizens', *Vice*, 9 April 2020, https://www.vice.com/en_us/article/dygbxk/these-30-regimes-are-using-coronavirus-to-repress-their-citizens.
15. Stephen Thomas and Eric C. Ip, 'COVID-19 Emergency Measure and the Impending Authoritarian Pandemic', *Journal of Law and the Biosciences* 7, no. 1 (2020): 1–33.
16. Francis Fukuyama, 'The Thing That Determines a Country's Resistance to the Coronavirus', *The Atlantic*, 30 March 2020, https://www.theatlantic.com/ideas/archive/2020/03/thing-determines-how-well-countries-respond-coronavirus/609025; and Ilan Alon, Mathew Farrell, and Shaomin Li, 'Regime Type and COVID-19 Response', *FIIB Business Review* 9, no. 3 (2020): 152–160. For a general survey of state capacities, see Ramraj, *COVID-19 in Asia: Law and Policy Context*.
17. Sarah Engler, Palmo Brunner, Romane Loviat, Tarik Abou-Chadi, Lucas Leemann, and Andreas Glaser, 'Democracy in Times of the Pandemic: Explaining the Variation of COVID-19 Policies across European Democracies', *West European Politics* 44, no. 5–6 (2021): 1077–1102.
18. See, for example, Maciej Kowalewski, 'Street Protests in Times of COVID-19: Adjusting Tactics and Marching "as Usual"', *Social Movement Studies* 20, no. 6 (2021) 758–765; and T. Plümper, E. Neumayer, and K. G. Pfaff,

How to explain the different responses among different regimes to the pandemic control emergency measures? For liberal democracies in general, the gap between the normal and the exceptional was sharp, and the restrictions on rights and freedoms during the pandemic made real differences, both epistemologically and empirically. Under pandemic control measures, public gatherings were banned, rallies and processions were barred, and freedom of mobility was curtailed. These restrictive measures, which may be commonly accepted and even taken for granted under authoritarianism, may produce shocks, be met with resistance and are, in any event, hard to implement in democracies.

The Chinese political system is well-equipped to manage novel crises. The authoritarian advantage is referred to as democratic centralism, in which a constitutionally entrenched Communist Party monopolises political power to exercise 'absolute leadership'. There are no effective checks and balances, and the decision-making process is, in McCubbins' terms, 'decisive' or even 'tyrannical'.[19] Under democratic centralism, China's pandemic control efforts are defined as 'centralization, coercive intervention, and state paternalism'.[20] The decision to impose a total lockdown on first Wuhan, a city of over 11 million people, then Hubei, a province of 65 million people, and finally on most of the other provinces was a decisive moment in China's war against the virus,[21] a move that received initial disbelief, shock, and suspicion in the international community, but later became a standard preventive measure that was widely adopted.[22] The lockdown illustrated the decisiveness and swiftness of the system in sharp contrast with some of the democratic gridlocks that have been commonly observed. By the time Shanghai was totally locked down in 2022, what the Party-state is capable of achieving its policy objectives regardless of the costs was laid bare.[23] After all, this is the same Party that implemented the One Child Policy and other massive projects unprecedented in human history. Political systems with concentrated political power may be able to act decisively while others with more fragmented political powers—subjecting decisions to multiple veto points and excessive checks and balances—may succumb to gridlock and political paralysis in the process.[24]

'The Strategy of Protest against Covid-19 Containment Policies in Germany', *Social Science Quarterly* 102 (2021): 2236–2250.

19. Mathew D. McCubbins, 'Gridlock', in *The Encyclopedia of Democratic Thought*, ed. Barry Clarke and Joe Foweraker (Abingdon: Routledge, 2000), 325. See also Gary W. Cox and Mathew D. McCubbins, 'The Institutional Determinants of Economic Policy Outcomes', in *Presidents, Parliaments, and Policy*, ed. Stephan Haggard and Mathew D. McCubbins (Cambridge: Cambridge University Press, 2001), 21–63.

20. Gao and Zhang, 'China's Public Health Policies in Response to COVID-19'.

21. Eddie Yu, 'An Analysis of China's Strategy in Combating the Coronavirus Pandemic with the 3H Framework', *Public Administration and Policy: An Asia-Pacific Journal* 24, no. 1 (2021): 76–91.

22. Keith Bradsher, 'As China Fights the Coronavirus, Some Say It Has Gone Too Far', *New York Times*, 20 February 2020, https://www.nytimes.com/2020/02/20/business/economy/china-economy-quarantine. html.

23. See, for example, Bloomberg, 'China Lockdowns Cost at Least $46 Billion a Month, Academic Says', https://www.bloomberg.com/news/articles/2022-03-29/china-lockdowns-cost-at-least-46-billion-a-month-academic-says?leadSource=uverify%20wall.

24. McCubbins, 'Gridlock', and Alon, Farrell, and Li, 'Regime Type and COVID-19 Response'.

13
Observations and Conclusion

Christine Loh with contributions from other authors

COVID-19 has been a humbling experience. Many experts from around the world have written about the large number of lessons that could be drawn from the pandemic. The most obvious overarching lesson is that authorities around the world need to do the right things and do them right very quickly whenever there is an infectious disease outbreak. Speed is important because of the mathematics of exponential spread.

COVID-19 was a shock to the world, but a pandemic should not have been a surprise. Many countries had pandemic plans on the shelf—the risk of a pandemic is a 'known known'—but having plans is one thing, rolling them out successfully is another matter altogether.

A new coronavirus, named SARS-CoV-2, was first identified in China at the very end of 2019 and by 20 January 2020, China was going all-out to fight this highly transmissible disease. A number of countries and jurisdictions took early effective action by closing borders and imposing testing, tracing, and various social distancing restrictions to cut the spread of the virus. Many others did not. Once the World Health Organization (WHO) declared COVID-19 a pandemic in mid-March 2020, communities around the world went into lockdowns with enormous social and economic consequences. The speed and magnitude of the 'big pause' were disconcerting—there was nothing like it in living memory.

COVID-19 became more than a public health threat—it was an economic threat, as most people became homebound; and a social threat, as family life and many work and social activities had to adapt, in-person events were cancelled, and social gatherings discouraged or even disallowed. Schools were closed for an extended period and children all around the world lost many months of education. Tensions increased, particularly in places where the population was divided between those who stressed protecting the society from the pandemic (by lockdowns and other stringent public health measures), and those stressing individual freedom. COVID-19 was a political threat too. The emergence of a new disease accompanied by high fatalities and deaths, the scale and speed of its impact, and the myriad terrifying unfolding outcomes in real time tested every leader and health system—many failed in controlling transmission when

the opportunity was there in the early days. Cases and fatalities continued to mount. Governments had to step in with massive subsidies to help people through tough times as economies collapsed. COVID-19 went into a second year and new variants emerged, creating renewed havoc. Vaccines became available at the start of the second year in richer economies and were crucial to bringing about a certain level of immunity and reducing mortality rates as public health measures were progressively relaxed. The pandemic recovery was interrupted by subvariants of Omicron in the third year of the pandemic in 2022 that continued to disrupt lives, business, travel, and global supply chains.

This concluding chapter provides insights from the authors of this book. While some of the chapters contain specific recommendations relevant to the topic under discussion, the purpose of this chapter is to pull key general insights together. COVID-19 was and remains a deeply personal experience. We all know people whose lives were disrupted by the pandemic. Indeed, our own lives had been disrupted.

Choices Are Political

The COVID-19 pandemic provided examples from around the world of what to do and what not to do. Chapters 9 to 12 show the diversity of the responses to the pandemic in Greater China (Mainland China, Hong Kong, Macao, and Taiwan), the United States, Europe, and the United Kingdom. Those chapters seek to explain through the lens of good governance why various countries reacted so differently. Chapter 7 looks at the socio-economic consequences of COVID-19—the pandemic was extremely expensive for the world.

A number of factors were at play: firstly, the concept of the 'social contract' had a role in the governance practices of a jurisdiction. An element of good governance is that governments are supposed to be at least somewhat prepared for known risks ahead of time. People will often accept constraints and inconveniences for the greater good, especially in emergencies. Chapter 6 provides a discussion about the concept of the social contract and its relevance in good governance and political decision-making (although it is unclear that this stage what contribution the pandemic may make to the concept of the social contract), while Chapters 9 to 12 discuss how it manifested itself in various jurisdictions in light of COVID-19.

Second, political trust was important too (see Chapter 1). Those societies where the people trusted the government's performance and/or trusted each other to act in the public interest were more willing to abide by restrictions in crises. Research showed the level of political trust was a useful indicator of a successful response to COVID-19. On the whole, the Greater China and Asia-Pacific jurisdictions had higher political trust in governments and/or within society. In Europe, some countries had higher political trust than others and those with higher trust tended to do better in their pandemic response, as government and citizens were better aligned. Societies with low political trust were more polarised and less accepting of pandemic restrictions. The lesson here

is political and socio-cultural systems that encourage the reduction of division would help in emergencies, such as dealing with a pandemic.

Third, leaders and governments have to make political choices when facing several waves of outbreaks with respect to COVID-19. The quality of leadership affected the response. Chapter 5 shows transmission of a disease needs to be contained quickly; otherwise, exponential growth can become unstoppable. Reducing the rate of spread at an earlier point in an epidemic cut the incidence of the disease dramatically. Those who acted early reaped the benefits in both public health and socio-economic terms. Staying vigilant for over three years tested every jurisdiction and its leaders. Chapter 7 notes rich economies threw money at the problem to provide massive subsidies that often did not reach those most in need. Poor economies had few options.

Preparedness vs. Leadership

The quality of leadership and governance practices at the time of crisis made the difference. COVID-19 showed a new infectious disease outbreak requires the immediate application of very tough actions from governments. Acting decisively and mobilising available resources, even in lower-income economies and irrespective of the type of political system, made a measurable difference in terms of infections and deaths.

The Global Health Security Index 2019 (GHSI 2019), published on the eve of the COVID-19 outbreak, noted that the world as a whole was poorly prepared (see Chapter 1). According to its ranking method, the United States and the United Kingdom came out as the top two countries with respect to the potential they had to deal with a pandemic. That potential may have been there, but preparedness simulations carried out by those two countries in recent years showed how unprepared they were. The United Kingdom's *Exercise Cygnus* in 2016, and America's *Crimson Contagion* in 2019, identified serious failures in many areas of pandemic preparedness. The United States and the United Kingdom turned out to be among the worst performers in the first two years of the pandemic. The GHSI continued to use the same assessment method after COVID-19 had already emerged for its 2021 report (GHSI 2021). The United States remained in first place, while the United Kingdom dropped to seventh place, still ranking ahead of others who did very much better. The countries that did well were in the Greater China and Asia-Pacific regions of diverse political systems and cultures, encompassing rich and middle- and lower-income countries. The designers of the GHSI acknowledged in GHSI 2019 and GHSI 2021 that their ranking systems could not assess the quality of leadership needed in times of emergency, which is understandable for such an index— but going forward, it may be better if the GHSI did not rank countries against each other and focused instead on how a country progresses without reference to others. High scores may give leaders an unrealistic sense of confidence.

Case for a Strong Initial Reaction

During the SARS outbreak in 2003, Dr Henk Bekedam, then the director of Health Sector Development, WHO, Western Pacific Regional Office, made it clear that to fight an infectious disease outbreak, one cannot be just 100 per cent ready, one needs to be 300 per cent ready. COVID-19 reminded us that with every outbreak, it is challenging to have a fully accurate risk assessment at the start of the outbreak. It is, therefore, prudent to act quickly and be ready for the worst—that is, the disease could be a highly transmissible and virulent disease. However, governments may not want people to panic and there can be resistance to applying tough restrictions in the early stages of a new outbreak, as the disease may not turn out to be of great concern. Stringent actions may turn out to be an overreaction. This is a universal phenomenon albeit with different cultural manifestations. The problem is no one knows at the start of an outbreak what the disease would be like. If COVID-19 taught us anything, it is that we do need to be prepared to react strongly.

Therefore, preparedness should surely mean having the governance capacity and capability to react aggressively at the beginning of an outbreak. Closing borders or reducing travel intensity initially can buy time for a more complete risk assessment. Other preparedness measures that would be important in the early days of the next pandemic—if not before—include building capacity in advance of an outbreak for testing and tracing, having sufficient personal protective equipment (PPE) for frontline health workers, and providing consistent messaging that gives information that helps people to stay calm because they are informed about what to expect and do rather than to tell people they don't need to worry—'it's just the flu'. The COVID-19 experience showed many examples at the start of the outbreak of what to do and what to avoid in diverse political systems and richer and poorer economies. Leaders in Greater China, Singapore, South Korea, Thailand, Vietnam, Australia, and New Zealand provided good examples of acting quickly and messaging clearly, while leaders in the United States and the United Kingdom took considerable time to acknowledge the seriousness of the outbreak and acted late.

Perhaps something similar to extreme weather warning systems could be developed for infectious diseases, where people become familiar with what to do as signals are issued. Hong Kong's typhoon warning system is an example of a successful, long-standing system where residents understand what to do as higher signals are posted alongside well-practised explanations about the likely trajectory of the typhoon, and what people should be aware of and be ready for. The Hong Kong signalling system is designed by meteorological experts and signals are raised in accordance with set conditions and not by politicians. Once a signal is posted, institutions and the public know what they need to do. Obviously, an infectious disease outbreak communication system would have to be designed differently, but once there is a system, people can get used to it and a standardised governance system can be developed. The advantage of such a system is that it is managed by subject experts.

Bringing the COVID-19 Pandemic to an End

As noted in Chapter 4, investing in COVID-19 vaccines and antiviral drugs was worthwhile. Having effective vaccines and drugs that became available in the second year of the pandemic meant that public health measures could be used more sparingly. Many higher-income countries achieved high levels of vaccination uptake in adults by early 2022, with third and even fourth and fifth doses being offered to maintain those high levels of protection. When breakthrough infections do occur in vaccinated individuals, they tend to be mild, and the high levels of population immunity conferred by vaccinations and also natural infections in most parts of the world meant that COVID-19 posed much less of a threat from 2022 onwards than it did earlier in the pandemic. However, when the Omicron variant emerged in late 2021, although it was seen as a milder variant, its increased rate of transmission and ability to evade prior immunity led to many infections occurring in a very short space of time. Even though each of those infections was—on average—milder, there were so many infections that the number of serious cases requiring hospital care at the epidemic peak still reached or exceeded levels in previous epidemics in some locations.

As time goes by, ensuring that vaccine coverage remains high will be a priority. One of the challenges for governments is to get the most vulnerable groups vaccinated early—this was far from easy in the light of the vaccine hesitancy experienced in many jurisdictions. In economies where vaccines are available, instead of monitoring the proportion of the population with two doses, three doses, or four doses, attention might instead switch to monitoring the proportion of older adults who have had a vaccination dose within say the last six months and encouraging regular booster doses to keep immunity at higher levels. It is likely that COVID-19 will continue to circulate; what is less clear is how frequently new variants or subvariants will emerge. We cannot rule out the possibility that some public health measures will have to be re-instituted to deal with resurgences in COVID-19 transmission perhaps in upcoming winters in temperate locations. In other words, in fighting infectious diseases, vaccines are not necessarily the silver bullet—they become part of a package of political, social, and economic measures that are needed in the arsenal.

Mathematics for Policy-makers

Chapter 5 provides a thorough discussion of the mathematics of infectious diseases, including the use of mathematical epidemiological models to predict the effects of alternative policies to contain the spread of the disease. In the early stage of an outbreak, reducing the rate of spread cuts the number of cases, which lowers the pressure on hospitals and reduces fatalities—and also reduces adverse economic impacts. In the later stages of the epidemic, especially if a vaccine or a medication is developed that reduces infectiousness, the models forecast a slowdown in growth and eventually dwindling numbers of cases. In this phase, the same models help to decide which segment of