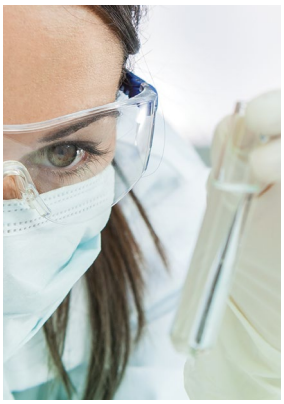

Introduction: Lessons for Pandemic Policy

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This second volume in the World Bank's *Disease Control Priorities* series, *fourth edition* (*DCP4*), deals with pandemic prevention, preparedness, and response. A distinguished group of authors has reviewed the available evidence and experience to draw conclusions for policy. The volume's chapter 1 provides an overview of the main findings in the volume. In this Introduction, the editors present their own conclusions for policy by drawing on but stepping back from the specifics of the volume to convey the lessons we have drawn from working with each other and the authors over a number of years, including during our mutual experience of COVID-19 (coronavirus).

The Introduction focuses on lessons for policy, which raises the question of "whose policy?" Lessons tend to be general and potentially serve multiple policy communities. That said, previous editions of *Disease Control Priorities* focused principally on a global audience of interested academic institutions, international organizations, and major bilateral donors to health. This volume, in contrast, addresses what we view as the policy options of those individual countries whose governments actively seek to be prepared. It shares widespread concerns that some governments show little commitment to preparation—the United States in the years subsequent to the pandemic phase of COVID-19 is but one example. Communication directed to these governments (until well into the next pandemic) is likely of little value. Thus, this volume addresses the narrower audience of concerned policy makers, including those in government.

We start with the conclusion that policy matters. The *Lancet* Commission on Investing in Health found that, among the 30 most populous countries, the poorest-performing against mortality from COVID-19 (Bangladesh, Mexico, and the Russian Federation) experienced over five times the level of excess mortality as did well-performing countries (for example, China, France, and Japan) (Jamison et al. 2024). Even the best-performing countries, however, experienced severe losses of life, as well as economic and social disruption. The specific causal chains leading from policy to success or failure remain to be determined, will differ from pandemic

to pandemic, and may never be definitively known. Even success will likely be incomplete. Policy plausibly makes an important difference, though, in separating merely bad outcomes from terrible ones.

The magnitude of pandemic risk provides the context for considering the significance of policy. Mortality risk remains high. In 2021, 2.6 million people died from AIDS, tuberculosis, or malaria (WHO 2024). In a particular year, it is unlikely that anyone will die in a pandemic; however, on average over time, and at current levels of risk, the analyses reported in this volume conclude that about 1.6 million people per year can be expected to die from an influenza pandemic and another 0.9 million from a coronavirus pandemic. These numbers should be viewed as only approximate, as known unknowns. In addition, unknown unknown sources of pandemic risk exist. Despite the unknown unknowns, the main dimensions of risk prove well enough understood to prepare for, and preventive measures to reduce risk are at least partially understood.

Our main conclusions for policy fall under five headings, which we will deal with in turn:

1. National policy makers would be mistaken to count on operating in a "good" environment.
2. Effective public health and social measures (PHSM) exist to slow transmission.
3. Effective medical countermeasures will likely be key to mitigating mortality.
4. Taking full advantage of vaccines, when and if they become available, will entail maximizing ease of access for those at high risk and with high motivation to be vaccinated.
5. Science is critically important, and much science will or can be local.

1. DIMENSIONS OF A GOOD ENVIRONMENT

Several dimensions of a "good" environment for pandemic prevention and response have been persuasively delineated in recent major reviews (Clark and Sirleaf 2025; Fisher 2025; Horton 2021; Osterholm and Olshaker 2025; Patrick, Larnder, and Ruck 2025; Sachs et al. 2022; Sridhar 2022; Yamey et al. 2024). They include the following:

- National governments and international organizations should support efforts at early detection of emergence of new pathogens, closely monitor gain-of-function research, and regulate activities involving high risk of animal-to-human transmission.
- Major international organizations should be well financed to respond quickly to global and country needs. International collaborations should invest in vaccine development and manufacturing capacity, increasing the probability of a quickly available vaccine with intellectual property that is widely shared.
- National populations should be induced to respond to national leadership in a cooperative spirit to contain the pandemic.

- Both mainstream and social media should be educated to provide an honest picture of the current state of the science and the trade-offs that science poses for individual and collective choice.
- National governments should prepare seriously for the next pandemic.

We join these other analysts in advocating for the creation of such a favorable environment, but little in the evolution of national and international politics in the past decade offers much hope. Although a final pandemic agreement (treaty) was agreed on in 2025, and reflects progress, reaching closure required so many compromises that little optimism is warranted. We feel that prudent national policy makers cannot realistically assume that an effective strain-specific vaccine will be available in their country any time early in a pandemic, that other governments will be prepared, that international cooperation will result in financial support, or that, for many countries, important segments of their own populations and media will be cooperative. Despite this bleak policy environment, much can still be done.

2. PUBLIC HEALTH AND SOCIAL MEASURES

Rapid implementation underpins attenuation of a pandemic's impact. Quick scientific assessment and publication on COVID-19 enabled the rapid responses actually implemented in many countries of the Western Pacific as early as mid-January 2020 (Wang et al. 2020). In addition to the Wang et al. warning of pandemic risk, *The Lancet* also published in January 2020 a prescient projection of the global spread of COVID-19 (Wu, Leung, and Leung 2020) and, in early March 2020, an assessment of the probable impact (or lack thereof) of mitigation measures that also proved prescient (Anderson et al. 2020).

Domains of early action include isolating known sources of infection (individual and community), isolating susceptible individuals from infection, and introducing measures to slow the spread of what will, with high probability, be an aerosol-transmitted virus. These measures will typically include masks, ventilation and air filtration, and social distancing including venue closures.

Isolating known sources of infection may involve unpopular measures like closing national borders or quarantining cities. Identifying (including through testing) and isolating infectious individuals is a lesson from public health 101, but remarkably many countries in the COVID-19 pandemic made essentially no effort to do so. At the same time many countries of the Western Pacific did create means for infectious individuals to isolate and effective incentives for that isolation. Arguably, these efforts contributed importantly to their success.

Rapid action involves not only rapid implementation of measures expected to slow transmission but also rapid relaxation of those measures when they are no longer needed (or when learning from experience has shown them to be ineffective). School closures provide an important example. Early in the course

of COVID-19, epidemiologists learned that schools were not an important venue of transmission and that school-aged children were at minimal risk of death. Nevertheless, school closures remained in place in far too many countries for far too long. As frightened populations will undertake efforts to isolate themselves, public policy's role may well importantly lie in convincing individuals to return to normal life.

3. MEDICAL COUNTERMEASURES

In the early days of COVID-19, the case fatality ratios in Wuhan, China, were very high. Clinicians in Wuhan quickly developed approaches to supportive care that significantly improved survival prospects—and their findings were published in *The Lancet* less than two months after the pandemic began (Huang et al. 2020). Case management matters.

It is correct to say that each pandemic will differ from its predecessors. It is also true that, in all likelihood, aerosol transmission and respiratory distress will characterize the next pandemic. Thus, assuring good supplies of oxygen and appropriate isolation rooms will prove valuable not only for pandemic preparation but also more generally for health system strengthening. Ensuring that clinical staff are as protected as possible will also be key to ethically strengthening clinical response.

Rapid trial and error learning offers the promise of relatively quickly generating the clinical tools to enhance survival, and we return to this point in our discussion of the importance for governments to facilitate and encourage scientific understanding for responses to an unfolding pandemic. Rapid initiation of clinical learning, including identification and evaluation of effective medicines (and of which potentially promising medicines are ineffective), will be important.

4. VACCINES

Vaccines can provide protection against severe disease and death. Relatively early in COVID-19, strong government incentives and support resulted in German and US mRNA vaccines that provided such protection. Also apparently successful against mortality were more traditionally developed vaccines such as a vaccine from Oxford/AstraZeneca and another from Sinovac in China.

To the (possibly substantial) extent that vaccines primarily will confer individual protection, government policies to vigorously encourage or even coerce vaccine uptake are likely to prove counterproductive. Particularly early in a pandemic, vaccines are likely to remain in short supply and there will be high payoff to making available supplies easily accessible to individuals who wish to be immunized—prioritizing among them the most at risk like health care and other essential workers.

Unless it turns out that already-existing vaccines have some effectiveness against a new pandemic pathogen—and there is some evidence for this possibility—vaccines will, as we have stressed, become available only late into a pandemic if at all. PHSM combined with medical countermeasures thus will remain of primary importance even if, as with COVID-19, vaccines ultimately prove of significant value. Investing in vaccine development also provides insurance against the evolution of the pathogen into highly transmissible forms relatively invulnerable to PHSM. The much less good relative performance of China and Japan late in COVID-19 resulted, in all likelihood, from the evolution (elsewhere) of the Omicron variant, which was so transmissible that PHSM were less effective.

An implication of the potential to adapt relatively standard vaccines to deal with a new pathogen is that many individual countries will find it within their scientific capacity to develop and manufacture a potentially successful vaccine.

5. THE CRITICAL ROLE OF EVER-EVOLVING SCIENCE

Science underpins development of the understanding of pandemic characteristics, medical countermeasures, effective PHSM, diagnostics, and vaccines. Countries will, of course, differ in the extents to which they can mobilize effective scientific responses, but rapid mobilization of available resources will, at a minimum, facilitate rapid uptake of advances from elsewhere and systematic learning about what is working locally.

The effectiveness of masks, hand hygiene, and air filtration—to take a few examples—will depend on transmission characteristics of the virus and is thus knowledge that can be acquired locally while simultaneously learning from efforts elsewhere. At the same time much is known, or could be known, from the COVID-19 experience and accumulated experience with airborne transmission of respiratory viruses. It is thus puzzling that distillation of this experience into information of direct use to policy makers, clinicians, and the public remains so limited. There likewise appeared to be no up-to-date distillation that this volume could turn to of the best available evidence on the protectiveness of the major COVID-19 vaccines against infection, against severe disease, and against onward transmission. Distilling such information now would help pre-position a country's scientific community for action against a new outbreak. It would likewise help guide decisions about investing in stockpiles and reserve manufacturing and clinical capacity. Chapters in this volume provide valuable starting points on the evidence base, but much remains to be done.

Policy makers and the public will be well advised to listen carefully to science as it adds to existing knowledge. But listening carefully in no way implies "following the science." Scientists will (rightly) have their own views about trade-offs between vaccine safety and efficacy. Or between acting quickly on weak evidence or waiting for the evidence base to improve. Or about how to balance risks of quickly reopening schools against the social costs of prolonged closure. Their role as scientists, however,

lies in providing policy makers and the public with the best available evidence on the trade-offs. Policy makers and the public should retain responsibility for making their own determinations—informed by science but not dictated by scientists. Governments that choose to take this perspective may find that they need to resist pressure from regulatory agencies and medical or public health establishments that would prefer to keep these trade-off judgments for themselves.

We judge that rapid mobilization of the scientific community, and committing substantial resources to it, will have high payoffs in national pandemic control. The scientific role is no less essential for being circumscribed.

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Collective striving for a better global environment for pandemic preparedness may well have some success, and that is to be hoped for—hoped for, but not planned for. We have in this volume attempted to elucidate the multiple pathways that a committed national government could follow for effective response despite an unsupportive international environment.

REFERENCES

Anderson, R. M., H. Heesterbeek, D. Klinkenberg, and T. D. Hollingsworth. 2020. "How Will Country-Based Mitigation Measures Influence the Course of the COVID-19 Epidemic?" *The Lancet* 395 (10228): 931–34.

Clark, H., and E J. Sirleaf. 2025. "The Pandemic Agreement Is a Milestone: Now It Is Time for Action in National Capitals." *The Lancet* 405 (10495): 2109–11.

Fisher, D., ed. 2025. *Infectious Disease Emergencies: Preparedness and Response*. National University of Singapore Press.

Horton, R. 2021. *The COVID Catastrophe: What's Gone Wrong and How to Stop It Happening Again, 2nd Edition*. London: Wiley.

Huang, C., Y. Wang, X. Li, L. Ren, J. Zhao, Y. Hu, L. Zhang, et al. 2020. "Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China." *The Lancet* 395 (10223): 497–506.

Jamison, D. T., L. H. Summers, A. Y. Chang, O. Karlsson, W. Mao, O. F. Norheim, O. Ogbuoji, et al. 2024. "Global Health 2050: The Path To Halving Premature Death by Mid-Century." *The Lancet* 404 (10462): 1561–1614.

Osterholm, M. T., and M. Olshaker. 2025. *The Big One: How We Must Prepare for Future Deadly Pandemics*. New York: Hachette Book Group.

Patrick, D., A. Larnder, and C. Ruck, eds. 2025. *Understanding and Controlling Pandemics: Lessons Learned from COVID-19*. Volume 1 of *Effective Pandemic Response: Linking Evidence, Intervention, Politics, Organization, and Governance*, edited by P. Berman. Singapore: World Scientific.

Sachs, J. D., S. S. Abdool Karim, L. Aknin, J. Allen, K. Brosbøl, F. Colombo, G. Cuevas Berron, et al. 2022. "The *Lancet* Commission on Lessons for the Future from the COVID-19 Pandemic." *The Lancet* 400 (10359): 1224–80.

Sridhar, D. 2022. *Preventable: How a Pandemic Changed the World & How to Stop the Next One*. London: Viking.

Wang, C., P. W. Horby, F. G. Hayden, and G. F. Gao. 2020. "A Novel Coronavirus Outbreak of Global Health Concern." *The Lancet* 395: (10223): 470–73.

WHO (World Health Organization). 2024. "WHO Methods and Data Sources for Country-Level Causes of Death 2000–2021." Global Health Estimates Technical Paper WHO/DDI/DNA/GHE/2024.2, WHO, Geneva.
Wu, J. T., K. Leung, and G. M. Leung. 2020. "Nowcasting and Forecasting the Potential Domestic and International Spread of the 2019-nCoV Outbreak Originating in Wuhan, China: A Modelling Study. *The Lancet* 395 (10225): 689–97.
Yamey, G., A. V. Diez Roux, J. Clark, and K. Abbasi. 2024. "Pandemic Lessons for the 2024 US Presidential Election." *BMJ* 384: q150.