Given all that we have experienced throughout the Covid-19 pandemic, what have we learned about making hard risk-risk trade-off decisions when the next health crisis hits? The questions faced have been many and complex: Should governments open schools, risking spread of a deadly disease? Or should schools educate children remotely, offering inferior pedagogy, providing no socialization, and leaving poor and minority families behind? Should governments shutter “nonessential” businesses to stem viral spread—risking job insecurity, impoverishment, and economic collapse? If vaccines are produced in record time, should regulatory agencies move full speed ahead, or should they “pause” at every safety signal? Should the agencies expedite full licensure, and should they move quickly toward authorization for children?

These are among the agonizing risk-risk trade-offs we have faced, as a society, since the very first moments of the Covid-19 pandemic. And we still don’t fully know the answers. How can ethics help us think about hard trade-offs that weigh competing values and have deep consequences for society and particularly the most disadvantaged?

Let’s begin with what we don’t know and with the problem of how to act under conditions of scientific uncertainty and rapidly evolving understanding. During the Covid-19 pandemic, decision-makers have had to act before scientific certainty could be established on basic epidemiological facts. Early on, public health agencies advised that aerosolized spread of SARS-CoV-2 was unlikely. It is now regarded as a primary mode of transmission. We had high hopes that vaccines would virtually block spread. We now understand that vaccines are less effective in preventing breakthrough (and reinfections) with Covid-19 variants, especially the currently circulating Omicron variant. Additionally, individuals with breakthrough infections carry viral loads similar to those of unvaccinated individuals with Covid infections and are capable of efficient transmission.

If everyone masked up, would it impede viral spread? At the start of the epidemic, both the U.S. Centers for Disease Control and Prevention and the World Health Organization said no, and then equivocated. These two major scientific agencies have issued conflicting advice, with the WHO urging vaccinated individuals to continue masking and the CDC advising in May 2021 that vaccinated people generally did not need to wear masks in public. In July, the CDC reversed this guidance in light of the surging Delta variant and evidence that it could be transmitted by vaccinated individuals. Shifting, even conflicting, scientific recommendations have sown seeds of doubt in the public and split communities along political and philosophic divides. Uncertainty arose about the optimal interval for administering a two-dose vaccine and whether different vaccines could be mixed. And then government agencies began wrestling with decisions about administering third, and later fourth, mRNA doses, including who should receive them and when. (Presently, the CDC recommends third booster doses for everyone twelve years of age and older).

This essay discusses the challenges of making policy trade-offs amid scientific uncertainty. While there may
be no perfect formula for deciding what to do and when, we propose four key considerations for assessing trade-offs and apply those considerations to the areas of education, economies, health care, travel and migration, social engagement, and medical countermeasures.

**Pandemic Policy Approaches: The Precautionary Principle and “Playing It Safe”**

In a health emergency, instincts may drive people toward decisive action even in the face of scientific uncertainty. Under the precautionary principle, preventative action is encouraged to avoid an emerging hazard that has the potential to cause catastrophic or irreversible damage, even when scientific understanding is lacking. Exercise of the precautionary principle comes in various forms, such as delaying or pausing new innovations to review their safety or imposing stringent regulations to contain a health hazard whose impacts are not fully known. Put simply, the precautionary principle can be understood as “playing it safe.” It favors erring on the side of overreacting to control a threat while it is still being understood rather than underreacting and allowing the threat to spread. Yet although similar rationales have been accepted in various policy realms (for example, environmental policy), the precautionary principle has less traction in infectious disease control.

The reason, of course, is that playing it safe to reduce the risk of a spreading infection involves major trade-offs across nearly every sector of society—and it is hard to know which course will lead to the greatest benefits or harms. Playing it safe in terms of controlling a spreading virus may feel right, but there are hidden and not-so-hidden costs. The United States could have dramatically slowed SARS-CoV-2 by locking down hard and long. But even with lockdowns less long and strict, we have probably left a generation of school children behind, and forced countless people into unemployment, unstable housing, and food insecurity. Lockdowns cause deep loneliness and social isolation, restrict travel, and impede constitutionally protected rights to pray and assemble.

Sometimes, of course, well-targeted interventions can produce benefits to multiple sides of complex problems. Many commentators have pitted public health against the economy, suggesting that stronger mitigation measures might harm productivity. Yet many countries—including China, South Korea, Taiwan, Australia, and New Zealand—that acted decisively to control the virus fared far better economically.

**Weighing the Ethics and Evidence for Risk-Risk Trade-Offs**

Looking ahead to the next epidemic or pandemic, how should governments weigh often-competing considerations amid scientific uncertainty and divergent value judgments? When there is suffering on both sides of the equation, how many lives, how much educational loss, and how much economic hardship are we willing to risk to stem a widely circulating virus? Often, there is no single, obviously correct answer, and different societies may weigh the trade-offs differently; for example, liberal democracies might prize freedom over health; and lower-income countries or communities may not have the economic cushion to withstand a wholesale shutdown the way that wealthier societies could. Although the unquestionably right answers remain elusive, the following key ethical and empirical considerations are useful in evaluating the hard trade-offs.

*How likely is it that the intervention will achieve its public health goal?* A trade-off is not worth the economic and social costs unless the public health intervention is likely to achieve its goal of controlling viral spread, and to a significant extent. Thus, understanding the evidence base for a risk-mitigation measure is a crucial first step. While scientific evidence may be gradually evolving, does extant evidence clearly suggest that the proposed measure will be effective? Is the benefit significant (for example, saved hospitalizations and deaths), will it be widespread (benefiting the entire population or a significant subsection of it), and will it be equitably distributed?

*Are there any less-restrictive methods to achieve the goal as well or better?* If the loss or downside entailed in a public health intervention can be eliminated or reduced, there is an ethical obligation to use a measure that has lower personal, societal, and economic costs. A public health intervention should be necessary to avert a real harm, proportionate to the harm it seeks to avoid, and only as restrictive as is needed to achieve the desired end. Using overly restrictive or overly broad measures when a more limited or targeted intervention would work as well, or better, is ethically problematic.

*Will the intervention carry predictable or unintended harms, and to what extent?* Even before an intervention is imposed, the public health agency should anticipate harms—both those that may be unavoidable with a particular intervention and those that are merely possible. Harms can come in a variety of ways, and each illustrates a trade-off between the value of the public health measure and the burden it creates. Unintended harms can be economic, educational, and personal. Health-health trade-offs are also a major concern. Measures that may be effective to curb the spread of a novel pathogen could create health risks of a different sort, including delayed diagnosis or treatment, mental distress, child or partner neglect or violence, or alcohol and substance misuse. And these are exactly the kinds of harms that have occurred throughout the Covid-19 pandemic and occurred in past epidemics, such as the West African Ebola epidemic. In fact, an all-consuming focus on preventing the transmission of SARS-CoV-2 has reversed many achievements in global health and economic development, including reductions in poverty and maternal and child deaths and increases in food security and childhood vaccination coverage.

*Are the benefits and burdens of the intervention fairly distributed?* Even before the Covid-19 pandemic, the pre-
How should governments weigh often-competing considerations amid scientific uncertainty and divergent value judgments?

The four questions posed above are useful in examining governments’ decisions about trade-offs during the pandemic and determining how responses to the next major outbreak could be improved. If there were a single observation that could be garnered from the world’s collective experiences with Covid-19, it is that virtually every country struggled mightily in curbing hospitalizations and deaths using nonpharmaceutical interventions. Countries with the most robust health systems had some of the world’s highest rates of hospitalization and death, and those with lower rates (certain East Asian and island nations) acted early and hard, often with draconian lockdowns; aggressive testing, tracing, and quarantine; and travel bans.

Nonetheless, overall, there remains little scientific consensus on the extent to which nonpharmaceutical measures effectively curbed viral spread. Experts projected that complete inaction would have resulted in over 50 percent of countries’ populations infected, with deaths among 0.1-0.6 percent of the global population, concentrated in the elderly, immunocompromised, and socioeconomically disadvantaged groups. Most countries never quite got to those staggering levels, but infection rates with the highly infectious Omicron variant are pushing case rates to unprecedented levels. Absent ample vaccine supplies, nations would eventually have had devastating hospitalization and death rates. It turned out that, for most liberal democracies, nonpharmaceutical interventions had two modest but important impacts on disease epidemiology: they helped “flatten the curve” for a short while to prevent hospitals from becoming overwhelmed, and they bought some time for the development and rollout of vaccines. But they came with a high cost to liberty, privacy, mental health, and the economy.

Education. During the initial spike in the pandemic, in April 2020, UNESCO (the United Nations Educational, Scientific and Cultural Organization) estimated that nearly 90 percent of the world’s students, including nearly 80 million in the United States, were impacted by school closures. Half the world’s students were still affected by March 2021, and by September of that year, 117 million students were still out of school. Article 26 of the United Nation’s Universal Declaration of Human Rights recognizes a right to education, yet governments were ill prepared to support adequate virtual learning. Poor children in particular lacked reliable internet access or lived in crowded homes not conducive to learning. Hundreds of millions of children are estimated to have fallen below literacy standards, perpetuating cycles of poverty and gender inequities, especially in lower-income communities. In the United States, the Constitution requires that all children have equal access to education regardless of race, religion, sex, income, or citizenship status.

vailing global narrative was one of profound inequities, with large swaths of the population left behind in virtually every respect, from employment, housing, and education to health and life expectancy. Thus, equity must be embedded into public health interventions, ensuring that benefits accrue fairly and ameliorating the burdens that are felt disproportionately by disadvantaged and marginalized populations. Covid-19 itself took roughly twice the lives per capita for racial minorities in the United States as for White Americans. That was the product of systemic racial injustice in the health system as well as in society as a whole. But even the interventions to stem Covid-19 were inequitable. On one level, the line that “we are in this together” is true. But on another level, a person of privilege could weather a lockdown with a stocked fridge, a steady income, and a virtual workplace. The same is not true for “essential workers.” And when highly effective vaccines were rolled out, the benefits accrued mostly to the well-off, which is especially evident through a global lens. While most of the U.S. population is vaccinated or has access to vaccines, many lower-income countries are not on track to be anywhere near high vaccine coverage for several years.

Many of the inequities in benefits and burdens can be significantly ameliorated. Governments can ramp up social support services for essentials like income, food, housing, and health (both physical and mental). When pharmaceutical interventions like diagnostics, treatments, and vaccines are rolled out, priority could be given to historically disadvantaged populations within and among nations.

These four steps in understanding risk-risk trade-offs— involving effectiveness, less-restrictive means, harm identification and amelioration, and equitable distribution—are not purely empirical endeavors. They also need to account for public trust and confidence. Even highly effective and safe vaccines under empirical standards cannot work if there is high vaccine hesitancy. Masks and distancing may be scientifically valid and important, but if people won’t mask up or maintain social distance, the virus will spread exponentially. Thus, a lack of public trust could destroy the utility of even the soundest public health intervention, which is why sound risk communication and public engagement are crucial to successful pandemic responses.

Risk-Risk and Risk-Benefit Trade-Offs: What’s at Stake?

The four questions posed above are useful in examining governments’ decisions about trade-offs during the pandemic and determining how responses to the next major outbreak could be improved. If there were a single observation that could be garnered from the world’s collective experiences with Covid-19, it is that virtually every country struggled mightily in curbing hospitalizations and deaths using nonpharmaceutical interventions. Countries with the most robust health systems had some of the world’s highest rates of hospitalization and death, and those with lower rates (certain East Asian and island nations) acted early and hard, often with draconian lockdowns; aggressive testing, tracing, and quarantine; and travel bans.

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Yet even in the United States, wealthy though it is, inequities were palpable, with the severest learning losses in reading and mathematics reported among schools that serve primarily students of color.10 With countless children still missing from schools a year after the pandemic hit the United States, educational achievement gaps could be generational.11

Where shifting educational environments may be necessary to protect teachers, students, and families during an outbreak, strategies implemented during Covid-19 brought enormous harms that were largely shouldered by the already disadvantaged. This past September saw children returning to in-person learning (although some school districts have returned to remote learning in response to the Omicron surge). In the United States, at least, jurisdictions varied widely in how safe school settings would be. In many geographic areas (particularly the Northeast and the West Coast), teachers were vaccinated and children masked. But in the South and Midwest, poorer and rural children often returned to school without basic public health mitigation measures.

Economies. The abrupt shock of Covid-19 and related lockdowns brought the economic world to a virtual halt, causing the global economy to shrink in 2020 by an estimated 3.5 percent12—representing the deepest recession since the Great Depression.13 Millions of people lost employment and income, depleted their savings, and still struggled to pay rent and other bills. In higher-income countries, governments globally spent $11.5 trillion by September 2020 to support businesses, individuals, and families; poorer countries that lacked this capacity relied on donors and international lenders like the International Monetary Fund to provide a lifeline to vulnerable populations, but little help arrived.14

Still, the pandemic revealed that prioritizing health over the economy is a false dichotomy; there is a synergy between public health and economic stability. While long-term economic impacts remain unknown, countries that implemented stronger infection-control measures earlier experienced fewer Covid-19 hospitalizations and deaths and appear to be recovering better economically.15 The public will decline to engage in shopping, travel, and leisure if they remain fearful of contracting a dangerous pathogen. In evaluating this trade-off, the most important consideration is whether, and to what extent, business closures lowered hospitalizations and deaths.

Better evidentiary understanding of the positive (and negative) effects of shutdowns is crucial. As Covid-19 shutdowns brought demonstrable harms to individuals, families, and businesses, determining the least-restrictive mechanisms to keep populations safe from viral spread while avoiding the worst economic harms should be the aim of thorough study in the aftermath of the pandemic.

Health care. As Covid-19 overwhelmed health systems, countries redirected resources, personnel, and finances toward fighting the pandemic. Among 105 countries surveyed by the WHO, 90 percent reported non-Covid health service disruptions, with substantial losses in low- and middle-income countries in fighting conditions like malaria, AIDS, and tuberculosis and for childhood immunization campaigns.16 Among even the wealthiest countries, substantial disruptions were reported in services for noncommunicable diseases and mental health, as well as maternal and newborn care, with the greatest burdens borne by low-income people and racial minorities, who often lacked capacity to receive quality virtual health services. Overall, what we have seen with Covid-19, and many other health crises, is that as many, or more, deaths are attributable to diseases other than the epidemic disease. Like previous pandemics, Covid-19 exacerbated risk factors for suicide, such as economic stress, social isolation, and loss of mental health services.17 As a result of this pandemic, the excess deaths reported will persist as the outcomes of delayed diagnoses and treatments manifest over the coming years.

Sadly, as long as health care systems remain underfunded, understaffed, and underprepared, shifts in health care delivery during emergencies may be unavoidable to maximize scarce resources and personnel. But even when health care must be rationed, it should not result in the major inequities that we have seen during Covid-19. Looking forward, we must combat marginalization domestically and globally by ensuring that all populations are able to reap the benefits of telehealth innovations to assure continuous, equitable access to care.

Travel and migration. Despite the WHO’s recommendations against border closures after it declared Covid-19 a global emergency under the International Health Regulations, almost all nations went against this advice and closed their borders to outside nations.18 In November 2021, more than fifty countries reinstated partial or complete travel bans against several countries in southern Africa where cases of the Omicron variant were first reported. Border closures devastated trade, travel, and tourism. People who study and work abroad lost educational or income opportunities. Travel bans kept families apart and, in some cases, prevented people from getting home or fleeing danger. Many times, border closures were overbroad, senseless, and grounded in politics, xenophobia, or discrimination, as with the Trump administration’s policy to expel migrants, separate children from families, and require asylum seekers to remain in Mexico, often in crowded and unsafe conditions, while awaiting a court hearing.19 Discriminatory immigration policies—whether preceding or in reaction to the pandemic—resulted in surmounting health risks as the U.S. Immigration and Customs Enforcement detention facilities became hotspots for Covid-19 transmission.

Travel restrictions make sense if they can keep a nation safe from a dangerous epidemic, but there is scant evidence that closing borders—which causes enormous disruptions to international or even domestic travel—can curb an already spreading epidemic or pandemic.20 It is true that some countries, especially island nations like Australia and New Zealand, fared well with travel restrictions, while travel bans
paired with aggressive internal measures seemed to succeed, especially in East Asia, such as in China and Vietnam. But overall, travel restrictions were an abysmal failure, likely not worth the huge trade-offs.

As Covid-19 vaccination rates increased in high-income countries, governments have considered or implemented “vaccine passports,” to allow only those who can show digital or other proof of vaccination status to receive travel privileges or access to certain food, retail, or entertainment services. For example, since the summer of 2020, France has required people to have a pass sanitaire, issued only to those with proof of full Covid-19 vaccination (including a booster shot as of January 2021) or a recent negative test, to access various types of establishments (such as bars, restaurants, shopping centers, public transportation, and nursing homes).23 Vaccine passports could encourage vaccination and help ease restrictions in a safe manner. If vaccines are plentiful, then the case is strong for requiring proof of vaccination. Globally, however, there are cavernous inequalities in access to Covid-19 vaccines. Vaccine passports for international travel could leave lower-income countries even further behind.

Social engagement. Restrictions on social gatherings, implemented by nearly all countries during Covid-19, demonstrated some effectiveness in reducing viral spread from one person to the next.24 But these interventions also came with costs. In the United States, the Supreme Court struck down public-gathering restrictions as applied to houses of worship, in line with trends of recognizing strong First Amendment freedoms including religion, speech, and assembly. Social-distancing ordinances have also been a near death sentence for persons experiencing domestic abuse, substance misuse, homelessness or unsafe housing, and food insecurity.25 Others experiencing social isolation, including vulnerable groups like the elderly, have suffered excruciating blows to their mental health and quality of life.

Trade-offs like these are hard to measure, but the crucial point is that there are ways to ameliorate harms while keeping effective public health measures in place. With a social safety net, including social and mental health support services, some of the emotional hardships of isolation can be reduced.

Medical countermeasures. The development and approval of SARS-CoV-2 vaccines in less than a year was an unprecedented human achievement. Although the virus baffled most public health systems, science offered an astonishingly effective tool. Yet the whole process of vaccine trials and regulatory approval raised questions about the safety and ethics standards for hurrying new vaccines to the markets. Both China and Russia approved vaccines before large-scale, phase III testing even began. Russia’s vaccine had been tested on only seventy-six volunteers from the country’s military when it was approved in August 2020—sparking criticism from scientists around the world on issues of scientific integrity and informed consent.26 Even today, the WHO has not yet granted Sputnik V their emergency-use listing.27 Meanwhile, Chinese vaccines have been shown to be far less effective than the mRNA technologies widely used in high-income countries, especially against the Delta and Omicron variants.28

In the United Kingdom, the United States, and Europe, vaccines were approved under stringent protocols requiring phase III clinical trials, yet leadership from all these jurisdictions temporarily paused vaccine deployment (for AstraZeneca in the United Kingdom and Europe29 and Johnson & Johnson in the United States30) after a miniscule number of severe blood clots were reported. When the United States paused the Johnson & Johnson vaccine, vaccination rates of all three U.S.-approved vaccines began to fall sharply, and they took some time to recover.31 Actions to ensure vaccine safety thus slow vaccination rates both by restricting market availability and by arousing public safety concerns. But failing to take seriously reported safety issues could create public distrust, too. For a virus that continues to take thousands of lives each passing day, how much risk should we be willing to accept when it comes to vaccines?

Post-Covid-19, it is important that protocols for emergency countermeasure development and approval are reexamined. While the benefits of rapid vaccine development during Covid-19 have been undeniable, are there ways to better mitigate the risks and protect against harms? How can we best assure the public that approval decisions are based on sound science, and not politics? Plans for prioritizing vaccine distribution to vulnerable and marginalized populations—both nationally and globally—should also be crafted well ahead of the next pandemic.

For now, the world remains deeply unprepared for epidemic threats, and risk-trade-off decisions will remain key facets of the Covid-19 pandemic and its aftermath. No one knows when the next pandemic will strike or what the pathogen will be (for example, influenza, Ebola, a coronavirus, or something else), but we do know that it will occur. We face a choice. Do we return to the predictable cycle of complacency followed by panic? Or will we learn from Covid-19, and prepare—using effective, less-intrusive, and equitable measures to prevent, detect, and respond? That level of preparedness needs to take place both nationally and through sound global financing and governance, including through a strengthened World Health Organization.

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