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Ethical Issues in Pandemic Prevention, Preparedness, and Response

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ABSTRACT

Pandemic policies raise complex ethical challenges, as well as scientific and technical ones. This chapter examines four critical areas where ethical analysis is essential for effective pandemic prevention, preparedness, and response: spending decisions, clinical research, restrictions on rights and freedoms, and fair allocation of scarce medical resources.

Spending on pandemic prevention, preparedness, and response often involves trade-offs with other societal priorities, such as education, infrastructure, and environment. Navigating these trade-offs requires careful consideration of opportunity costs and distributional impacts.

Rights and freedoms can likewise present difficult trade-offs when pandemic policies restrict individual liberties, requiring clear goals and proportionate responses that consider differential impacts across populations.

Clinical research during pandemics must maintain ethical standards while addressing urgent public health needs. This chapter illustrates this imperative by exploring how ethical standards apply to challenge trials and to randomized studies of policy interventions.

Finally, scarce pandemic countermeasures like vaccines and therapeutics demand fair allocation frameworks that serve four core objectives: benefiting people, mitigating disadvantage, ensuring equal concern, and recognizing reciprocity.

INTRODUCTION

Pandemics present important ethical challenges as well as scientific and technical ones. Other chapters in this volume raise questions with ethical dimensions:

- How much should we spend on pandemic prevention and preparedness compared to other societal priorities? (chapter 1)
- Should live animal markets be eliminated to prevent pandemics? (chapter 3)
- Should barriers to dual-use research on pathogens that present pandemic risk be heightened? (chapter 4)
- Which countries and people should be prioritized to receive scarce vaccines? (chapters 9, 10, and 11)
- What posttrial access to interventions should research participants receive? (chapter 11)
- When, if ever, should schools be closed in a pandemic? (chapter 8)
- How much should each country contribute to pandemic financing efforts? (chapter 13)

These questions have scientific and technical dimensions as well as ethical ones. For instance, determining how much to spend on pandemic prevention and preparedness should be informed by expected outcomes of spending, such as the number of deaths expected to be averted. By contrast, assigning relative importance to different types of outcomes—such as deaths earlier in life as opposed to later (chapter 2)—is an ethical question.

Ethical dimensions of pandemic decision-making are often signposted by explicit appeals to ethical concepts such as equity, need, and solidarity. At other times, ethical dimensions instead appear as tacit assumptions, such as that generating a larger total quantity of health or averting more deaths should be primary goals of pandemic policy.

Both explicit invocation of ethical concepts and tacit adoption of ethical commitments merit careful ethical analysis. It is widely accepted that pandemic response should be equitable, but equity is often left undefined. Defining equity more precisely in turn raises questions. For instance, some assert that it is inequitable for countries' ability to pay to affect their vaccine access (chapter 9). This concern stands in tension with allowing wealthier countries to spend more than others on other types of health technologies (Krohmal and Emanuel 2007). Others define equity as responsiveness to needs, but needs themselves require definition. For instance, chapter 13 sensibly asserts that "limited resources" should be "allocated where they are most needed"—a proposal that in turn requires a definition of need. Related to this concern, some deny that overall cost-effectiveness should be the primary basis for assessing policies. They argue that a policy that is not the most cost-effective might have preferable distributional consequences because it better advances the health of those who are worst off or have more severe disease. Last, ethics must be engaged with, but is not determined by, the socioeconomic and cultural landscape. Understanding public preferences, as well as the potential for influence by financially motivated firms and other actors, is important to ethical

analysis and implementation of ethical frameworks, but those considerations do not determine the proper answer to ethical questions.

Pandemic response also raises challenging ethical questions because preventing pandemic harms is, and should be, just one among many societal priorities. As other chapters recognize, public spending on pandemic prevention, preparedness, and response can crowd out other spending priorities both inside and outside health systems, such as spending on chronic disease, environmental remediation, or infrastructure. The use of nonpharmaceutical interventions, like activity closures to reduce pandemic spread, can set back other important societal goals like education (chapter 8). Spending on pandemic prevention and preparedness must be balanced against other health system spending (chapter 12) and other needs more generally (chapter 2).

If preventing pandemic harms always took priority over other goals, the ethics of pandemic response would be simple. Any trade-offs with other societal aims could safely be ignored. Because averting pandemic harms is not all that matters, however, pandemic policies must always be considered against the backdrop of overall societal policies. Policies that would be appropriate to adopt if only pandemics mattered sometimes should not be adopted because other things matter as well. Moreover, pervasive trade-offs also exist among different pandemic policies—such as spending on some vaccines as opposed to others.

The pervasiveness of trade-offs and the relevance of other social objectives illustrate the ethical flaws of one popular slogan, "Nobody is safe until everyone is safe" (Takemi and Steiner 2020). Achieving complete and universal safety—"everyone is safe"—is impracticable because most pandemic pathogens cannot be eradicated.[1] Aiming at the mirage of making "everyone" safe will lead to the pursuit of increasingly burdensome measures despite diminishing returns. The ethical goal of pandemic policy must instead be to make people *safer* in a fair, equitable, and reasonable way. Fairness does not require identical or complete protection against infection for all populations. Rather, policy makers must identify which measures provide sufficient protection against pandemic harms at an acceptable level of cost and burden, and consider how to fairly distribute that protection. They must make these decisions responsively and transparently both during and outside of active health emergencies.

This chapter analyzes four illustrative contexts in which pandemic prevention, preparedness, and response present challenging ethical issues: (1) spending, (2) clinical research, (3) restrictions on rights and freedoms, and (4) fair allocation of scarce interventions. Table 15.1 explains each context's core ethical values, quantitative and implementation dimensions, and pitfalls to avoid. This chapter focuses on these four contexts because they cut across a variety of chapter topics, although it recognizes the relevance of other contexts such as health care provision. Each topic connects with others—greater spending, for instance, could ease clinical research, reduce the need to restrict rights, and mitigate scarcity. Each, however, implicates distinctive ethical values, making it useful to analyze each in depth while noting connections across them.

Table 15.1 Ethical Issues in Pandemic Prevention, Preparedness, and Response

Relevant ethical context	Ethical values	Quantitative operationalization	Implementation choices	Pitfalls to avoid
Spending	Maximizing net benefit Mitigating relative disadvantage Mitigating absolute disadvantage Mitigating clustered disadvantage Identifying values (if any) that are insulated from trade-offs	Cost-benefit analysis Cost-effectiveness analysis Extended cost-effectiveness analysis Distributional cost-effectiveness analysis Cost-consequence analysis Social welfare function	Direct spending (for example, cash payments) Implicit spending (for example, grants of IP rights)	Ignoring potential opportunity costs of pandemic spending Assuming that an intervention having a good value somewhere makes it a good value everywhere
Clinical research	Social value Scientific validity Fair subject selection Favorable risk-benefit ratio Independent review Informed consent Respect for participants	Estimation of social value and risk-benefit ratio Assessment of public trust effects Assessment of fairness of subject selection	Permitting vs. prohibiting CHI trials Permitting vs. prohibiting randomized trials of policies	Ignoring the ethical problems (for example, spending on ineffective treatments) presented by *not* conducting research Applying exceptionalist standards to CHI trials
Rights and freedoms	Freedom of movement Freedom of association Education Intellectual freedom	Defining threshold of allowable pandemic risk	Command-and-control regulation Overall risk cap Pricing risky activities	Equating differential treatment with discrimination Failing to define goals and endpoints for rights-limiting policies
Fair allocation of scarce medical resources	Benefiting people and preventing harm Mitigating disadvantage Equal concern Reciprocity	Measuring expected benefit (for example, averted deaths, averted years of life lost, or potential years of life lost) Measuring mitigation of disadvantage	Points systems Categorized priority systems Levels for decision (individual, regional, country, global)	Focusing only on a single type of harm (for example, deaths) Failure to create and implement an allocation framework

Source: Original table prepared for this publication.

Note: CHI = controlled human infection; IP = intellectual property.

SPENDING

Spending on pandemic prevention, preparedness, and response presents inevitable opportunity costs. Pandemic-oriented spending consumes resources that might instead be used to pursue other societal goals. For instance, some have proposed stockpiling pandemic response interventions such as ventilators. Amassing stockpiles, however, competes with other societal priorities that might be more important, such as funding health care for nonpandemic conditions, education, or environmental protection (Halpern and Miller 2020). Because of the inevitability of opportunity costs, different types of pandemic spending must be compared against one another, and the size of the pandemic budget compared against other budgets.

Trade-offs between pandemic spending and other aims diminish when pandemic investments also deliver value in nonpandemic times. A ventilator stockpile largely sits idle outside a pandemic. By contrast, growing the public health and medical workforce could provide available personnel to address nonpandemic problems—serving as a dual-use investment that both supports routine care and public health and is available to address outbreaks and emergencies (chapter 11). As noted in chapter 12, staff shortages rather than physical equipment tended to be the limiting factor during most COVID-19 pandemic surges. In addition to a stronger workforce, some pandemic response technologies also have co-benefits outside pandemics. For instance, reconfiguring physical spaces to reduce pandemic disease spread could potentially also mitigate nonpandemic conditions such as common respiratory infections or indoor particulate pollution.

Economic analyses could help elucidate the likely benefits and costs of pandemic investments, including benefits that come in nonpandemic times or address nonpandemic harms (Persad and Pandya 2022). For instance, biosafety measures' expected costs and benefits can be better understood via economic analysis (chapter 12).

In addition to learning from economic analyses, policy decisions must grapple with fundamental ethical questions about the fair distribution of benefits, as well as proposals that some rights should be insulated from economic and opportunity-cost analysis. Most accounts of fair distribution evaluate policies by considering factors beyond net benefit. One commonly considered factor is how badly the worst-off individuals will fare under a policy, either relative to others or in absolute terms. Another is whether a policy weakens the link between pandemic harms and social disadvantage: that is, whether a policy mitigates differential pandemic outcomes that constitute health disparities or inequities (Braveman 2006). Economic evaluations can consider these distributional factors through the use of distributional and extended cost-effectiveness analyses or social welfare functions. Understanding community values can help in making spending decisions, but the consideration of such values must be done carefully and with attention to the risk of overrepresenting particularly vocal groups (McCoy et al. 2019). The breadth of health emergencies' effects, for instance, makes efforts to focus primarily on those directly affected dubious.

By contrast to distributional factors that can be represented in economic analyses, a truly absolute right—one admitting no trade-offs—is difficult to represent in an economic evaluation. In a pandemic context, however, it is hard to envision a positive claim to medical assistance that is genuinely absolute, as opposed to particularly important.

Importantly, economic analyses must compare a given spending proposal to alternative uses of the same funds. For instance, the One Health chapter describes the cost of identifying all viruses of pandemic risk at about US$4 billion (chapter 3). When deciding whether to invest in identifying all viruses presenting pandemic

risk, decision-makers should ask both (1) whether this investment is a *superior* use of limited funds compared to some alternative spending currently occurring, and (2) whether it is the *optimal* use of limited funds. A proposal whose benefits exceed its costs may nevertheless be suboptimal, because some alternative proposal provides even more benefit compared to its cost and both proposals cannot be simultaneously adopted.

The need to compare spending proposals becomes particularly urgent in countries that, before a pandemic, could deliver only a very limited package of health interventions. As chapter 12 notes, "local context, cost drivers, and epidemiology" can "greatly influence the overall value for money" that a given intervention provides. The merits of investing in advanced care at the level of intensive care units, for instance, depend on local health system conditions (chapter 12). Philanthropic funders, particularly from high-income countries, should not assume that, because an intervention represents a good buy domestically, it is appropriate to fund abroad (Persad 2015).

Biomedical innovations that support pandemic response, such as vaccines and antiviral medications, present distinctive spending questions. These interventions tend to be scarce at first, but scarcity could be mitigated by spending more in advance to encourage research, development, and manufacturing. Rather than up-front spending, however, governments often seek to encourage research, development, and manufacturing by granting innovators exclusive rights, such as patents, to market an innovation for some period of time.

Determining the optimal quantity and mechanism for spending to encourage innovation for pandemic response is an important and challenging task. Some have argued that access to interventions would be best promoted by suspending the enforcement of intellectual property (IP) rights or not granting them in the first place (Foss-Solbrekk 2021)—an appealing short-term solution for advocates and governments because it requires no up-front spending. But suspending IP rights without replacing them with alternative innovation incentives would be misguided. First, taken by itself, suspending the enforcement of IP rights in pandemic interventions would reduce the incentive to develop such interventions (Hemel and Ouellette 2023). As chapter 11 notes, the goal must be to "ensure market access for target populations without setting prices so low as to jeopardize incentives for pharmaceutical innovation or manufacturing." Chapter 10 likewise notes that "incentivizing socially valuable vaccine investments without 'giving away the store' to pharmaceutical manufacturers may require carefully designed policies." Second, suspending enforcement is not likely to promote manufacturing without some other form of spending to encourage knowledge transfer.

Rather than IP suspension alone, properly encouraging future innovation will require policies that reward and fund that innovation (Emanuel et al. 2021a). Such policies could employ alternatives to grants of IP rights. Prizes for pandemic response innovations, for instance, could encourage investment in the development

of such innovations (Sampat and Shadlen 2021). So could patent buy-outs or "push" funding that supports research on specific interventions (refer to chapter 10).

CLINICAL RESEARCH

Determining the best strategies for pandemic prevention and response often requires research on human subjects. When is such clinical research ethical? Research ethics does not disappear in pandemics (London and Kimmelman 2020). Rather, the same fundamental ethical requirements remain relevant. One prominent account of clinical research identifies seven ethical principles: (1) social value, (2) scientific validity, (3) fair subject selection, (4) favorable risk-benefit ratio, (5) independent review, (6) informed consent, and (7) respect for participants (Emanuel, Wendler, and Grady 2000).

This section will apply these principles to two debates that often arose during the COVID-19 pandemic and appear likely to arise in other pandemics. One centered on the ethics of controlled human infection (CHI) trials, often dubbed "challenge trials," which would have intentionally exposed consenting subjects to a pandemic pathogen in order to evaluate countermeasures such as vaccines. Another debate involved population-level research on nonpharmaceutical countermeasures such as mask policies or indoor ventilation. Although other research ethics problems, such as poorly designed trials, were even more widespread (refer to chapter 11), and other problems such as setting research priorities (Pierson and Millum 2018) remain crucial, CHI trials and population-level randomized trials raise particularly interesting and distinctive ethical questions in pandemic contexts.

Challenge Trials

The primary ethical argument in favor of CHI trials emphasizes the first principle from Emanuel, Wendler, and Grady (2000): social value. At certain points in the COVID-19 pandemic, more than 10,000 people were dying worldwide per day. Accelerating the development of countermeasures by even a day could therefore have provided enormous benefits (Chappell 2022).

Most arguments against CHI trials charge that CHI trials would have violated some other ethical requirement. Consider fair subject selection. Some worried about the underrepresentation of groups facing a disproportionate burden of disease—for instance, that CHI trials in the United States during COVID-19 would enroll disproportionately fewer racial and ethnic minorities, who faced an outsized burden of disease. Others worried about overrepresentation of these groups—that efforts to recruit participants at high baseline risk of COVID-19 infection would lead to "targeted recruitment of minority groups," which would heighten distrust (Spinola et al. 2020, 1573). Despite the importance of fair subject selection, fairness does not require perfection, and CHI trials do not face distinctive selection problems. There is no evidence to suggest that underenrollment is a greater problem for CHI trials

than for other trial designs. Nor does enrolling participants at high exposure risk require race-targeted recruitment.

Many arguments criticized CHI trials' risk-benefit ratio. Some claimed that CHI trials have no prospect of direct benefit to participants, only a prospect of harm. The risk-benefit requirements for ethical research, however, do not require a prospect of benefit to participants themselves. Rather, when risks to participants outweigh benefits to them, ethical evaluation requires considering whether "the societal benefits in terms of knowledge justify the excess risks to individual subjects" (Emanuel, Wendler, and Grady 2000, 2706). Given the great value of knowledge about potential pandemic interventions, CHI trials could potentially satisfy the risk-benefit requirement even if they present net risks to participants. Moreover, some CHI participants might benefit from better-quality care than available outside trials or from protection conferred by the study intervention. CHI trials of pandemic pathogens might thus in fact have a prospect of benefit.

Others charged that participants from lower- and middle-income countries would participate in CHI trials without their communities reaping the benefits of their participation (Moodley, Maasdorp, and Rennie 2021). Concerns about community benefits, however, do not distinctively apply to CHI trials and are a familiar topic in the ethics of international clinical research (Wendler and Shah 2017). Chapter 11, for instance, notes that clinical research in low- and middle-income countries raises questions about "the equitable distribution of research benefits and market access."

Some argue that there is an absolute upper limit on the expected severity of research-related harms that cannot be exceeded, irrespective of the social value of knowledge and even if participants consent (Resnik 2012). Belief in upper risk limits may have undergirded some commentators' belief that COVID-19 CHI trials were unacceptable in the absence of a "rescue therapy" that limits the severity of disease (Sulmasy 2021). Such an upper limit might proscribe, for instance, CHI trials of pathogens with very high infection fatality rates such as Ebola virus, even when the trials have high expected social value and even when participants have consented. Others, however, argue that no universal upper limit on risk exists (Steel 2020).

Informed consent to CHI trials has also been challenged: some argue that COVID-19's novel nature and unknown long-term risk profile would have precluded informed consent to COVID-19 CHI trials (Spinola et al. 2020). This argument is implausible. Individuals could and did informedly consent to other in-person activities, such as providing or receiving medical care, that would have exposed them to COVID-19. Additionally, participants can informedly consent to research that exposes them to risks that are not fully understood (Schaefer et al. 2020).

Others worried that payment would lead participants to consent to research they would have otherwise declined to join (Sulmasy 2021). However, a participant can elect to join a study because of payment, or even in order to be paid, while still informedly consenting. Payment vitiates informed consent only if it precludes appropriate consideration of research risks and benefits (Cryder et al. 2010).

The right to withdraw from research was also raised as a concern about CHI trials. If volunteers were infected during the study, critics claim they "would need to stay on the research unit, making the right to withdraw meaningless" (Spinola et al. 2020, 1573). Again, this concern is dubious. Participants in inpatient, non-CHI trials *unrelated* to a pandemic disease would also need to take isolation precautions if they contract the pandemic disease during those trials. The possibility that isolation precautions will be needed does not make inpatient trials ethically impermissible. Furthermore, infected volunteers would not necessarily need to stay on the research unit—they might allowably be discharged whenever any other individual with the pandemic disease could likewise be discharged.

Last, some charged that CHI trials do not produce scientifically valid results because they must exclude participants at high risk of complications (Moodley, Maasdorp, and Rennie 2021). Scientific validity and social value, although framed as distinct principles, are closely linked: presumably, scientific validity matters because scientifically valid results are more likely to enable socially valuable outcomes. Concerns about CHI trials' scientific validity could be addressed in two ways. One is to let CHI trials enroll consenting individuals even if those individuals face higher risk of severe outcomes, which would enable the participant population to mirror the population of ultimate recipients (Chappell 2022). The other is to exclude consenting participants on risk grounds and justify doing so on the basis that such exclusions are common outside CHI trials and consistent with scientific validity (Eyal and Gerhard 2022). For instance, long-term care facility residents were starkly underrepresented in the actual, non-CHI trials used to test COVID-19 vaccines, yet were among the first groups to receive vaccines (Branswell 2020). No trial design perfectly mirrors actual use. Trade-offs between scientific validity and individual risk are inevitable: enrolling participants at greater risk of serious outcomes will enhance validity but heighten risk.

Beyond these seven principles of ethical research, some have argued that researchers' professional duties prohibit them from intentionally infecting even consenting participants. These arguments often conceive of health professionals' role responsibilities as requiring nonmaleficence. Although nonmaleficence could justify professionals individually declining to conduct CHI trials, reasonable pluralism about health professionals' role responsibilities counsels against entrenching these conceptions as legal prohibitions on CHI trials.

Other objections, finally, contend that CHI trials—despite initial appearances—may lack net social value. This objection is the most promising but requires factual assessment rather than speculation. One social value objection contends that CHI trials would have led to public distrust in research if participants became severely ill or died. Others have argued that CHI trials "endanger ... our whole society (its moral fabric), by making it less likely that we will take the sort of relatively easy measures prescribed by experts to avoid future crises" (Bramble 2021). This claim, however, is a factual and empirically assessable one, not an ethical conjecture. Some studies suggest that public trust would have been preserved as long as the public understood that trial participants were voluntarily taking these risks in order to realize a socially

valuable outcome (Broockman et al. 2021). Furthermore, any loss of public trust due to poor CHI trial outcomes would need to be weighed against dimensions of social value other than public trust.

Another objection contends that CHI trials might not have in fact accelerated access to countermeasures (Shah et al. 2020). During the COVID-19 pandemic, rampant viral spread made it tenable to conduct conventional, non-CHI trials. Additionally, regulators might not have approved vaccines on the basis of data from challenge trials alone. Whether CHI trials in fact could accelerate the development of certain types of countermeasures is, as objectors acknowledge, an empirically assessable question. The answers will likely depend on the type of countermeasure and the nature of the pandemic in question.

Randomizing Nonpharmaceutical and Policy Interventions

Deciding whether to implement nonpharmaceutical interventions such as masking or school closures, or to make policy choices like pausing elective procedures during pandemic surges, also benefits from a high-quality evidence base. Perhaps chapter 8's most decisive takeaway is that we lack high-quality evidence regarding the effect of school closures on pandemic disease.

Strengthening the evidence base for nonpharmaceutical and policy interventions can be done through systematic research, including randomizing populations to different interventions. During the COVID-19 pandemic, however, prominent researchers and officials rejected randomized trials of mask policies as unethical because masks had proven beneficial on the basis of mechanistic plausibility or observational studies (Czypionka et al. 2021). Similar arguments could be leveled against randomized trials of other nonpharmaceutical interventions such as reducing the density of activities or improving ventilation (for example, Gilman et al. 2020).

Randomized trials of nonpharmaceutical interventions can be ethical even if other evidence already exists. Understanding *how much* benefit nonpharmaceutical interventions like masking or ventilation provide is crucial for deciding how much to invest in implementing these interventions. Another important argument for randomized trials is that the absence of high-quality evidence creates room for financially motivated actors to market unproven interventions to the public and to governments. High-quality evidence ensures that limited resources can be directed toward valuable treatments, and enables health care and allied professionals to act in accordance with their professional obligations to provide effective treatment.

The ethical starting point should be that, when evidence about the magnitude of multiple policies' benefits is of low enough quality that no policy is clearly best, it is acceptable to compare these policies in a formal randomized trial, rather than merely picking among them. Moreover, at the population level, it is neither practicable nor necessary to require more individualized consent for randomization between two acceptable policies than would be required in order to choose one of

the policies for universal application. For instance, if it is acceptable for a community to require high-filtration masks, to require only cloth masks, or to require no masks at all, it should also be acceptable to rigorously compare these policies using randomization. The same is true for other interventions such as activity closures. Notably, randomized designs have been used to test some policies such as incentives for vaccination uptake (Milkman et al. 2022).

RIGHTS AND FREEDOMS IN PANDEMIC POLICY

Many pandemic policies present trade-offs with individual rights and freedoms. Chapter 3, for instance, discusses how animal agriculture practices, trade, and human population movement can increase pandemic risk. Yet many risk-producing activities (such as long-distance travel or consuming farmed animals) are highly valued parts of people's lives (Barnhill and Bonotti 2022). Chapter 4, meanwhile, discusses biosecurity, including scientific research on pathogens that could cause pandemics. Limiting such research could reduce some pandemic risks but could impinge on an exercise of intellectual freedom that has value even beyond its potential to prevent future pandemics. Chapter 8 discusses education in the context of pandemic school closures—it emphasizes schools' role in generating human capital and meeting basic needs, but notes that education is also recognized as an important individual human right.

Addressing trade-offs between pandemic prevention, preparedness, and response and individual freedoms requires policy makers to identify which freedoms are most important and consider how to effectively prevent pandemics while securing those freedoms. One way to conceptualize this trade-off is to imagine a pandemic risk budget, in which each activity—such as keeping schools open—consumes a portion of the risk budget proportional to the risk it presents (Budish 2020). This risk budget should prioritize more important activities over less important ones, just as a household or national budget prioritizes more important over less important spending.

Identifying more important activities or freedoms, however, can be challenging. Optimistically, we might hope to identify a ranking of rights with which nobody can reasonably disagree. For instance, keeping in-person schools open seems more important than keeping live animal markets open. The COVID-19 pandemic indicated that primary and secondary education are highly beneficial and particularly difficult to conduct remotely (Levinson, Cevik, and Lipsitch 2020). The same is true of medical primary care services. In contrast, we learned that some other activities can be effectively carried out remotely: the difference between watching a movie in person or attending a workplace meeting in person versus conducting these same activities remotely is much smaller than the difference between in-person and remote primary education.

However, some might object that education is easier to conduct remotely than live animal markets, or that live animal markets or in-person workplace meetings are

necessary to cultural or religious practices. Ultimately, such choices may require recourse to voting processes or elected decision-makers.

Ethical trade-offs with individual freedom are particularly stark when the intervention must be or is implemented without allowing individuals to opt in or out—for example, with activity and travel restrictions, such as school and border closures, and density limits. Assessment of these trade-offs must recognize that restricting some freedoms (for instance, restricting animal markets) may enable others (for instance, continuing to practice animal agriculture).

A further issue is that the burdens and benefits of restrictions are often unevenly distributed. People at high risk of poor outcomes from a pandemic disease may benefit more from restrictions, whereas people who depend on restricted activities are more burdened. Border closures, for instance, may benefit people who do not travel and are at high medical risk if infected, but harm those who travel to visit loved ones or depend on employment activities that require crossing borders.

Pandemic policy should also recognize that closing one activity or space inevitably redirects people to other activities or spaces (Marcus 2020). For instance, closing outdoor playgrounds may increase risk if it leads people to gather indoors. Closing schools or workplaces may increase risk if people instead gather in higher-risk settings.

Border and school closures are two useful policies to analyze from an individual rights and freedoms perspective because both were widely adopted during the COVID-19 pandemic and both also stand in clear tension with important individual rights—the right to education and the right to travel. In addition, both border and school closures could be imposed in either universal or partial fashion. For instance, borders and schools could be open only to individuals who have received a vaccine or who take relevant nonpharmaceutical measures (Persad and Emanuel 2020).

In addition to partial closures based on vaccination status or taking nonpharmaceutical measures, it is also possible to target partial closures based on medical vulnerability. For instance, during COVID-19, older adults were often prioritized for vaccine access because they faced higher risk of severe outcomes if infected (Saadi et al. 2021). Analogously, older adults could also have been prioritized for mask requirements, particularly for high-quality masks that protect wearers, or for vaccine requirements (Williams 2022). Or they could have been distinctively excluded from certain spaces where infection was prevalent (Savulescu and Cameron 2020). In general, societies seemed more willing to target pure benefits, such as priority vaccine access, toward people at high risk than to similarly target interventions like vaccine or mask requirements that would both protect and burden people at high risk. Targeting burdensome interventions, however, can also be justifiable when it enables effective pandemic policy at less cost to individual freedom. Invidious discrimination treats people differently on the basis of irrelevant differences such as skin color; in contrast, risk of poor outcomes if infected is a relevant difference that could justify differential treatment.

Rights and freedoms are also implicated when interventions require uptake by individuals. Examples include vaccination, testing, and the use of nonpharmaceutical protective equipment such as masks. Policy makers have a variety of options to increase uptake, including educational programs, exhortations, financial incentives, and requirements (refer to chapter 7). When practicable, it is preferable to begin with voluntary programs before implementing requirements (Mello, Silverman, and Omer 2020). Requirements, however, can be acceptable when they promise sufficiently great benefits in comparison to their burdens.

Last, protecting rights and freedoms requires clearly defining the goal of pandemic response interventions. Even very restrictive interventions may be justifiable when hospitalizations threaten health system functioning, or when these interventions have good prospects of stalling disease spread. In contrast, deciding whether to continue the use of interventions—particularly burdensome ones—in less exigent circumstances is more challenging. For instance, some have argued that medical personnel should be required to wear masks upon request, or that coworkers of an employee at greater risk of severe COVID-19 outcomes should similarly be required to wear masks as an accommodation of that coworker (Raz and Dorfman 2021). Outside of a crisis that threatens health system functioning, it is harder to justify long-term mandatory masking even if it protects some individuals' health. Determining which measures are justified requires identifying and balancing the interests of health professionals, patients, and the broader public.

Precisely defining the goal of pandemic response, however, remains challenging. In other contexts, some have suggested using the harm of common diseases such as seasonal influenza as a baseline (Emanuel et al. 2021b). The "nobody is safe until everyone is safe" approach, meanwhile, suggests that zero deaths should be the goal. A zero-death goal, however, violates what this chapter stated at the outset: preventing pandemic harm is not all that matters, and pandemic prevention frequently presents trade-offs. It is unlikely that a universal threshold can be identified, but we can at least say that the criteria for phasing interventions in and out should be based on interventions' benefit, their cost, and their burden on freedoms and rights, with interventions that are cost-effective and minimally jeopardize freedoms implemented before more burdensome interventions like school closures (chapter 8).

FAIRLY ALLOCATING SCARCE INTERVENTIONS

Some pandemic response interventions are expected to be initially or persistently scarce, such that not everyone who can benefit will be able to receive them. During the COVID-19 pandemic, scarcity existed for testing, vaccines, antiviral medications, and critical care interventions like intensive care unit beds and medical personnel. Vaccines and antivirals were also scarce during the mpox public health emergency. This scarcity creates the need for fair allocation of interventions among nations, subnational entities, medical facilities, and ultimately patients.

Table 15.2 Ethical Objectives and Priority Groups for Allocation

Ethical objective	Priority groups
Benefiting people and reducing harm	Those likely to suffer serious direct harms (death, loss of future life, loss of function) without the intervention
	Those (such as caregivers) whose subjection to direct harm will deprive others of crucial benefits
	For a communicable illness, those who are likely to transmit illness to others (refer to chapter 8 on indirect benefits of vaccination)
Mitigating disadvantage	Those whose lives will worsen overall if they do not receive the intervention
	Those who have been subject to systematic disadvantage
Affording equal concern	All groups
Reciprocity	Those who have taken steps that mitigated pandemic harms

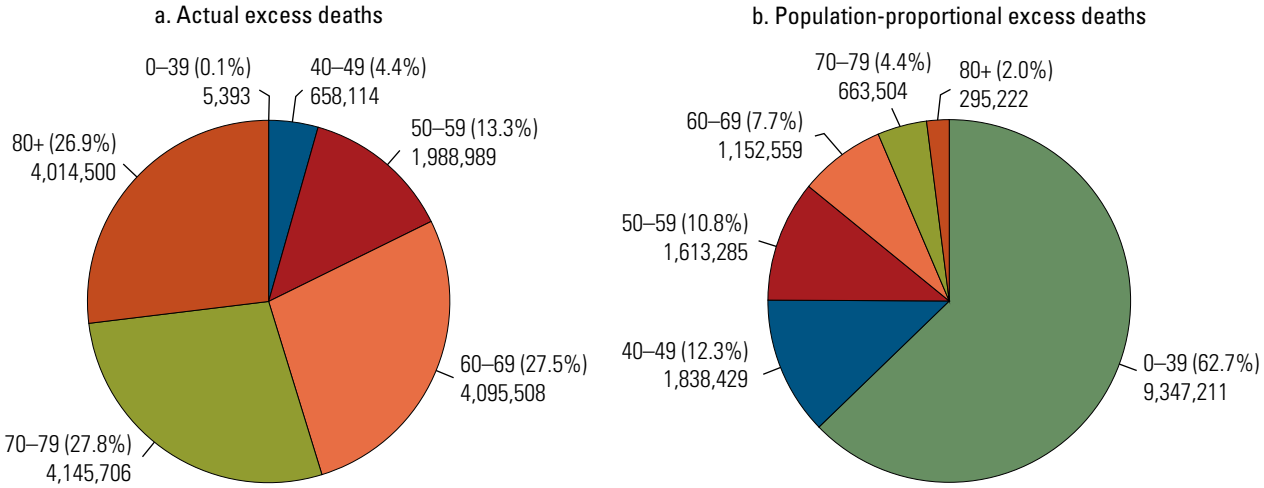
Source: Adapted from Emanual and Persad 2023.

The most central objective of fair allocation in a pandemic is to benefit people and reduce harms (Emanuel and Persad 2023). Importantly, this objective aligns with other aspects of pandemic response, which also usually emphasize benefiting people and preventing harm. Other important ethical objectives include mitigating disadvantage, equal concern for potential recipients, and reciprocity (table 15.2).

In allocation policy, harms beyond imminent loss of life should be considered. Some have argued that pandemic response should ignore differences in how much life patients stand to lose and consider only how likely patients are to die in the immediate term after contracting the pandemic disease (Gaurke et al. 2021; Rajczi et al. 2021). This approach is contrary both to harm prevention and to mitigating disadvantage. The COVID-19 pandemic, which disproportionately killed people later in their lives, was awful. Far worse, however, would be a pandemic disease with similar transmissibility and infection fatality rate to COVID-19, but age-neutral severity and death rates (Ruf and Knuf 2014) (figure 15.1). Such a disease would kill nearly 10 million people under the age of 40, including millions of children, rather than the few thousands of younger people who died of COVID-19. Tens of millions more years of life would be lost. Moreover, because of the life-shortening effects of social disadvantage (Chetty et al. 2016; Vyas, Hathi, and Gupta 2022), the people who die earlier in life from this disease would more likely have been disadvantaged in other respects as well, compared to the older adults who disproportionately died from COVID-19.

Focusing only on immediate death is likewise misguided for diseases with a lower fatality rate that may cause intense suffering, such as mpox, or may cause long-term loss of function, such as Zika. In addition, policies should account for the severe indirect harm to children and dependents when pandemic diseases kill parents and caregivers or render them unable to provide needed care (Gorin 2021). Widespread loss of crucial caregivers marked the worst parts of the human immunodeficiency virus (HIV) epidemic (De Wagt and Connolly 2005).

Figure 15.1 Actual and Population-Proportional Excess Deaths from COVID-19, by Age Range, January 2020–December 2021



Sources: Based on data from Wong et al. 2023 (panel a) and 2023 data from https://population.un.org/wpp/downloads?folder=Standard%20Projections&group=Population (panel b)

For interventions like vaccines and antiviral medications that prevent pandemic exposure from resulting in severe disease, benefiting people and mitigating disadvantage generally align. In general, disadvantaged people are more exposed to pathogens and so stand to gain more from interventions that forestall pandemic harms among exposed individuals. This reality supports integrating indexes of disadvantage into decisions about who should be first to receive an antiviral medication or vaccine (Kaalund et al. 2022).

In contrast, for critical care interventions that treat patients who are already severely ill, benefiting people and mitigating disadvantage will more often—but not always—stand at odds. Sometimes, disadvantage may reduce prospect of benefit: a disadvantaged candidate for treatment may be less likely to survive even if they receive interventions, or may have a lower posttreatment lifespan. In these difficult situations, mitigating disadvantage must sometimes give way: it can be justified to greatly benefit a better-off person rather than to modestly benefit a worse-off person (Parfit 2012).

Reciprocity presents distinctive issues. Frontline medical personnel potentially have reciprocity-based claims to scarce pandemic interventions. So do others who have worked to reduce pandemic harms, such as participants in research on pandemic interventions (Rid, Lipsitch, and Miller 2021). Meanwhile, individuals whose conduct exacerbated pandemic harms may be subject to claims of negative reciprocity that justify prioritizing others above them for interventions (Persad and Largent 2022). Particularly if reciprocity-based prioritization would worsen outcomes or exacerbate disadvantage, however, reciprocity-based claims might instead be better addressed using nonmedical resources. Medical personnel's reciprocity claims could be recognized with hazard pay (Jølstad and Solberg 2023),

or trial participants compensated with benefits other than priority access to scarce pandemic countermeasures.

Backward-looking principles other than reciprocity may likewise have little purchase in pandemic contexts (refer to Moodley et al. 2020). Even if a group has historically been unjustly denied access to medicines or otherwise unfairly disadvantaged, prioritizing its members for access to pandemic interventions may not be the ethically best way of addressing their claims. Financial compensation or access to nonpandemic interventions may be preferable.

Some have questioned whether these and other ethical principles for allocation are applicable across different cultural contexts (Moodley et al. 2020). Each principle's application should be sensitive to context. In particular, how to best benefit people and limit harm will depend on context. A pathogen may disproportionally affect different populations in different countries. For instance, during the 2022 mpox public health emergency, most cases and hospitalizations in Europe and North America involved men who have sex with men, differing from the historic distribution of cases and severe outcomes in the African countries where mpox had been endemic (Mitjà et al. 2023).

CONCLUSIONS

Pandemic prevention, preparedness, and response require navigating complex ethical terrain across multiple domains. Success demands both rigorous quantitative analysis and careful consideration of ethical values. For spending decisions, cost-effectiveness and distributional analyses should inform priorities while avoiding the trap of ignoring opportunity costs. In clinical research, maintaining consistent ethical values in pandemic contexts remains crucial. Regarding rights and freedoms, policy makers must define clear thresholds for allowable pandemic risk and endpoints for restrictions, while recognizing that differential treatment based on different expected outcomes is not necessarily discriminatory. Frameworks for allocating scarce resources should seek to operationalize ethical objectives like benefiting people, mitigating disadvantage, and recognizing reciprocity.

Common pitfalls to avoid include focusing on single types of harm while ignoring others, assuming interventions that work in one context will work equally well elsewhere, failing to define clear goals and endpoints for rights-limiting policies, and not creating comprehensive frameworks. Success requires quantifying trade-offs when possible, while remaining attentive to ethical values that resist pure quantification. Implementation choices should favor evidence-based, contextually appropriate approaches that acknowledge both the urgency of pandemic response and the continuing importance of other societal priorities.

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NOTE

1. Carter Center, "Diseases Considered as Candidates for Global Eradication by the International Task Force for Disease Eradication," https://www.cartercenter.org/resources/pdfs/news/health_publications/itfde/updated_disease_candidate_table.pdf.

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