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The Economics of the COVID-19 Pandemic in Poor Countries

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Abstract

The COVID-19 pandemic has upended health and living standards around the world. This article provides an interim overview of these effects, with a particular focus on low- and middle-income countries (LMICs). Economists have explained how the pandemic is likely to have different consequences for LMICs and demands distinct policy responses compared to those of rich countries. We survey the rapidly expanding body of empirical research that documents the pandemic's many adverse economic and noneconomic effects in terms of living standards, education, health, and gender equality, which appear to be unprecedented in scope and scale. We also review research on successful and failed policy responses, including the failure to ensure widespread vaccine coverage in many LMICs, which is needed to end the pandemic. We close with a discussion of implications for public policy in LMICs and for the institutions of international governance, given the likelihood of future pandemics and other major shocks (e.g., climate).

1. INTRODUCTION

The SARS-CoV-2 coronavirus (COVID-19) pandemic may be global in scale, but poor and rich countries have experienced the crisis very differently. This article aims to document the COVID-19 pandemic experience of residents of low- and middle-income countries (LMICs), with a principal focus on the economic consequences and associated policy responses. We cover both conceptual issues—including whether public health and social safety net policy responses should be different in LMICs and in rich countries—and the emerging empirical facts, such as the adverse effects of the pandemic on living standards, gender equality, and other outcomes in LMIC populations.

We aim to be comprehensive but face several important limitations. The first and most important one relates to timing: We write this article as the pandemic rages and new variants are emerging, changing the virus' transmissibility and lethality. Although there has been an explosion of research on COVID-19 across disciplines, which we attempt to distill here, the pandemic situation remains fluid, as does the state of research about it, and there are possibly many twists and turns ahead regarding how it will play out. As a result, our discussion is necessarily tentative and incomplete.[1] Nonetheless, we see value in summarizing what has been learned to date, both to provide insight to researchers and policy makers today and as a snapshot of scholarly thinking in the midst of this unprecedented crisis.

The article is also simultaneously broader and narrower in scope than many other *Annual Reviews* contributions. The piece is broader in that we dive more deeply into the gray research literature—for instance, nongovernmental organization (NGO) reports, public policy briefs, media opinion pieces, and journalistic accounts—than is typical for an academic review. This is a necessity given how rapidly the pandemic situation is changing and how much of the relevant work has not yet been published in standard academic outlets. The article is also narrower than we would like: Although the pandemic has touched all aspects of our lives, we lack the space to cover all relevant economic and societal issues. In particular, there are multiple important political economy topics—regarding political stability, democratic transitions, and conflict (Barrett et al. 2021) as well as pandemic misinformation—that we are unable to cover.

Our review of the burgeoning literature on the economics of COVID-19 in LMICs has yielded useful insights and facts. Although there is broad agreement among public health experts that widespread vaccination coverage is the best way to end the pandemic, vaccine distribution among many LMIC populations remains limited over a year after mass distribution began in the United States, the United Kingdom, and some other wealthy countries (Tregoning et al. 2021). At the time of writing (December 2021), only 4.7% of people in Sub-Saharan Africa—the world's poorest region—have been fully vaccinated. In our opinion, the stark difference in access to lifesaving COVID-19 vaccines between poor and rich countries is not only a moral outrage but also a strategic error: The virus can mutate and become more virulent as billions of people in LMICs remain unvaccinated, and those new variants can then spread to rich countries, possibly prolonging the pandemic for years.

Improving vaccination rates will require addressing gaps in supply, of course, but also preparing for last-mile delivery problems and vaccine hesitancy in LMICs (although the recent experience with HIV/AIDS shows these can be tackled; see Nachega et al. 2021). Until then,

Supplemental Material >

[1]The **Supplemental Appendix** contains a more complete listing of existing studies. In addition, the Innovations for Poverty Action (IPA) Research for Effective COVID-19 Responses (RECOVR) Tracker maintains an up-to-date list of studies on COVID-19's socioeconomic impacts (see **https://www.poverty-action.org/recovr**).

nonpharmaceutical interventions (NPIs) like mask distribution remain a key weapon in the arsenal to stem the spread of COVID-19 and prevent already-weak health care systems in LMICs from becoming overwhelmed. This requires large-scale behavioral change that has been a stubbornly difficult challenge in all countries, poor and rich alike, and as a result, many LMIC governments have resorted to periodic lockdowns to control the virus. Yet these lockdowns have imposed large-scale economic, social, psychological, and even health costs, especially in LMICs that have weak distribution systems for economic relief and where large shares of the population work in the informal sector, outside of the official government social safety net.

An accumulating body of evidence indicates that the adverse effects of the pandemic—in terms both of COVID-19 morbidity and mortality and of the damage caused by lockdowns—extend far beyond the immediate economic effects, as bad as they are. There are distributional consequences with disproportionately adverse effects for women, low-income, and migrant workers as well as other vulnerable groups, and broader effects on other welfare metrics including educational progress, access to health care, mental health, and the risk of domestic violence. It seems likely that the pandemic's negative socioeconomic consequences will persist for years to come.

The article is organized as follows. Section 2 discusses key conceptual issues, with a particular focus on how underlying differences across poor and rich countries may influence both the pandemic impacts and the design of appropriate policy responses. Section 3 provides an overview of global patterns of COVID-19 infection and mortality. Section 4 surveys empirical work on the pandemic's effects on living standards and food security (mainly based on household surveys) as well as national accounts evidence suggesting that the global COVID-19 recession is the largest since World War II. Section 5 extends this discussion to education, health access, and mental health and to outcomes among migrant populations and women. Section 6 presents lessons about effective policy, including behavioral insights regarding NPI adoption.

The final section looks forward, both to the hoped-for end of the pandemic and beyond, in search for lessons for future crises. In the context of a global pandemic, it is apparent that policy decisions made in one part of the world will affect all others. Given the magnitude of the crisis, we argue that greatly expanded assistance from rich to poor countries is needed—in terms of both vaccines and financial resources—to address the twin health and economic crises in LMICs today. The pandemic has also made it painfully obvious, in case the climate crisis had not already done so, that current institutions of international governance are not well designed to achieve the collective action needed to provide global public goods, such as effective pandemic preparedness and response.

2. CONCEPTUAL ISSUES WHEN ANALYZING THE ECONOMICS OF COVID-19 IN LMICs

An unusual attribute of COVID-19, relative to other recent viral epidemics like Ebola or Zika, is that this pandemic mainly hit richer countries first. The virus was already widespread in South Korea, in Italy, and then in the United Kingdom and the United States, before its effects were directly felt in any LMIC other than China, where it originated. In fact, migrants returning from richer countries in Europe and East Asia brought the virus into South Asia (Ahsan et al. 2020, Lee et al. 2021). As a result, much early policy analysis centered around the experience of rich countries and the policy strategies they should pursue to contain the virus. An influential Imperial College epidemiological model (Ferguson et al. 2020), calibrated to UK data, was the basis for widely publicized social distancing guidelines (Boseley 2020, Fink 2020). This model predicted that without flattening the curve of infections through social distancing and lockdowns, the demand for hospital beds or ventilators could exceed the health system's capacity. An overwhelmed

health system unable to provide care for either COVID-19 or non-COVID-19 medical issues would lead to many excess, unnecessary deaths.

The policy discussion on flattening the curve captured the attention of major international media (*Economist* 2020, Roberts 2020). Even though the data underlying this analysis were most relevant for rich countries in Western Europe and North America, the benefits of social distancing became the dominant policy narrative influencing lockdown decisions everywhere, including in LMICs. Countries like India hurriedly instituted lockdowns, sometimes with harsh unintended consequences on migrants and informal workers who were stranded in the city without jobs or housing (Abi-Habib & Yasir 2020, Barker et al. 2020, Pandey 2020).

Supplemental Material >

Economics research contributed to this policy discussion in at least four ways. Here we provide a high-level summary of a few contributions; readers may refer to **Supplemental Table A1** for a more complete list of studies that we do not have room to elaborate on here.

First, the pandemic and associated lockdown were an unprecedented simultaneous shock to all sectors of the economy, so that the received wisdom from standard macroeconomic models may not be sufficient to understand the full range of economic impacts, and standard fiscal stimulus measures or monetary policy ideas may not apply. Guerrieri et al. (2020) show that the supply shock from worker layoffs and firm exit during the pandemic could trigger changes in aggregate demand larger than the shock itself.

Second, economists conducted cost-benefit analyses of social distancing policy by estimating the monetary value of the lives saved from bringing the virus under control, so that this value could be directly compared against the GDP losses from the lockdowns. In an early contribution, Greenstone & Nigam (2020) applied the value of statistical life (VSL) methodology on epidemiological projections of life-years saved through social distancing in the United States, and they estimated that the reduction in mortality was worth $7.9 trillion, which exceeded any reasonable projections of GDP losses from the lockdowns. They conclude that aggressive social distancing in rich countries is economically sensible. Alon et al. (2020) argue that blanket lockdowns are less effective in LMICs compared to other countries, saving fewer lives per unit of lost GDP, whereas age-specific policies are more effective. Barnett-Howell et al. (2021) analyze how the benefits of social distancing and suppression varied across rich and poor countries and estimate that the economic value generated by equally effective social distancing policies is roughly 240 times larger for the United States, or 70 times larger for Germany, compared to the value created in Pakistan or Nigeria.

A third, related contribution from economists was to model the trade-offs of implementing alternative forms of social distancing to provide guidance to policy makers. Acemoglu et al. (2021) added GDP loss projections and age-specific COVID-19 mortality rates to the prominent Susceptible, Infected, and Recovered (SIR) epidemiological model to argue that targeted lockdowns for vulnerable groups (e.g., the elderly) and curbing contact across age groups could limit mortality while preserving economic output better than blanket lockdowns.

Fourth, economists also conducted empirical analysis to evaluate the actual effects of NPIs like social distancing on COVID-19 infections. Using event-study designs, Hsiang et al. (2020) show that imposing social distancing in China, South Korea, Italy, Iran, France, and the United States slowed COVID-19 spread, averting an estimated 495 million infections. Similarly, Fang et al. (2020) show that a lockdown in the city of Wuhan significantly prevented COVID-19 cases in neighboring regions: By their estimates, cases in the 347 Chinese cities outside the Hubei province would have been 64.8% higher.

Isolating the causal effects of COVID-19 response policies is methodologically difficult because the decision to impose mobility restrictions will itself respond to emerging virus threats. **Supplemental Figure A1** makes clear how lockdowns were made more restrictive in the United States,

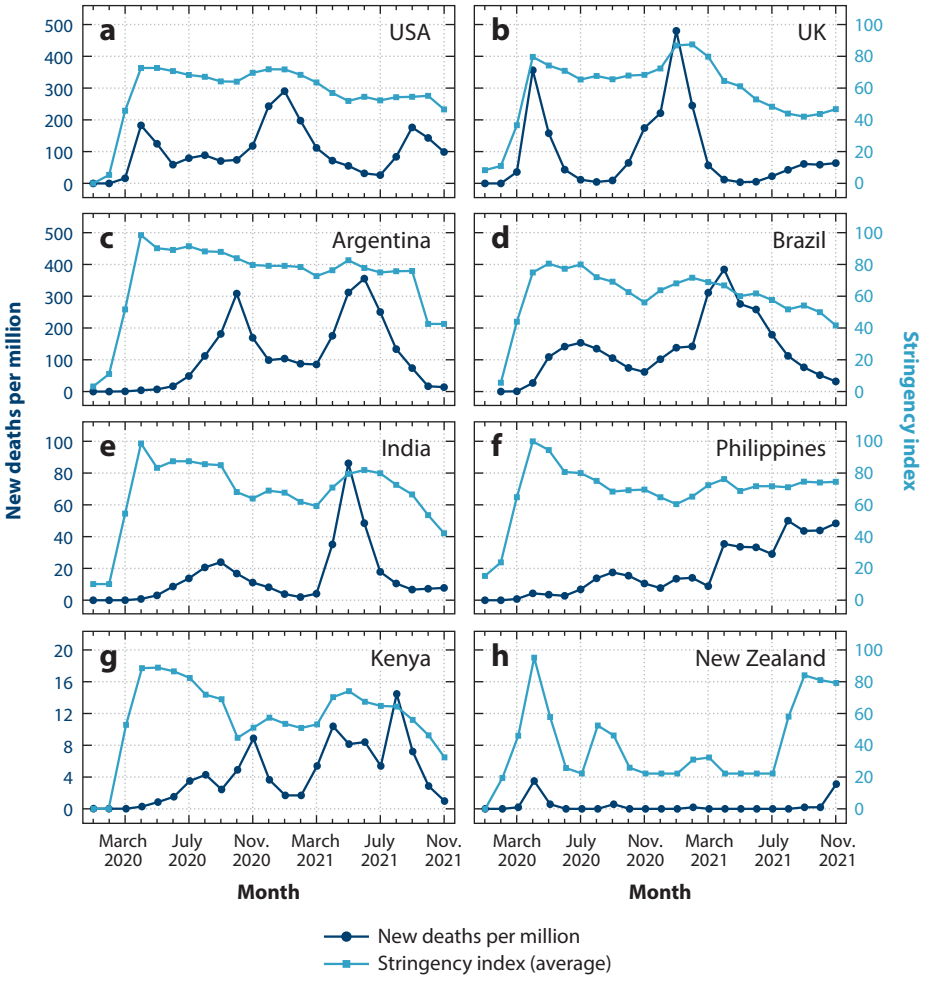

Figure 1

Government stringency index in response to COVID-19 deaths per million over time. This figure shows the relationship between deaths and government responses to contain the spread of COVID-19 across the selected countries. The level of government response is measured by the stringency index constructed by the Oxford COVID-19 Government Response Tracker (at **https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker**). It is a composite measure that is based on nine containment and closure policy measures and their respective severities. These indicators include school closures, workplace closures, internal and international travel bans, and stay-at-home orders. The index is then rescaled to be between 0 and 100. If policies vary at the subnational level, the index considers the level of response of the strictest sub-region. Data from Hale et al. (2021).

the United Kingdom, Brazil, and New Zealand exactly when COVID-19 fatalities started rising. **Figure 1** illustrates the interplay between patterns of COVID-19 fatality rates and the stringency of government policy responses found by Hale et al. (2021) for a range of LMICs and high-income countries (HICs). It is evident that policy choices have varied widely, even across countries within the same income category. New Zealand, Argentina, and India imposed the strictest lockdowns early in the pandemic, but the United States, the United Kingdom, and Brazil did not. This allowed New Zealand to crush the virus, which in turn allowed a much quicker reopening once

local transmission was eliminated. In contrast, the virus remained in circulation and mobility remained depressed for much longer in response to the half-hearted distancing attempts in the United States and the United Kingdom (Mobarak 2021). Geography and luck also play important roles: Argentina (and Uruguay) experienced a second wave much later despite their strict early lockdowns, possibly due to their proximity to Brazil, where a new variant of the coronavirus emerged. India maintained a low fatality rate for months after its initial lockdown,[2] with experts struggling to explain its success (Mukherjee 2021), only to be hit by a massive spike in fatalities a full year after the pandemic started, again linked to a new virus variant.

In addition to the early economic analysis, parallel discussions in the international news media were also heavily focused on rich countries. We learned about South Korea's impressive testing and contact tracing strategies, juxtaposed against the failure of the United States to implement the same (Fisher & Sang-Hun 2020, Parodi et al. 2020); about the smartphone-based tracking of virus spread in Israel (Lubell 2020); and about the emerging politics around lockdowns, masking, and anti-science attitudes in Europe and North America (Romm 2020). While interesting, this was not the most directly relevant information for LMIC policy makers. If the COVID-19 testing infrastructure is virtually nonexistent, sophisticated contact tracing procedures cannot be implemented. In places where mask-wearing makes no political statement, policy makers need to focus on other factors driving behavioral change. Lost in that media shuffle were the indigenous frugal innovations that West African and Central American countries had developed when dealing with the Ebola and Zika epidemics (Meriggi & Mobarak 2020).[3] Learning about these strategies might have helped South Asians more than rushing to follow UK or US policy guidelines.[4]

There are several reasons explaining why the early economic analysis, inspired by models and data from rich countries, was not necessarily applicable to LMICs. First, the epidemiological models were calibrated to demographic and health system capacity data in rich countries, and the model's predictions on the benefits of imposing social distancing may change when applied to LMIC settings. Barnett-Howell et al. (2021) formally explored this hypothesis and found that the benefits are much smaller in LMICs, due to the large differences in population age structures and health system capacities across poor and rich countries. For instance, the proportion of elderly population is six times larger in high-income countries relative to low-income ones, and COVID-19 fatality rates are an order of magnitude larger for the elderly than for young people. Second, in rural areas of LMICs with limited health infrastructure—for example, where there are no ventilators—flattening the curve by delaying infections would not actually prevent unnecessary deaths because the infection curves in the model remain above the (very low) health capacity line. Imposing social distancing therefore produces much smaller gains in terms of deaths averted compared to what happens in richer-country settings.[5]

[2]The official COVID-19 mortality statistics in India have been disputed (see Anand et al. 2021).

[3]For example, the government in Sierra Leone encouraged Veronica buckets, a Ghanaian invention popularized during the Ebola crisis that consists in simple wash stations with (sometimes bleached) water, soap, and a plastic basin for washing hands. These do not require running water and therefore can be more easily placed in a wide range of locations in poor countries.

[4]Post-lockdown reopening guidelines provided by the WHO were framed around test positivity rates, but inadequate testing capacity may have limited their applicability in LMICs (Shonchoy et al. 2021).

[5]Kim & Loayza (2021) and von Carnap et al. (2020) find smaller marginal gains from suppression than from mitigation measures, and the gains from both mitigation and suppression are again smaller in poor countries than in rich nations. As noted above, Alon et al. (2020) argue in favor of age-specific or sector-specific policies (e.g., school closures) over blanket lockdowns in LMICs.

When one converts the lives saved into a monetary value using the VSL methodology [as done by Greenstone & Nigam (2020) and Barnett-Howell et al. (2021)], one finds an even larger gap between the benefits generated in rich and in poor countries, in part because the VSL is estimated to be much higher in the United States or the United Kingdom than it is in Nigeria or Bangladesh (Viscusi & Masterman 2017). This is not because some lives are inherently worth more than others, but because the poor and the rich would naturally choose to make different money-versus-risk trade-offs in a pandemic situation. Richer people can more easily afford to stay at home, in that they are more willing to sacrifice their livelihoods to avoid the risk of contracting COVID-19. In contrast, a poor worker in Bangladesh may be less inclined to forgo their economic livelihood if staying home implies that their children will not have enough to eat that week.[6] This logic explains both why the pandemic and lockdowns impose larger costs on poorer populations within countries and why VSL is larger in richer countries. When LMICs with weak social safety nets have to worry about the hunger that emerges from social distancing, they do not make the same policy choice as rich countries.

Ma et al. (2021) quantify these effects by augmenting an SIR model with macroeconomic indicators on the effects of economic downturns on child mortality. They find that in poor countries, lockdowns can lead to 1.76 child deaths per COVID-19 fatality averted, producing a net increase in mortality. This echoes an early sharply worded op-ed warning that "lockdowns will starve people in low-income countries" (Jamison 2020).

Taken together, these analyses highlight the fact that not only the benefits of social distancing are smaller in LMICs, but also the costs imposed on society are arguably far larger due to weaknesses in health infrastructure and the social safety net. We present empirical evidence on these adverse consequences in the next three sections.

3. EMPIRICAL OVERVIEW OF HEALTH PATTERNS DURING THE COVID-19 PANDEMIC

The virus was first identified in Wuhan, China, in late 2019 (hence the 19 in its name). Starting in early 2020, the virus spread globally, and by March there were rising infections in countries at all income levels (**Figure 2**) and in all major world regions (**Figure 3**).[7] The numbers of new infections (**Figures 2*a***, **3*a***) and deaths (**Figures 2*b***, **3*b***) are likely to be underestimates given limited COVID-19 testing capacity (especially early in the pandemic) and misreporting by some governments, issues we return to.

The time pattern of recorded infections was notably different across country income levels. Throughout 2020 and 2021, recorded cases and deaths per capita were generally higher in HICs (**Figure 2**) and in the Organisation for Economic Co-operation and Development (OECD)

[6]This is a systemic issue that distinguishes LMICs. Alfaro et al. (2020) show that in economies with larger informal sectors, a greater share of the workforce faces unemployment risk during lockdowns. For example, 50% of jobs in Colombia were at risk when COVID-19 prevention measures were instituted, but this proportion would have dropped to 33% if Colombia's employment distribution had looked like that of the United States.

[7]The infection data are collated by the Our World in Data database (Ritchie et al. 2020) and are from the COVID-19 Data Repository at Johns Hopkins University (Dong et al. 2020). Immunization data are collated by Our World in Data from official reports, and excess mortality data are from the Human Mortality Database Short-Term Mortality Fluctuations data series (University of California, Berkeley, and Max Planck Institute for Demographic Research; **http://www.mortality.org**) and the World Mortality Dataset (Karlinsky & Kobak 2021).

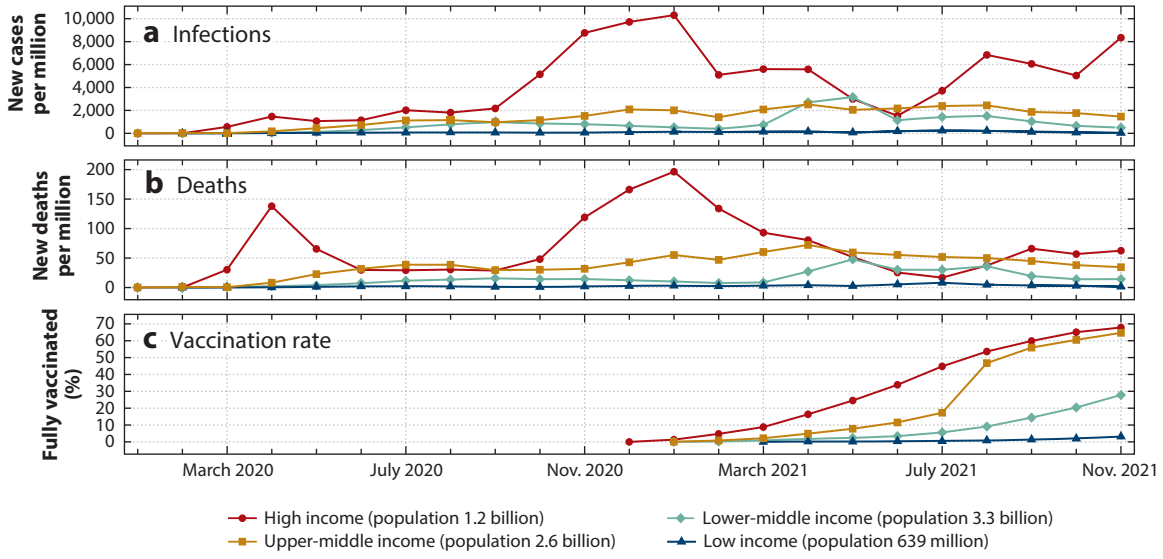

Figure 2

The figure shows (*a*) infections, (*b*) deaths, and (*c*) vaccination rates by income group (high-income countries, upper-middle-income countries, lower-middle-income countries, and low-income countries). All numbers have been population-weighted to account for different population sizes across income groups. Data from Dong et al. (2020), Ritchie et al. (2020).

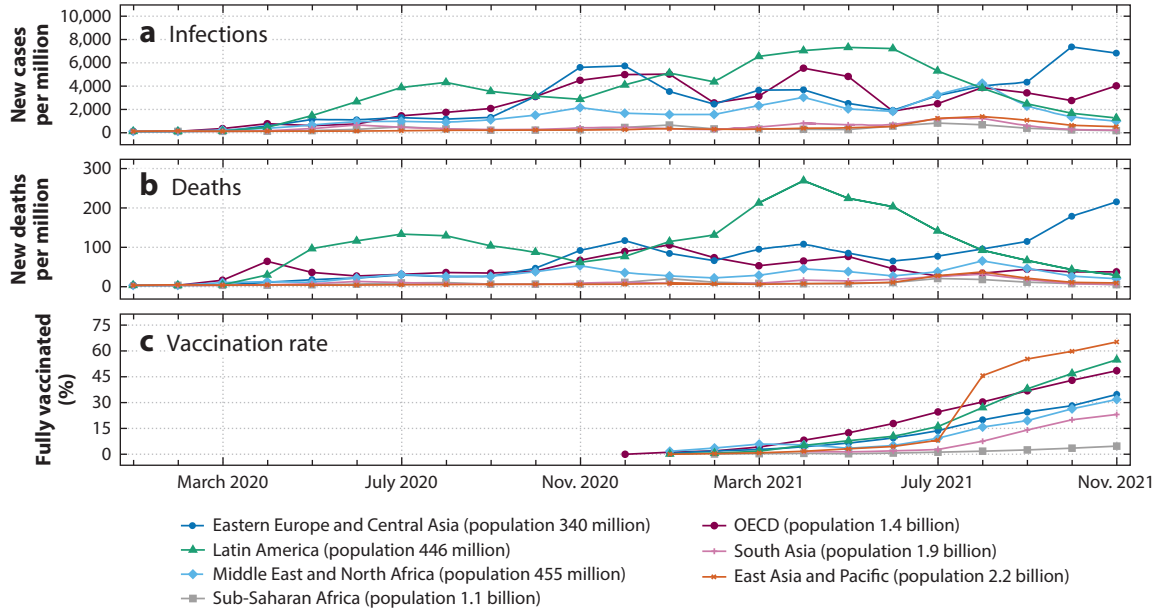

Figure 3

The figure shows (*a*) infections, (*b*) deaths, and (*c*) vaccination rates in OECD countries and non-OECD countries by region (Sub-Saharan Africa, Middle East and North Africa, Latin America, South Asia, East Asia and Pacific, and Eastern Europe and Central Asia). All numbers have been population-weighted to account for different population sizes across income groups. Data from Dong et al. (2020), Ritchie et al. (2020).

group (**Figure 3**) than in LMICs, echoing Section 2 above, which suggests that certain aspects of demography or economic structure may have partially shielded poor countries, at least early on. These broad patterns are reflected in the experiences of several of the highest-population countries in these regions (see **Supplemental Figure A2**).

Supplemental Material >

Yet some of these gaps could also reflect more testing and better reporting in HICs (Nkengasong 2020). Over 2020, recorded infection and death rates in middle-income countries (**Figure 2**), and in particular in Latin America, Middle East and North Africa, and Eastern Europe and Central Asia (**Figure 3**), show sharp increases, probably due to both rising cases and improved reporting (Beschel & Yousef 2020); however, overall rates remained modest into 2021 in the world's two poorest regions, South Asia and Sub-Saharan Africa. The rising rates of excess mortality documented in some LMIC regions—and again in Latin America, Middle East and North Africa, and Eastern Europe and Central Asia (see **Supplemental Figure A3**)—during 2020, even when official COVID-19 cases and deaths were relatively flat, suggest pervasive underreporting.[8]

Following a spike in new infections and deaths in wealthy countries in late 2020 to early 2021, a similar rise affected LMICs several months later. By early to mid 2021, recorded infections and deaths per capita were higher in several LMIC regions than in the OECD (**Figure 3**), including in Latin America and South Asia. Several of the world's largest LMICs, including India and Brazil (see **Supplemental Figure A2**), experienced sudden surges of cases and deaths, often linked to the rise of new virus variants that were particularly infectious (including the Delta variant). These surges overwhelmed health care systems and led to thousands of deaths, many of which may have gone unrecorded (Anand et al. 2021).

The 2021 reversal of pandemic fortune across world regions can be attributed to the rising infection rates in all LMIC regions combined with a dramatic decline in COVID-19 cases and deaths in rich countries. The main cause of this drop is the mass deployment of vaccines (Tregoning et al. 2021), which began in early 2021 (**Figures 2*c*, 3*c***). By the end of the period covered in the figures (December 1, 2021), vaccination rates had increased dramatically in HICs, including in the United States and the United Kingdom (see panel *c* of **Supplemental Figure A2**), and stood at several times the vaccination rates in lower-middle-income and low-income countries.

In 2021 (**Figure 4*a***) and at the time of writing (**Figure 4*b***), the rates of COVID-19 vaccination have been consistently highest in the world's wealthiest countries—concentrated in Europe, North America, East Asia, and Oceania—and have declined monotonically with per capita income (**Figure 2*c***). The world's poorest region, Sub-Saharan Africa, has by far the lowest rate of fully vaccinated population, at only 4.7%, with somewhat higher rates in middle-income regions (43.9%), although these still lag behind the OECD's 48.5% (**Figure 3*c***). In this matter of literal life and death, wealthy societies have monopolized access to the new vaccine technology through policy decisions that have failed to support the global COVAX effort[9] to provide vaccines to

[8]Of course, the pandemic could have also contributed to higher mortality for causes other than direct COVID-19 deaths—for instance, due to an inability to receive treatment for other health conditions or to deteriorating socioeconomic conditions (which we return to below)—so the rise in excess mortality while reported COVID-19 deaths were modest does not definitively prove that the cases were underreported.

[9]COVID-19 Vaccines Global Access (COVAX) is an initiative led by governments, global health organizations, manufacturers, and civil society groups meant to provide more equitable access to COVID-19 testing, treatment, and vaccines for all countries and especially LMICs. Although millions of vaccine doses have been delivered through the initiative, only a fraction of the promised doses have been delivered, and they have often been severely delayed.

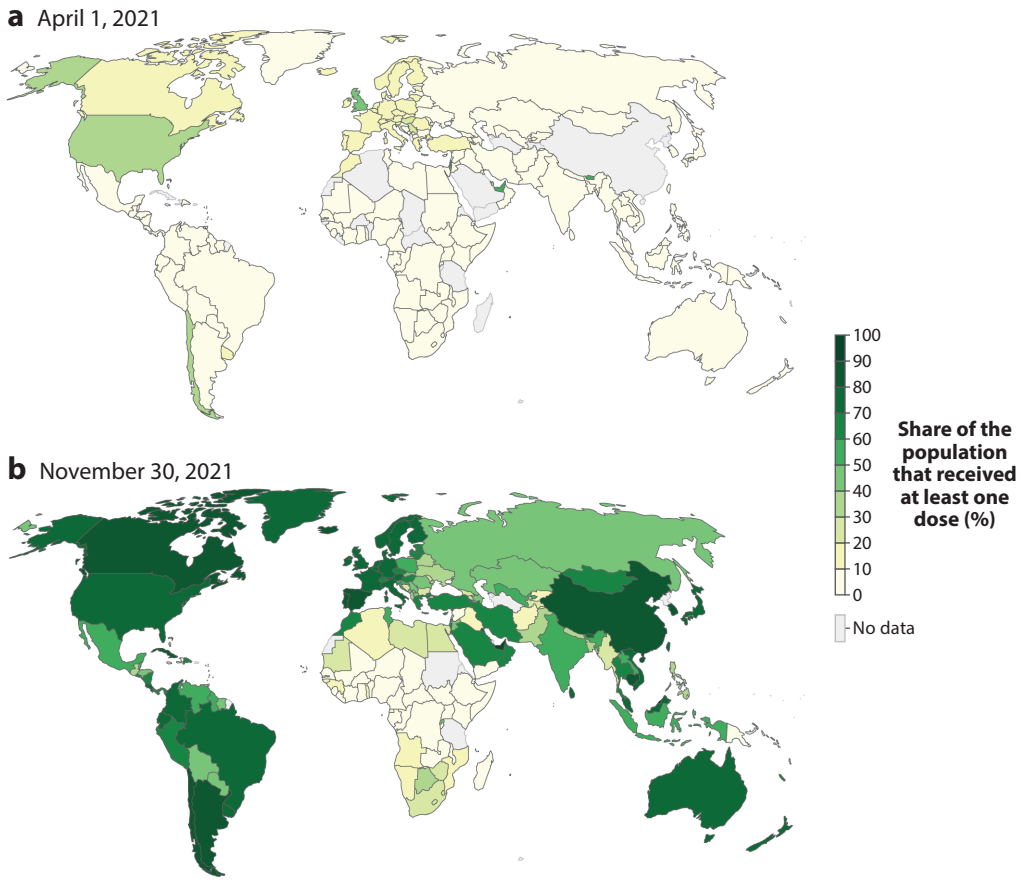

Figure 4

Map of global vaccine coverage by country, showing the share of the total population that received at least one vaccine dose. This may not equal the share of people who are fully vaccinated if the vaccine requires two doses. These data are only available for countries that report the breakdown of doses administered by first and second doses. Figure adapted from Ritchie et al. (2020) (CC BY 4.0).

LMICs, while simultaneously providing third doses for their own populations (Mueller & Robbins 2021).[10]

Together with many other observers, including public health experts (Hassan et al. 2021, *Lancet Infect. Dis.* 2021, Moon et al. 2021, McSweeney & Chingono 2021), we believe this is categorically unjust and represents an abdication of ethical and humane leadership on the part of the world's richest societies, including the country that we live in (the United States). At the time of writing, many of the richest countries have large stocks of unused vaccines, as vaccine hesitancy has slowed mass distribution efforts, while highly vulnerable populations in LMICs, including health care workers and the elderly, remain largely unvaccinated. The World Health Organization (WHO)

[10]For detailed data on vaccine procurement by individual countries, blocs (e.g., African Union), and global agreements such as COVAX, readers may consult the Launch & Scale Speedometer website at **https://launchandscalefaster.org/COVID-19/vaccinepurchases**.

Director Dr. Tedros Ghebreyesus stated in January 2021, "I need to be blunt: The world is on the brink of a catastrophic moral failure—and the price of this failure will be paid with lives and livelihoods in the world's poorest countries" (WHO 2021b).

Amid this, LMIC governments, too, have a role to play to ensure that vaccines reach their citizens. They must invest in more robust distribution systems, especially those that can reach remote populations, to prevent dissemination delays when supplies arrive.

In the next section, we review the empirical evidence on the economic impacts of the pandemic in LMICs.

4. IMPACTS ON LIVING STANDARDS IN POOR COUNTRIES

The COVID-19 pandemic has also been an enormous economic shock: Global GDP declined by approximately 3% in 2020, a recession larger than any decline recorded in the last six decades (Int. Monet. Fund 2020a) (**Supplemental Figure A4**). As a point of contrast, global GDP declined by roughly 1–2% during the Great Recession of 2009 and was largely flat during the 1973–1974 Oil Crisis. Although comparable national series are not readily available, it is likely that the COVID-19 pandemic has caused the largest global decline since the periods of the Great Depression and World War II in the 1930s and 1940s (Int. Monet. Fund 2020b). In absolute numbers, the pandemic has increased the number of people living in poverty by nearly 100 million, back to 2015 levels, undoing 5 to 6 years of progress (Mahler et al. 2021).

Supplemental Material >

We next discuss a growing literature documenting the evolution of economic conditions in LMICs since March 2020, utilizing household surveys and other data sources to go beyond the national statistics that form the basis of **Supplemental Figure A4**. Aggregate national accounts data have recognized deficiencies relative to direct surveying for tracking the well-being of the poor (Deaton 2003a,b). Household surveys are necessary because aggregate data can overlook large segments of the population: Over a quarter of economic activity and half of all workers in Africa, Asia, and Latin America are in the informal sector (Int. Labour Organ. 2018, Medina & Schneider 2020), and therefore they are not fully captured in most official statistics. Informality similarly undermines the informativeness of private sector transaction data such as payroll, credit, or smartphone transfers. Hence, many approaches that national statistical agencies and researchers have used to document COVID-19 economic patterns in HICs cannot easily be implemented in LMICs.[11]

Egger et al. (2021) provide one of the first relatively comprehensive analyses of pandemic living standards in LMICs during 2020. These authors, as well as Bundervoet et al. (2022), discussed below, rely on original, large-sample household surveys in LMICs. These research teams adapted existing data collection protocols to deploy phone surveys, often starting within weeks

[11] Data collection during the pandemic posed a unique set of methodological challenges in LMICs. Economic data are regularly reported by government agencies in HICs, but they are less frequently collected in LMICs and less reliable when large shares of the economy are in the informal sector. To generate high-frequency signals during the pandemic, Chetty et al. (2020) creatively assemble granular-level records produced by the data systems of US private companies to document spending, revenue, and employment rates. A similar data infrastructure does not exist in most LMICs. This is why development economists resorted to phone surveys in LMICs as the primary method of tracking economic conditions during the pandemic. This can be supplemented with smartphone-based data on (say) mobility from Google, Facebook, and other sources (Buckee et al. 2020, Kraemer et al. 2020, Ilin et al. 2021), but smartphone penetration is also lower in LMICs, limiting representativeness. The World Bank and its partners in national statistical offices have filled in important gaps in 2020–2021 through large-scale phone surveys in scores of countries, creating public data that have contributed to many of the projects that we survey in the remainder of this section and the next.

of the beginning of the pandemic. Egger et al. (2021) utilize random sampling to generate statistically representative information about 16 populations in nine countries in Africa, Asia, and Latin America—namely, Bangladesh, Burkina Faso, Colombia, Ghana, Kenya, Nepal, Philippines, Rwanda, and Sierra Leone—that have a combined population of nearly 500 million. The 30,000 surveys collected cover heterogeneous samples constructed in different ways: Seven samples rely on random digit dialing (RDD)[12] and skew toward wealthier mobile phone owners, whereas nine are drawn from earlier studies representative of specific subsamples, including formal and informal sector workers, agricultural laborers, small business enterprises, refugees, migrants, and their families.

Although these data are unusually timely, they have important limitations. All post-COVID-19 data were collected via telephone interviews to comply with social distancing guidelines. Unfortunately, this placed limits on data collection: Surveys were short, lasting only 15–30 min, and focused on relatively coarse economic measures, rendering some types of measurement infeasible. Some of the surveys compared the income reported in pre-COVID-19 baseline surveys to the income reported in the phone survey to determine possible changes. Yet others relied on retrospective reports of baseline income, which carry the risk of respondent recall or reporting biases. Finally, the data focused on March to July 2020 and thus are valuable for tracking the initial shock but not the pandemic's extended effects.

With those caveats in mind, Egger et al. (2021) document the widespread nature of economic hardships and of the decline in living standards: Across the 16 samples, between 8% and 87% of respondents report a drop in income during the crisis period, with a staggering median of 70%. It is important to recognize up front that these pandemic effects are the combined effects of the virus and of the country-specific policy responses, and these factors cannot in general be separately identified. The proportions reporting declines in employment are similarly high, ranging from 5% to 49% (median share 30%). The adverse economic shock has been compounded by impediments to livelihood: In most countries, a large share report reduced access to markets (median share 31%), likely related to the ubiquitous lockdowns.[13] Together, these drops in employment, income, and access to markets contribute to food insecurity: Between 9% and 87% of respondents were forced to miss or reduce meals (median share 45%). Even in Colombia—the richest country in the sample—large shares of respondents report drops in income (87%) and employment (49%) as well as increased food insecurity (59%).

Social support in response to the economic shock has been mixed: The proportion of respondents who report benefiting from government or NGO support runs the gamut in the sample from 0 to 49% (median share 11%). However, the high rate of missed meals and reduced portion sizes suggests that even when these efforts were present, they were insufficient. For instance, Rohingya refugees in Bangladesh report the highest rates of assistance, likely due to preexisting international aid infrastructure, yet even in this sample 27% of respondents report food insecurity. More detailed data in one Kenya sample indicate that households also engage in extensive dissaving, such as selling assets and spending stored cash, to stabilize consumption.[14]

These adverse economic effects vary substantially both across countries and among different subsamples within countries, but, perhaps surprisingly, Egger et al. (2021) find little evidence that

[12] RDD is a type of probability sampling in which the research sample is determined by randomly generating telephone numbers to call. This creates a study sample representative of those with a phone. Very poor households may not own phones or live in areas with low connectivity, and so they may be underrepresented (an issue the authors discuss but we do not focus on here).

[13] Ceballos et al. (2020, 2021) similarly find disruption of agricultural market access in India.

[14] Mahmud & Riley (2021) find dissaving in a Ugandan sample but no large-scale asset liquidation.

this variation is systematic by socioeconomic status (SES). The finding that even relatively well-off households experienced adverse economic shocks in LMICs indicates that the rich could not easily buy their way out of the crisis, and it resonates with academic and journalistic accounts (Cefalà et al. 2020, Dahir 2020a, Singh & Kumar 2021). There is similarly no clear pattern across refugee and non-refugee populations: Reported food insecurity is actually slightly lower among refugees than in the host communities living near Rohingya camps in Bangladesh (perhaps due to greater presence of humanitarian organizations there); yet food insecurity is somewhat higher among refugees in Kenya compared with a national sample.[15]

Egger et al. (2021) also draw on a subset of samples that feature more detailed panel or repeated cross-sectional data, and these richer measures allow them to quantify the depth of economic decline. Firm revenue, a natural measure of overall local economic activity, was adversely affected: In rural Kenya, average firm profits and revenues fell by 51% and 44%, respectively (both had $P < 0.05$ relative to pre-crisis levels; see **Figure 5*a***). Sierra Leone experienced a similarly large decline of 50% ($P < 0.05$; see **Figure 5*b***).[16] In the rural Kenya sample, there was also a decline in per capita consumption expenditures (**Figure 5*c***), with declines in nonfood expenditures of 29% ($P < 0.05$) persisting through May 2020. Food expenditures in Kenya and Sierra Leone actually rose slightly, by 11% (**Figure 5*c***) and 6% (**Figure 5*d***), respectively, although in Sierra Leone this appears to be driven by higher food prices (19%, $P < 0.05$ relative to previous period; see **Figure 5*f***) rather than greater quantities consumed. In contrast, Kenyan prices were largely stable or even fell slightly (**Figure 5*e***). These data indicate that households appear to be cutting back nonfood consumption in an effort to maintain essential food intake.

Examining food insecurity in greater detail, Egger et al. (2021) observe rising rates of missed meals and reduced portions during the crisis in both Kenya (**Figure 5*g***) and Sierra Leone (**Figure 5*h***), and for both adults and children ($P < 0.05$ for all effects). The sharp rise in child food insecurity is alarming, given the potentially large negative effects of child undernutrition on later life outcomes (Victora et al. 2008, Baird et al. 2016).

A second notable study is by Bundervoet et al. (2022). Like Egger et al. (2021), these authors rely on phone surveys conducted in the first months of the pandemic and collect similar economic outcomes. This allows for comparability with Egger et al.'s (2021) work and also presents similar limitations—for instance, around the imperfect representativeness of phone survey samples. A major advantage of this impressive effort coordinated by the World Bank is its use of data from a larger set of countries, 34 in total (with a combined population of 1.4 billion people) from Sub-Saharan Africa, East Asia and the Pacific, Latin America, Eastern Europe and Central Asia, and Middle East and North Africa, representing the full range of LMICs.

They document extensive job loss, drops in income, and rising food insecurity across this large sample of countries, with magnitudes similar to the median levels found by Egger et al. (2021): 36% of respondents stopped working in the early pandemic and over 64% of households reported decreases in income. Food insecurity also rose, and the authors find large adverse effects in all major LMIC regions. Bundervoet et al. (2022) also present detailed information on the

[15] A central methodological concern in Egger et al.'s work (2021) and in the related studies surveyed below is that non-pandemic factors could drive the evolution of outcomes over time—for instance, seasonal variation related to the agricultural cycle. Although it is challenging to rule these out, the authors argue that the consistency in outcomes across multiple samples, with a wide range of seasonal patterns, suggests that they are largely documenting the impact of the crisis. In addition, in some cases they were able to directly document that food insecurity was far higher during the 2020 crisis than in the same season in previous years.

[16] Bishi et al. (2020) find that 91% of traders in Lagos, Nigeria, reported zero revenue during lockdown periods and that sales rose after reopening (but did not return to pre-pandemic levels).

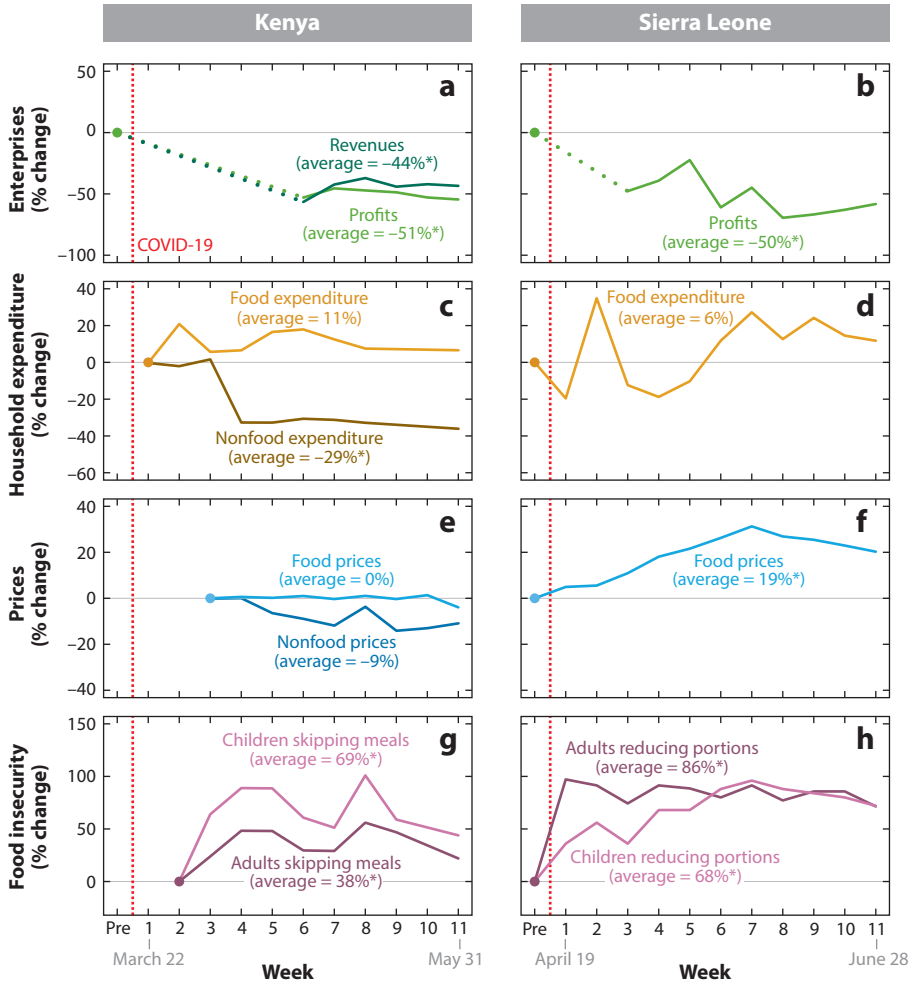

Figure 5

Key economic indicators over time. The figure shows the percentage difference from baseline for several indicators in rural Kenya and Sierra Leone during the COVID-19 global pandemic relative to the pre-COVID-19 or early-COVID-19 levels. The Kenya sample is representative of all households and enterprises across 653 rural villages in three sub-counties taking part in an unconditional cash transfer program. The Sierra Leone sample is representative of households in 195 rural towns across all 12 districts of Sierra Leone. Surveys in Kenya were conducted in two rounds. During the first round (weeks 1 through 8), 8,594 households were interviewed. During the second round (week 11), 1,394 households were surveyed, of which 1,123 were interviewed for a second time. Surveys in Sierra Leone were conducted across 2,439 households. The pre-COVID-19 levels (labeled *Pre*) are from questions that recall data from February (*left column*) and March (*right column*, panels *b*, *d*, *f*) or from a previous survey conducted in November 2019 (panel *h*). The post-COVID-19 levels are from questions that recall data from the prior 7 days (panels *b*, *d–h*), the prior 2 weeks (panel *a*), and a combination (prior 7 days for food and prior 2 weeks for nonfood expenditures in panel *c*). The weeks on the horizontal axis refer to the start of the recall period for each observation rather than the period during which the data were collected. The dotted lines in panels *a* and *b* show the linear trend from the pre-COVID-19 baseline to the first observation for each respective time series. Baseline level for panel *g* is 1.3 days out of 7 for adults and 0.72 out of 7 for children. Baseline level for panel *h* is 35% of adults and 25% of children missing any meals in the prior 7 days. The asterisk indicates $P < 0.05$. Figure adapted from Egger et al. (2021) (CC BY 4.0).

heterogeneity of impacts across major demographic and socioeconomic groups. A striking finding is the far higher share of women who lost a job at the start of the pandemic (42%) compared to men (31%), suggesting that the crisis was experienced in a highly gendered fashion (as we discuss in the next section). The gradient with respect to SES is more nuanced: Workers in nonagricultural self-employment experienced particularly large drops, whereas those working in agriculture—who are often among the poorest in LMICs—were somewhat less affected. Similarly, there were large income drops across the respondents' educational distribution. Khamis et al. (2021) extend the collection of core economic measures and show that there was a substantial but still only partial recovery in income and employment in the latter half of 2020.[17]

Although no other studies (to our knowledge, and at the time of writing) have the extensive cross-country LMIC coverage provided by Egger et al. (2021), Bundervoet et al. (2022), and Khamis et al. (2021), an emerging literature documents the impacts of the pandemic among particular populations. As shown in **Supplemental Table A2**, these works study a wide variety of LMIC cases and examine outcomes ranging from food insecurity to firm performance and coping strategies. Together, they echo the central finding of sudden and large declines in economic activity and living standards in LMICs during the pandemic.

Supplemental Material >

We point the reader to the **Supplemental Appendix** for a fuller picture; here, we discuss a few examples. Mahmud & Riley (2021) collect follow-up phone survey data among an existing sample in rural Uganda during the early months of the pandemic, and they document adverse economic consequences, including falling household income and food consumption (by 60% and 50%, respectively), a drawing down of savings, and declining life satisfaction. Le Nestour & Moscovitz (2020) similarly find that 87% of Senegalese households experienced a drop in income and increased food insecurity in the early pandemic. Malik et al. (2020) find that household income and small business sales fell by roughly 90% in Pakistan, and microfinance repayment rates plummeted; both Hamadani et al. (2020) and Rahman & Matin (2020) document similar patterns in Bangladesh.

This body of evidence leaves little doubt that the COVID-19 pandemic has had a massively negative economic impact on households and firms across LMICs since March 2020. One key limitation of this evidence, however, is that it focuses mainly on the early pandemic period. It will be valuable for new studies to present data from the late 2020 period into 2021 (and beyond) for a fuller dynamic picture.[18]

An important open question is the role that government lockdown policies played in driving these adverse outcomes. Although critical for containing the spread of the virus, more severe lockdown policies in India have been associated with greater regional declines in GDP, including when measured using night lights (Beyer et al. 2020), as well as reduced income, food insecurity, and mental health outcomes among women, based on household surveys (Bau et al. 2022). Yet Meyer et al. (2021) document a large negative impact on the livelihoods of Ethiopian garment workers in mid-2020 due to changes in world demand for their products, despite the fact that there were at the time few COVID-19 cases in the country and that Ethiopia was pursuing mild lockdown policies (Oqubay 2020), which is evidence of the truly global nature of the economic shock.

[17] Furbush et al. (2021) document a similar time pattern of partial household economic recovery in late 2020 in four Sub-Saharan African countries.

[18] A valuable source for up-to-date LMIC data is the World Bank's Household Monitoring Dashboard (at **https://www.worldbank.org/en/data/interactive/2020/11/11/covid-19-high-frequency-monitoring-dashboard**), which suggests improvements in socioeconomic conditions in many countries in 2021.

5. BROADER IMPACTS ON HOUSEHOLDS AND SOCIETY

This section outlines effects beyond those on income and living standards that were discussed in the previous sections; here, we focus on (*a*) education, (*b*) health access, and (*c*) mental health. Some of these effects are the direct result of the pandemic, and others could be the consequence of the resulting economic shock as well as of the coping mechanisms that individuals and households took to deal with rapidly declining living conditions. We also place special focus here on how the pandemic has differentially affected (*d*) migrants and refugees and (*e*) women across all of these dimensions. Some common coping mechanisms that LMIC households adopt to deal with adverse economic shocks have been shown to be differentially disadvantageous to women and girls, including practices of early marriage and reliance on transactional sex (Corno & Voena 2016, Archibong & Annan 2019, Corno et al. 2020, Jones & Gong 2021). Here we focus on a few studies; for a more thorough (although surely still incomplete) review, readers are referred to **Supplemental Table A3**. We do not cover many important societal outcomes because they fall beyond the scope of this article.[19]

Supplemental Material >

5.1. Education

The pandemic led to massive drops in school enrollment during 2020 and into 2021 in most countries, and this is likely to have a wide range of adverse consequences for the children's present, their future, and their societies.[20] Across poor and rich countries, most children had only a few weeks of in-person schooling during the first year of the pandemic (Evans et al. 2021). For children in many LMICs, one year of schooling accounts for a large proportion of the expected lifetime educational attainment.

We turn again to Bundervoet et al. (2022): They find that roughly 30% of children were unable to continue any schooling during the early pandemic. In some countries, like Kenya, entire school years were canceled [although the Government of Kenya later partially reversed this policy (Dahir 2020b, BBC 2021, Yusuf 2021)]. Bundervoet et al. (2022) highlight how these closures are likely to exacerbate social inequalities, as children of low-income families, those who had parents with less education, and those who lived in rural areas were all more likely to miss school time. Many remote schooling approaches—via Internet or television, for instance—are inaccessible to children from marginalized communities (Akmal et al. 2020, Mueller & Taj 2020, UNESCO 2021).

The initial data indicate that a substantial amount of learning was simply lost during the first year of the pandemic, and it remains unclear whether and how these children will be able to catch up. For instance, children in Ethiopia only learned 30–40% as much on average as in a normal school year (Evans et al. 2021, Kim et al. 2021), while math knowledge declined for many students in Kenya (Whizz Educ. 2021) and Pakistan (Crawfurd et al. 2021), particularly for those from poorer backgrounds. Phone survey data from the Young Lives project indicate that large shares of adolescents in Ethiopia, India, Peru, and Vietnam dropped out of school, chose not to enroll, or

[19] An important area that we miss relates to political outcomes, which may themselves have economic consequences. Disease outbreaks have affected politics throughout human history—as documented, for example, in all the ancient religious texts and in debates in the new US republic about the appropriate public health response to yellow fever (Chernow 2004)—and the global COVID-19 pandemic is no different. There are ample journalistic accounts and research studies linking the pandemic to the rise of political instability, authoritarianism, conflict, and polarization in countries rich and poor (Blanc & Brown 2020, Cheeseman & Smith 2020, Perrigo 2020, Swanson 2020, Kishi 2021), and this topic clearly merits detailed examination.

[20] The World Bank and UNESCO have detailed global trackers of school closures and education impacts (see **https://www.worldbank.org/en/data/interactive/2020/03/24/world-bank-education-and-covid-19** and **https://covid19.uis.unesco.org/global-monitoring-school-closures-covid19/**).

had minimal engagement with their teachers if enrolled (Favara et al. 2021). The economic shock caused by the pandemic may also make it more difficult for poor families to pay for school fees in the coming years. It seems unlikely that these losses will be fully reversed for those who dropped out due to the pandemic (Dessy et al. 2021, Evans et al. 2021, Favara et al. 2021).

Azevedo et al. (2021) argue that this loss of schooling, learning, and ultimately human capital in most LMICs could have major long-run economic consequences. They simulate the macroeconomic effects on future economic growth from the loss of schooling (and associated lower wages)—building on work by Barro (2013), among others, that estimates how aggregate schooling levels affect country economic growth—and find that the losses caused by a 5-month school shutdown in 2020 have a global net present value of US$10 trillion. Lopez et al. (2020) carry out a related exercise for lost preschool attendance. These studies are based on a partial equilibrium assumption; in other words, they assess the impact of education on a given society holding education constant in the rest of the world. The COVID-19 pandemic shock is unusual in that it reduced human capital in many, if not most, societies at the same time. Whether this global drop in learning has effects larger or smaller than those estimated in existing work depends on whether education in one country is a complement or a substitute to education in others; to our knowledge, this remains an unsettled question, but one with important implications for pandemic recovery.

These exercises remain speculative, but there are reasons to think that they may represent lower bounds on the true impacts of school closures, which also halted the delivery of the school-based feeding programs that are a main source of nutrition for hundreds of millions of poor children (Ahuja & Devolla 2021, Borkowski et al. 2021) as well as the provision of health programs (e.g., mass deworming) in scores of countries.[21] Staying home from school appears to have contributed to teenage pregnancies and marriages, which could have detrimental long-run effects for many young women's future economic prospects. Beyond the school closures, child undernutrition also increased sharply during the pandemic, and this will likely have negative long-run economic consequences (Osendarp et al. 2021).

5.2. Health Access

The ability to access health care has been severely disrupted in most countries, and especially in LMICs (Krubiner et al. 2020, WHO 2021a), due to a combination of supply side and demand side factors. On the demand side, most immediately, mobility restrictions and lockdowns (and fear of contracting the virus) have directly hindered many individuals from accessing services. The precipitous drop in living standards discussed in Section 4 has limited households' ability to purchase some medical services. Supply side disruptions have also been severe. In some countries, the concentration of resources to deal with COVID-19 infection spikes has drawn staffing away from other essential health services and has led to the loss of medical staff due to COVID-19 morbidity and mortality (especially before vaccines were widely distributed to health workers; Bandyopadhyay et al. 2020, Gholami et al. 2021). The pandemic fiscal shock has also reduced government health spending in many countries.

The combination of these factors has contributed to delayed or cancelled vaccination drives for other non-COVID-19 illnesses in most countries (WHO 2020b, Causey et al. 2021), with tens of millions of missed doses and disruption of medical care for other infectious diseases (e.g., tuberculosis, HIV/AIDS, malaria, etc.) and other health conditions (Jain & Dupas 2021) in many LMICs. These disruptions are predicted to lead to substantial increases in the future disease

[21] After the temporary halt of a long-standing national primary school deworming program in Kenya in 2020, the government was able to carry out mass treatment in 2021 (Hagemann 2021).

burden (McQuaid et al. 2020, *Nature* 2020, Sherrard-Smith et al. 2020, Weiss et al. 2021), imposing further human costs for years after the end of the pandemic. Meta-analysis also shows significant pandemic deterioration in maternal and neonatal health outcomes, as well as increased postnatal depression, with a disproportionate impact in LMICs (Chmielewska et al. 2021). This could compound the costs of schooling disruption and child undernutrition noted above.

5.3. Mental Health and Well-Being

There have been dramatic increases in anxiety and mental distress in LMICs during the pandemic related both to fear of the disease and to consequences of lockdowns, such as social isolation and economic deprivation (Kumar & Kumar 2020, Rajkumar 2020), including in Bangladesh (Hamadani et al. 2020), Ghana (Boateng et al. 2021), Iran, and China (WHO 2020a), among others. This global phenomenon appears to affect poor and rich countries, children and adults alike (Porter et al. 2021). As with other dimensions of health, access to mental health services has been severely disrupted (Kola 2020, WHO 2020c), which is particularly troubling given the low baseline access in LMICs.

The mental health impacts appear to be particularly pronounced for vulnerable populations, including women. Bau et al. (2022) survey Indian women and document increased sadness, depression, and hopelessness, with particularly adverse effects for women in areas experiencing stricter lockdowns and for women with daughters and living in female-headed households (which are often more economically vulnerable).

5.4. Migrants and Refugees

Poor households with migrant members were highly vulnerable during the COVID-19 pandemic because they faced a triple threat: increased exposure to the virus, local economic exposure to the downturn, and susceptibility to economic contraction in the destination markets. Of particular concern is the threat posed to forcibly displaced populations, who are disproportionately hosted in LMICs with weakened health care systems and safety nets.

The International Labour Organisation estimates that tens of millions of migrants were stranded abroad without a job during the pandemic (Int. Labour Organ. 2020). This is a significant problem for LMICs, because 192 of the 272 million people who live outside their countries of birth come from regions classified as less developed (UN Dep. Econ. Soc. Aff. 2019). This not only puts individual migrant households at risk but can also have significant global macroeconomic consequences: Direct remittances to LMICs in 2018 reached nearly US$500 billion, three times the amount of official development assistance. Internal (often rural to urban) migration is even more common in LMICs. Barker et al. (2020) find that both the public health risks of COVID-19 and the subsequent economic fallout have been particularly damaging to households that engage in labor migration and merit special policy focus.

The appropriate policies to deal with the risk of disease spread from migrant mobility are also not necessarily straightforward. For example, Burlig et al. (2021) show that moderately lengthy domestic mobility restrictions increase infections once those restrictions are lifted relative to either shorter or very long restrictions.

5.5. Gender Differences

As noted above, there is evidence that both economic losses and mental health problems have been more pronounced for women than for men during the pandemic (Hamadani et al. 2020, Bundervoet et al. 2022). In terms of other economic outcomes, Levine et al. (2021) compare

male- and female-headed households in Sierra Leone, and they find that the pandemic exacerbated preexisting gaps: Female-headed households faced greater food insecurity and were less likely to be informed about COVID-19 safe behaviors.

Investigators have examined and found evidence for similar gender differences along other dimensions. Women's work in many countries is concentrated in the informal sector and in jobs providing care to others, including health care, and many of these occupations have been hit particularly hard (Staab 2020). For instance, those working in domestic service jobs may not have been allowed to work in person at their employer's residence during lockdown periods. Moreover, informal sector workers may be excluded from government assistance, which may be restricted to those who pay into national social insurance schemes, and the same goes for those who lack national ID cards or mobile phones, all of whom are more likely to be female. Women working in health care professions—many of which are dominated by females[22]—were on the pandemic front lines and experienced increased infection risk, overwork, and burnout.

Care responsibilities extend far beyond work, and many women bore the brunt of childcare obligations during school lockdowns in both poor and rich countries (Abuya et al. 2020, UN Women 2020). This could disrupt their economic activities and threatened their households' livelihoods, especially for women who worked outside the home before the pandemic (Deshpande 2020, Cucagna & Romero 2021). Women are also disproportionately responsible for caregiving for ill household members, including those suffering from COVID-19, possibly for extended periods (i.e., due to long COVID-19) (Staab 2020, UN Women 2020). These care responsibilities often extend to older adolescent girls, affecting their ability to invest in their own schooling and to make other important life choices (Amin et al. 2020, Baird et al. 2021).

School closures have also been cited as a risk factor for one of the most important and troubling effects of this pandemic: a sharp rise in domestic violence against women and children (Taub 2020) that has been termed the shadow pandemic. Among LMICs, complaints and reports of intimate partner violence and domestic violence have increased by +0.47 standard deviations in Indian data (Ravindran & Shah 2020), 50% of women reported an increase in all forms of violence during the lockdown in Bangladesh (Hamadani et al. 2020), and there was a 48% increase in calls to a distress hotline in Peru from March to July 2020 (Agüero 2021; see also Peterman & O'Donnell 2020, Mahmud & Riley 2021).[23] Children and adolescents have experienced increased exposure to intrahousehold violence as well (Banati et al. 2020, Cent. Gend. Equity Health 2021).

Many factors may have contributed to this increase in violence, including the fact that recourses such as shelters and emergency lines have been curtailed due to infection risk (or overstretched due to the rise in distress calls or budget cuts); the deterioration of economic conditions and living standards; changes in living arrangements, including child presence in the home (rather than at school); and exposure effects simply due to greater proximity to partners during the day. Regardless of the particular mix of contributing factors in any setting, the rise in domestic violence during the COVID-19 pandemic is a major crisis and may leave physical and emotional scars for many years.

6. PUBLIC POLICY RESPONSES

As we write, in December 2021, the most important country-level policy response to COVID-19—and the only one that can bring this pandemic to an end—is to ensure widespread vaccination

[22] In Sub-Saharan Africa, 70% of community health workers are female (Staab 2020).

[23] In contrast, Hoehn-Velasco et al. (2021) show that in Mexico, in the initial months of lockdown (March to May 2020), alimony lapses, sexual crimes, and domestic violence reports decreased by 20%, but all crime rates were back to pre-pandemic levels within four months.

among the population. We first discuss the challenges LMICs have faced in procuring sufficient doses of vaccines. In the absence of widespread vaccine coverage, countries should implement nonpharmaceutical interventions like mask-wearing and distancing to slow the spread of disease (which is particularly urgent given the rise of new virus variants, including the Omicron variant that is rapidly spreading at the time of writing) and develop robust social safety nets for citizens whose livelihoods are threatened by the lockdowns. We discuss these two categories of public policy response in this section. **Supplemental Table A4** contains a more comprehensive listing of studies on these topics.

Supplemental Material >

6.1. Vaccination Coverage

Most LMICs currently fall far short of vaccination coverage goals (see **Figure 2*c***). As of December 1, 2021, in South Asia only 22.3% of Pakistanis and 27% of Nepalis were fully vaccinated; in West Africa only around 2.7% of Ghanaians and 1.7% of Nigerians were fully vaccinated; and in the Caribbean 17.1% of Jamaicans and less than 1% of Haitians were fully vaccinated (Ritchie et al. 2020). The low vaccination coverage in LMICs is largely due to supply shortages, and immediate policy action needs to focus on procurement (Ahuja et al. 2021). LMICs are currently dependent on support from either HICs or from the COVAX initiative for doses. HICs have chosen to largely focus on the challenges of vaccinating their own citizens, and support to LMICs has been limited: Rich countries are storing excess doses and have been administering third booster doses to their own vulnerable citizens in 2021, while coverage remains inadequate in LMICs. As noted above, this strategy facilitates the further mutation of SARS-COV-2, and the propagation of new variants in LMICs (such as Delta and Omicron) followed by reimportation to HICs will likely prolong the global pandemic.

A case study of COVID-19 vaccine access in Bangladesh illustrates the challenges many LMICs face to implement efficient campaigns. Bangladesh's inconsistent access to vaccines has led to a disorganized campaign, and 11 months after the first batch of vaccine doses arrived in the country, only 22% of the population had been fully vaccinated (Ritchie et al. 2020, Reza et al. 2021). Bangladesh was successful in procuring quite early the CoviShield vaccine—manufactured by the Serum Institute of India (SII) under license from AstraZeneca—and started a nationwide rollout on February 7, 2021. As in other countries, the government prioritized frontline health care professionals and those over 55 years old. Without an effective promotion campaign, demand was low, and access was extended to those aged 40 and above. SII received advance payment and agreed to provide 30 million doses by June 2021. However, after the first 5 million doses were delivered, India halted all vaccine exports due to the rapid spread of the Delta variant there, and that order remains unmet as of December 2021, as only part of the ban has been lifted. Bangladesh has since received smaller donations of Pfizer and Moderna vaccines and of the Chinese Sinopharm vaccine, but overall coverage is low and the campaign has not really begun in earnest in rural areas.

The Bangladesh case also illustrates that even when supply shortages are addressed, LMICs need to ensure efficient last-mile delivery of vaccines, lower access costs, and convenience—especially in remote rural areas—and to conduct campaigns to address vaccine hesitancy and build confidence in the new technology. LMIC governments need to prioritize robust distribution systems that can ensure that COVID-19 vaccines reach remote and rural populations. Simultaneously, they must initiate social mobilization programs that engage communities and their leaders with effective outreach, so that when the supplies arrive, dissemination delays can be prevented and the take-up maximized. Existing economics literature provides guidance on how to boost immunization rates (Banerjee et al. 2021). Solís Arce et al. (2021) show that vaccine hesitancy is generally lower in LMICs than in Russia or the United States (though itself variable across Sub-Saharan

African countries; see Africa Cent. Dis. Control 2021) and argue that shipping vaccines to LMICs is sensible from the perspective of maximizing coverage to build global herd immunity.

However, while these vaccine supply shortages remain, LMICs will need to minimize the public health and economic damages caused by a continuing epidemic by implementing the programs recommended by public health experts and economists in pursuit of two broad categories of goals: They should (*a*) use NPIs—such as widespread use of face masks and proper hygiene practices, dissemination of COVID-19 safety information and protocols, limits on crowding and religious/social gatherings, and social distancing policies—to slow the spread of disease; and (*b*) provide economic support to the vulnerable populations who are adversely affected by social distancing and lockdown protocols.

6.2. Non-Pharmaceutical Interventions

Early in the pandemic, public health experts and the political leadership in each country were tasked with convincing the general population to follow a new set of pandemic protocols, including NPIs. A large literature in the social sciences suggests that behavior change is difficult to achieve in a single domain, and ensuring population-level adoption of multiple new practices was, unsurprisingly, extremely challenging. Appropriate policy design is important because it affects adherence, as revealed through mobility data (Jamison et al. 2021).

Political leaders played a large role, either by providing clear guidance to their constituents and leading by example or by refusing to do that and jeopardizing public health goals. For example, several African leaders quickly enacted aggressive measures to close the airports in March 2020 and restricted mobility to slow the spread of COVID-19: Senegal, Rwanda, Mauritius, and Liberia began screening and quarantining travelers at the airport, while Ghana and Nigeria banned travel between cities and implemented curfews. Within a week of its first reported case, Kenya shut its schools, banned gatherings, and enforced a mandatory 14-day quarantine for incoming travelers (Mobarak & Mahbub 2020).[24]

In contrast, the United States was relatively slow to react, and national policy remained indecisive: Several high-level US government leaders, including former President Donald Trump, ignored basic social distancing and mask guidelines set by the Centers for Disease Control and Prevention, hosted large political rallies, and even encouraged people to protest against social distancing (Abutaleb et al. 2020). The Brazilian President Jair Bolsonaro systematically downplayed COVID-19 risks, blocked any centrally coordinated response (Ajzenman et al. 2021, Anderson 2021), and undermined local leaders who tried to implement lockdowns or mask mandates. The heterogenous political responses were at least partially responsible for the highly variable COVID-19 caseloads and fatalities across countries (Fitzpatrick et al. 2021).

Beyond the macro-level reactions of political leaders, there are many micro-level behavioral change strategies, information campaigns, and nudges that can promote adherence to COVID-19 safety protocols, and many economists have tested innovative interventions to provide relevant guidance to policy makers. For example, Banerjee et al. (2020a) (building on Alatas et al. 2019) show that light-touch messaging interventions involving celebrities can improve disease knowledge as well as some self-reported health behaviors (e.g., handwashing, adherence to social distancing) in the short run. Other researchers, including Fitzpatrick et al. (2021), Bahety et al. (2021), and Allen et al. (2021), have found more limited effects.

[24]There were also prominent examples of African leaders who were COVID-19 deniers and promoted destructive public health policies, most notoriously former Tanzanian President John Magufuli, who passed away in early 2021 reportedly of COVID-19-related causes (Dahir 2021).

6.3. Mask-Wearing

Much scientific evidence has accumulated during the pandemic that wearing face masks can slow the spread of COVID-19 and save lives. As LMICs wait for vaccinations, masks can act as an important and low-cost line of defense to control the pandemic. Laboratory studies show that masks block particles emitted by infected individuals, and randomized trials in hospitals indicate that surgical masks protect their wearers (Howard et al. 2021). Economists have contributed a number of observational studies to this evidence base, showing that countries with mask mandates or mask-wearing norms had lower infection rates (Abaluck et al. 2020, Leffler et al. 2020), that US states that mandated mask use subsequently experienced declines in case growth rates (Lyu & Wehby 2020), and that model simulations indicate that mask mandates can reduce the growth of cases (Chernozhukov et al. 2021).

Despite this growing evidence base on the benefits and cost effectiveness of masks, ensuring universal mask-wearing has met numerous practical, political, and even scientific challenges. Because a substantial share of coronavirus transmission stems from asymptomatic or presymptomatic individuals, the science would appear to support a policy of universal mask-wearing rather than mask-wearing only among those with symptoms. Yet mask-wearing has been politicized in some countries.[25] If the decision to wear a mask signals a political affiliation, then achieving universal mask-wearing becomes challenging in politically polarized societies. In January 2021, over 40% of the world's population lived in countries where mask-wearing was mandated in public areas, and another 40% in countries where universal mask norms prevailed (Abaluck et al. 2021). However, the actual empirical data suggest that it has been difficult to ensure persistent mask-wearing in LMICs. In Bangladesh, proper mask use remained very low, at around 10–20%, even after the government formally mandated mask use and threatened to fine those who did not comply (Abaluck & Mobarak 2020). An August 2020 phone survey in rural Kenya found that although 88% of respondents claimed to wear masks in public, direct observation in market centers revealed that only 10% actually did so (Jakubowski et al. 2021).

In LMICs with weak capacities to enforce mandates, a more proactive policy approach appears necessary to ensure consistent usage. Abaluck et al. (2021) show that a combination of mask promotion strategies involving free distribution, information dissemination, community leader engagement, and reinforcement via mild social shaming triples mask usage in rural Bangladesh; this effects persist for 10 weeks and it significantly reduces symptomatic COVID-19 transmission, especially among the elderly. This program was subsequently adopted by governments and other organizations in Bangladesh, Pakistan, India, Uruguay, and Nepal to reach over 100 million people, a notable example of how economics research can quickly translate into large-scale policy impact (Innov. Poverty Action 2021).

6.4. Social Benefit Transfers

Whereas policies regarding lockdowns and mask mandates have been controversial, there was broader consensus in many countries on the need to ensure a social safety net for those suffering from the pandemic-related economic shock, and as a result, many governments implemented new cash assistance programs or scaled up existing ones. Between March 20, 2020 and May 14, 2021, a total of 3,333 social protection measures—including social assistance, social insurance, and labor market protection programs—were planned or implemented in 222 countries or territories, and

[25] In the case of the United States, Bazzi et al. (2021) attribute some of this resistance to historical factors, such as a culture of rugged individualism in some regions.

cash transfers were the primary instrument (Gentilini et al. 2020). There is evidence that cash transfers can mitigate the adverse economic as well as mental and physical health consequences of COVID-19 (Banerjee et al. 2020b, Brooks et al. 2020). Effectively implementing cash transfer programs requires policy makers to overcome at least two key challenges: (*a*) identifying the households or individuals who most urgently require assistance, while minimizing inclusion and exclusion errors in targeting; and (*b*) transferring funds to the targeted beneficiaries safely and efficiently.

Variation in financial infrastructure across countries has shown to be important in the effectiveness of the targeting and delivery of such payments (Berkouwer et al. 2021). Countries with more advanced financial services that allow governments to send payments directly into digital or bank accounts can scale up transfers faster (Rutkowski et al. 2020). However, even Kenya, a mobile money leader in Africa, faced challenges in implementing a pandemic relief program: Human Rights Watch (2021) "found that only a small fraction of vulnerable families in Nairobi benefited from the [COVID-19 cash transfer] program, given cronyism, nepotism and outright favoritism." The urgency of the pandemic has created unprecedented opportunities for innovations in this area. For example, Blumenstock (2020) and Aiken et al. (2021) report on big data and machine learning techniques that helped the Togolese government target the most vulnerable households for direct cash payments. The systems developed through these partnerships could be useful for future assistance programs beyond the pandemic.

Other such COVID-19 innovations include the high-frequency phone surveys of statistically representative samples that have been spearheaded by the World Bank to improve data collection efficiency during the crisis. Such data could also be useful for building more robust social protection systems going forward. Innovations like Kenya's COVID-19 tracker, Sierra Leone's COVID-19 dashboard, and the data dashboards set up in Bangladesh[26] (in a partnership between the government innovation agency and researchers) ensure that new data and insights generated in response to the COVID-19 crisis quickly reach the desks of policy makers.

7. LOOKING FORWARD

We do not see this section as a conclusion in the traditional sense: We write while the COVID-19 pandemic continues to rage around the world, spreading and changing by the day and with no clear endpoint in sight. Rather, we hope to highlight some remaining issues and opportunities and to speculate about how the pandemic's impacts will radiate through LMICs in the coming years.

A main empirical finding of this article is that LMICs have been hit very hard health-wise, economically, and socially by the COVID-19 pandemic. The world has experienced the largest global recession in living memory, and the consequences in low-resource environments with limited government capacity have been particularly dire. Early hopes that the pandemic would simply pass poor countries by—due to their younger age profile or other factors—have unfortunately proven premature. A second focal fact in the literature is that in both richer and poorer countries, socially disadvantaged groups, including women and those who work in person with their hands (rather than behind a desk or at a computer), have experienced some of the pandemic's worst effects.

There are several lessons from the COVID-19 pandemic that are worth keeping in mind, although it is an open question how well they will apply to the next global crisis. Other global pandemics may occur in the coming decades, and increasingly frequent climate-related shocks

[26]Readers are referred to the Kenya COVID-19 Tracker (at **https://www.kenyacovidtracker.org/**), the Sierra Leone COVID-19 Dashboard (at **https://sl-dashboard.github.io/corona/**), and the Bangladesh Dashboard (at **https://dghs-dashboard.com/pages/covid19.php**).

are also likely. The COVID-19 pandemic experience indicates that building a more robust social safety net, including improving the ability of governments to quickly mobilize public assistance to vulnerable households, will be essential for an appropriately rapid and scaled-up response next time. One small silver lining of the pandemic is that large-scale social safety net programming has increased dramatically since early 2020 (Gentilini et al. 2020), and innovative delivery approaches have been developed and deployed at scale, including sophisticated targeting methods and low-cost mobile money transfers (Aiken et al. 2021).

At the same time, future crises may be different, and this might require learning a whole new set of lessons or pulling distinct policy levers. For instance, in contrast to COVID-19, the next virus that leads to a pandemic (should one occur) might be deadlier for children than for adults or the elderly. This would change the public health calculations and the appropriate policy response concerning which types of institutions should be shut, the optimal extent of social distancing, and the like. These caveats and uncertainties apply not only to future pandemics but also to the likely evolution of this pandemic in the near future. It is obvious that a major global public policy goal in the coming decades must be to avoid the next pandemic—for instance, by investing more to protect animal habitats and limit human interactions with wild animals.

The pandemic has also shone a negative light on the current ability of global institutions to address humanity's most important challenges. The coming year will be one in which the bonds of international solidarity will continue to be tested. The epidemiological consensus is that the only way out of the health crisis is to achieve high levels of vaccination globally (*Lancet Infect. Dis.* 2021), and there have been some moves in this direction, including the COVAX program and vaccine assistance from China, Russia, and other countries (Gavi 2020, Westcott 2021). Yet, as we showed above, these efforts have not been up to the challenge, and vaccination in the world's poor countries lags far behind.

As in the classic economic theory of externalities (Samuelson 1954), everyone remains vulnerable as long as large shares of the world's population remain unvaccinated. The pandemic will not be over for anybody until it is over for everybody. The next variant that emerges in a largely unvaccinated society could be more infectious or deadlier than the last. There is thus a very strong economic case for large-scale transfers—far beyond what we have seen so far—from the world's rich to poor countries to provide vaccination and other forms of assistance needed in this critical moment (Sandefur 2021). These are important not only for today but also for the future, given the potentially massive adverse long-run consequences of the COVID-19 pandemic for the next generation in LMICs—for instance, through lost educational opportunities, early and unintended pregnancy, and exposure to domestic violence.

Yet leaders in the world's rich countries have for the most part opted to direct assistance to poor countries that falls short of the level needed to contain the pandemic. The obvious explanation is a short-run political calculus: It is politically challenging for leaders to direct resources abroad when there is a public health crisis at home. Few leaders in wealthy countries have articulated the reality of the global situation to their citizens and explained the importance of giving all people access to the new life-saving vaccine technology.

Thus, we draw twin lessons from the COVID-19 pandemic. One is that scientific evidence and rational policy making, combined with genuine international solidarity and compassion, are critical ingredients to any successful response. The second is that the political reality of most rich countries does not allow them to be sufficiently generous to LMICs, even if this inadequate response ends up hurting the rich countries themselves by prolonging the crisis, as appears to be currently the case with COVID-19.

What is, then, a potential solution to this failure? One obvious way forward would be to establish a more robust system of international taxation, redistribution, and policy making—perhaps

through a strengthened United Nations system, which includes the World Health Organization—to overcome collective action problems and achieve an adequate degree of funding for global public goods like pandemic response (as well as for responding to global warming) (Nordhaus 2006). In the absence of a fairer system of global redistribution, the residents of LMICs, the vast majority of the world's population, remain at the mercy of the rich, hoping that vaccine charity will reach them before it is too late.

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LITERATURE CITED

Abaluck J, Chevalier JA, Christakis NA, Forman HP, Kaplan EH, et al. 2020. *The case for universal cloth mask adoption and policies to increase supply of medical masks for health workers*. Work. Pap., Yale Sch. Manag., Yale Univ., New Haven, CT

Abaluck J, Kwong L, Styczynski A, Haque A, Alamgir Kabir MD, et al. 2021. *Normalizing community mask-wearing: a cluster randomized trial in Bangladesh*. NBER Work. Pap. 28734

Abaluck J, Mobarak AM. 2020. Getting all Bangladeshis to wear masks. *WhiteBoard*, Dec. 1. **https://whiteboardmagazine.com/1958/getting-all-bangladeshis-to-wear-masks/**

Abi-Habib M, Yasir S. 2020. India's Coronavirus lockdown leaves vast numbers stranded and hungry. *New York Times*, March 29. **https://www.nytimes.com/2020/03/29/world/asia/coronavirus-india-migrants.html**

Abutaleb Y, Parker A, Dawsey J, Rucker P. 2020. The inside story of how Trump's denial, mismanagement and magical thinking led to the pandemic's dark winter. *Washington Post*, Dec. 19. **https://www.washingtonpost.com/graphics/2020/politics/trump-covid-pandemic-dark-winter/**

Abuya T, Austrian K, Isaac A, Kangwana B, Mbushi F, et al. 2020. *Experiences among adults and adolescents during the COVID-19 pandemic from four locations across Kenya: study brief round 3*. Res. Brief, Popul. Counc., Nairobi, Kenya

Acemoglu D, Chernozhukov V, Werning I, Whinston MD. 2021. Optimal targeted lockdowns in a multi-group SIR model. *Am. Econ. Rev. Insights* 3(4):487–502

Africa Cent. Dis. Control. 2021. *COVID-19 19 Vaccine Perceptions: A 15 Country Study*. Addis Ababa, Ethiop.: Africa Cent. Dis. Control

Agüero JM. 2021. COVID-19 and the rise of intimate partner violence. *World Dev.* 137:105217

Ahsan R, Iqbal K, Khan M, Mobarak AM, Shonchoy A. 2020. *Using migration patterns to predict COVID-19 risk exposure in developing countries*. Work. Pap., Yale Sch. Manag., Yale Univ., New Haven, CT

Ahuja A, Athey S, Baker A, Budish E, Castillo JC, et al. 2021. Preparing for a pandemic: accelerating vaccine availability. *AEA Pap. Proc.* 111:331–35

Ahuja A, Devolla M. 2021. It's time to reopen primary schools. *IDR*, July 20. **https://idronline.org/article/education/its-time-to-reopen-primary-schools/**

Aiken E, Bellue S, Karlan D, Udry CR, Blumenstock J. 2021. *Machine learning and mobile phone data can improve the targeting of humanitarian assistance*. NBER Work. Pap. 29070

Ajzenman N, Cavalcanti T, Da Mata D. 2021. *More than words: leaders' speech and risky behavior during a pandemic*. IZA Discuss. Pap. 14229, Inst. Labor Econ., Bonn, Ger.

Akmal M, Crawfurd L, Hares S, Minardi AL. 2020. *COVID-19 in Pakistan: a phone survey to assess education, economic, and health-related outcomes*. Policy Pap., Cent. Global Dev., Washington, DC

Alatas V, Chandrasekhar AG, Mobius M, Olken BA, Paladines C. 2019. *When celebrities speak: a nationwide Twitter experiment promoting vaccination in Indonesia*. NBER Work. Pap. 25589

Alfaro L, Becerra O, Eslava M. 2020. *EMEs and COVID-19: shutting down in a world of informal and tiny firms*. NBER Work. Pap. 27360

Allen J IV, Mahumane A, Riddell IVJ, Rosenblat T, Yang D, Yu H. 2021. *Correcting perceived social distancing norms to combat COVID-19*. NBER Work. Pap. 28651

Alon T, Kim M, Lagakos D, VanVuren M. 2020. *How should policy responses to the COVID-19 pandemic differ in the developing world?* NBER Work. Pap. 27273

Amin S, Rob U, Billah M, Ainul S, Irfan Hossain MD, et al. 2020. *COVID-19-related knowledge, attitudes, and practices among adolescent girls in Bangladesh*. Data Set, Popul. Counc., Nairobi, Kenya

Anand A, Sandefur J, Subramanian A. 2021. *Three new estimates of India's all-cause excess mortality during the COVID-19 pandemic*. CDG Work. Pap. 589, Cent. Global Dev., Washington, DC

Anderson JL. 2021. Brazil's COVID-19 crisis and Jair Bolsonaro's presidential chaos. *New Yorker*, April 13. **https://www.newyorker.com/news/daily-comment/brazils-covid-19-crisis-and-jair-bolsonaros-presidential-chaos**

Archibong B, Annan F. 2019. *"An ill wind that blows no girl any good": the impacts of climate-induced disease on gender inequality*. Work. Pap., Barnard Coll., Columbia Univ., New York

Azevedo JP, Hasan A, Goldemberg D, Iqbal SA, Geven K. 2021. Simulating the potential impacts of COVID-19 school closures on schooling and learning outcomes: a set of global estimates. *World Bank Res. Obs.* 36(1):1–40

Bahety G, Bauhoff S, Patel D, Potter J. 2021. *Texts don't nudge: an adaptive trial to prevent the spread of COVID-19 in India*. Work. Pap., Cent. Global Dev., Washington, DC

Baird S, Hicks JH, Kremer M, Miguel E. 2016. Worms at work: long-run impacts of a child health investment. *Q. J. Econ.* 131(4):1637–80

Baird S, Jones N, Goel N, Dutton R, Oakley E, et al. 2021. *Adolescent well-being in the time of COVID-19*. Tech. Doc., Partnersh. Matern. Newborn Child Health, World Health Organ., Geneva, Switz.

Banati P, Jones N, Youssef S. 2020. Intersecting vulnerabilities: the impacts of COVID-19 on the psycho-emotional lives of young people in low- and middle-income countries. *Eur. J. Dev. Res.* 32:1613–38

Bandyopadhyay S, Baticulon RE, Kadhum M, Alser M, Ojuka DK, et al. 2020. Infection and mortality of healthcare workers worldwide from COVID-19: a systematic review. *BMJ Global Health* 5(12):e003097

Banerjee A, Alsan M, Breza E, Chandrasekhar AG, Chowdhury A, et al. 2020a. *Messages on COVID-19 prevention in India increased symptoms reporting and adherence to preventive behaviors among 25 million recipients with similar effects on non-recipient members of their communities*. NBER Work. Pap. 27496

Banerjee A, Chandrasekhar AG, Dalpath S, Duflo E, Floretta J, et al. 2021. *Selecting the most effective nudge: evidence from a large-scale experiment on immunization*. NBER Work. Pap. 28726

Banerjee A, Faye M, Krueger A, Niehaus P, Suri T. 2020b. *Effects of a universal basic income during the pandemic*. Work. Pap., Mass. Inst. Technol., Cambridge

Barker N, Davis CA, López-Peña P, Mitchell H, Mobarak AM, et al. 2020. *Migration and the labour market impacts of COVID-19*. UNU-WIDER Work. Pap. 138, United Nations Univ. World Inst. Dev. Econ. Res., Helsinki, Finl.

Barnett-Howell Z, Watson OJ, Mobarak AM. 2021. The benefits and costs of social distancing in high- and low-income countries. *Trans. R. Soc. Trop. Med. Hyg.* 115(7):807–19

Barrett P, Chen S, Li N. 2021. COVID-19's long shadow: social repercussions of pandemics. *IMFBlog*, Febr. 3. **https://blogs.imf.org/2021/02/03/covids-long-shadow-social-repercussions-of-pandemics/**

Barro RJ. 2013. Education and economic growth. *Ann. Econ. Finance* 14(2):301–28

Bau N, Khanna G, Low C, Shah M, Sharmin S, Voena A. 2022. Women's well-being during a pandemic and its containment. *J. Dev. Econ.* 156:10289

Bazzi S, Fiszbein M, Gebresilasse M. 2021. "Rugged individualism" and collective (in)action during the COVID-19 pandemic. *J. Public Econ.* 195:104357

BBC. 2021. Coronavirus: Kenya reopens schools after nine months. *BBC News*, Jan. 4. **https://www.bbc.com/news/world-africa-55532789**

Berkouwer SB, Biscaye PE, Hsu E, Kim OW, Lee K, et al. 2021. *Money or power? Financial infrastructure and optimal policy*. NBER Work. Pap. 29086

Beschel RP Jr., Yousef TM. 2020. The Middle East and North Africa and COVID-19: gearing up for the long haul. *Brookings*, Dec. 13. **https://www.brookings.edu/opinions/the-middle-east-and-north-africa-and-COVID-19-gearing-up-for-the-long-haul/**

Beyer RCM, Jain T, Sinha S. 2020. *Lights out? COVID-19 containment policies and economic activity*. Policy Res. Work. Pap. 9485, World Bank, Washington, DC

Bishi H, Grossman S, Startz M. 2020. *How COVID-19 has affected Lagos traders: findings from high-frequency phone surveys*. C-19 Note, Cent. Econ. Policy Res., London

Blanc J, Brown FZ. 2020. Conflict zones in the time of coronavirus: war and war by other means. *Carnegie Endowment for International Peace*, Dec. 17. **https://carnegieendowment.org/2020/12/17/conflict-zones-in-time-of-coronavirus-war-and-war-by-other-means-pub-83462**

Blumenstock J. 2020. Machine learning can help get COVID-19 aid to those who need it most. *Nature*, May 14. **https://www.nature.com/articles/d41586-020-01393-7**

Boateng GO, Doku DT, Ebu Enyan NI, Owusu SA, Aboh IK, et al. 2021. Prevalence and changes in boredom, anxiety and well-being among Ghanaians during the COVID-19 pandemic: a population-based study. *BMC Public Health* 21(1):985

Borkowski A, Correa JSO, Bundy D, Burbano C, Hayashi C, et al. 2021. *COVID-19: missing more than a classroom. The impact of school closures on children's nutrition*. Innocenti Work. Pap., UNICEF Off. Res. Innocenti, Florence, Italy

Boseley S. 2020. New data, new policy: why UK's coronavirus strategy changed. *The Guardian*, March 16. **http://www.theguardian.com/world/2020/mar/16/new-data-new-policy-why-uks-coronavirus-strategy-has-changed**

Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, et al. 2020. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* 395(10227):912–20

Buckee CO, Balsari S, Chan J, Crosas M, Dominici F, et al. 2020. Aggregated mobility data could help fight COVID-19. *Science* 368(6487):145–46

Bundervoet T, Dávalos ME, Garcia N. 2022. The short-term impacts of COVID-19 on households in developing countries: an overview based on a harmonized dataset of high-frequency surveys. *World Dev.* 153:105844

Burlig F, Sudarshan A, Schlauch G. 2021. *The impact of domestic travel bans on COVID-19 is nonlinear in their duration*. NBER Work. Pap. 28699

Causey K, Fullman N, Sorensen RJD, Galles NC, Zheng P, et al. 2021. Estimating global and regional disruptions to routine childhood vaccine coverage during the COVID-19 pandemic in 2020: a modelling study. *Lancet* 398(10299):522–34

Ceballos F, Kannan S, Kramer B. 2020. Impacts of a national lockdown on smallholder farmers' income and food security: empirical evidence from two states in India. *World Dev.* 136:105069

Ceballos F, Kannan S, Kramer B. 2021. Crop prices, farm incomes, and food security during the COVID-19 pandemic in India: phone-based producer survey evidence from Haryana State. *Agric. Econ.* 52(3):525–42

Cefalà L, Gechter M, Tsivanidis N, Young N. 2020. *Economic impacts of COVID-19 lockdowns: an examination of recoveries in Jordan*. Policy Brief JOR-20081, Int. Growth Cent., Lond. Sch. Econ. Political Sci., London

Cent. Gend. Equity Health. 2021. *COVID-19 and gender research in LMICs: October–December 2020 quarterly review report*. Rep., Cent. Gend. Equity Health, Univ. Calif., San Diego

Cheeseman N, Smith J. 2020. The pandemic is being used to erode democratic freedoms. Civil society must fight back. *Mail & Guardian*, Apr. 17. **https://mg.co.za/article/2020-04-17-the-pandemic-is-being-used-to-erode-democratic-freedoms-civil-society-must-fight-back/**

Chernow R. 2004. *Alexander Hamilton*. New York: Penguin

Chernozhukov V, Kasahara H, Schrimpf P. 2021. Causal impact of masks policies, behavior on early COVID-19 pandemic in the U.S. *J. Econom.* 220(1):23–62

Chetty R, Friedman J, Hendren N, Stepner M, Oppor. Insights Team. 2020. *The economic impacts of COVID-19: evidence from a new public database built using private sector data*. NBER Work. Pap. 27431

Chmielewska B, Barratt I, Townsend R, Kalafat E, van der Meulen J, et al. 2021. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. *Lancet Global Health* 9(6):e759–72

Corno L, Hildebrandt N, Voena A. 2020. Age of marriage, weather shocks, and the direction of marriage payments. *Econometrica* 88(3):879–915

Corno L, Voena A. 2016. *Selling daughters: age of marriage, income shocks and the bride price tradition*. IFS Work. Pap. W16/08, Inst. Fiscal Stud., London

Crawfurd L, Hares S, Minardi AL. 2021. New data on learning loss in Pakistan. *Cent. Global Dev.*, May 11. **https://www.cgdev.org/blog/new-data-learning-loss-pakistan**

Cucagna E, Romero J. 2021. *The gendered impacts of COVID-19 on labor markets in Latin America and the Caribbean*. Policy Brief, World Bank, Washington, DC

Dahir AL. 2020a. Coronavirus is battering Africa's growing middle class. *New York Times*, June 29. **https://www.nytimes.com/2020/06/29/world/africa/Africa-middle-class-coronavirus.html**

Dahir AL. 2020b. Kenya's unusual solution to the school problem: cancel the year and start over. *New York Times*, Aug. 5. **https://www.nytimes.com/2020/08/05/world/africa/Kenya-cancels-school-year-coronavirus.html**

Dahir AL. 2021. John Magufuli, Tanzania leader who played down COVID-19, dies at 61. *New York Times*, March 17. **https://www.nytimes.com/2021/03/17/world/africa/tanzania-president-magufuli-dead.html**

Deaton A. 2003a. How to monitor poverty for the millennium development goals. *J. Hum. Dev.* 4(3):353–78

Deaton A. 2003b. *Measuring poverty in a growing world (or measuring growth in a poor world)*. NBER Work. Pap. 9822

Deshpande A. 2020. *The COVID-19 pandemic and gendered division of paid and unpaid work: evidence from India*. IZA Discuss. Pap. 13815, Inst. Labor Econ., Bonn, Ger.

Dessy S, Gninafon H, Tiberti L, Tiberti M. 2021. *COVID-19 and children's school resilience: evidence from Nigeria*. Policy Res. Work. Pap. 9736, World Bank, Washington, DC

Dong E, Du H, Gardner L. 2020. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect. Dis.* 20(5):533–34

Economist. 2020. COVID-19 is now in 50 countries, and things will get worse. *Economist*, Febr. 29. **https://www.economist.com/briefing/2020/02/29/covid-19-is-now-in-50-countries-and-things-will-get-worse**

Egger D, Miguel E, Warren SS, Shenoy A, Collins E, et al. 2021. Falling living standards during the COVID-19 crisis: quantitative evidence from nine developing countries. *Sci. Adv.* 7(6):eabe0997

Evans D, Hares S, Acosta AM, Saintis C. 2021. It's been a year since schools started to close due to COVID-19. *Center for Global Development*, Febr. 10. **https://www.cgdev.org/blog/its-been-year-schools-started-close-due-COVID-19**

Fang H, Wang L, Yang Y. 2020. Human mobility restrictions and the spread of the Novel Coronavirus (2019-NCoV) in China. *J. Public Econ.* 191:104272

Favara M, Freund R, Porter C, Sanchez A, Scott D. 2021. Young lives, interrupted: short-term effects of the COVID-19 pandemic on adolescents in low- and middle-income countries. *COVID-19 Econ.* 67:172–98

Ferguson N, Laydon D, Gilani GN, Imai N, Ainslie K, et al. 2020. *Report 9: impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand*. Rep., Imp. Coll. COVID-19 Response Team, Imp. Coll. Lond., London

Fink S. 2020. White House takes new line after dire report on death toll. *New York Times*, March 16. **https://www.nytimes.com/2020/03/16/us/coronavirus-fatality-rate-white-house.html**

Fisher M, Sang-Hun C. 2020. How South Korea flattened the curve. *New York Times*, March 23. **https://www.nytimes.com/2020/03/23/world/asia/coronavirus-south-korea-flatten-curve.html**

Fitzpatrick A, Beg S, Derksen L, Karing A, Kerwin J, et al. 2021. Health knowledge and non-pharmaceutical interventions during the Covid-19 pandemic in Africa. *J. Econ. Behav. Organ.* 190:33–53

Furbush A, Josephson A, Kilic T, Michler JD. 2021. *The evolving socioeconomic impacts of COVID-19 in four African countries*. Policy Res. Work. Pap. 9556, World Bank, Washington, DC

Gavi. 2020. *The Gavi Covax AMC: an investment opportunity*. Rep., Gavi Vaccine Alliance, Geneva, Switz. **https://www.gavi.org/sites/default/files/2020-06/Gavi-COVAX-AMC-IO.pdf**

Gentilini U, Almenfi M, Orton I, Dale P. 2020. *Social protection and jobs responses to COVID-19: a real-time review of country measures*. Brief, World Bank, Washington, DC

Gholami M, Fawad I, Shadan S, Rowaiee R, Ghanem HA, et al. 2021. COVID-19 and healthcare workers: a systematic review and meta-analysis. *Int. J. Infect. Dis.* 104:335–46

Greenstone M, Nigam V. 2020. *Does social distancing matter?* Work. Pap. 2020–26, Becker Friedman Inst. Econ., Univ. Chicago, Chicago

Guerrieri V, Lorenzoni G, Straub L, Werning I. 2020. *Macroeconomic implications of COVID-19: Can negative supply shocks cause demand shortages?* NBER Work. Pap. 26918

Hagemann J. 2021. Bringing back school-based deworming to Kenya during COVID-19. *Evidence Action*, April 7. **https://www.evidenceaction.org/bringing-back-school-based-deworming-to-kenya-during-COVID-19/**

Hale T, Angrist N, Goldszmidt R, Kira B, Petherick A, et al. 2021. A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). *Nat. Hum. Behav.* 5(4):529–38

Hamadani JD, Hasan MI, Baldi AJ, Hossain SJ, Shiraji S, et al. 2020. Immediate impact of stay-at-home orders to control COVID-19 transmission on socioeconomic conditions, food insecurity, mental health, and intimate partner violence in Bangladeshi women and their families: an interrupted time series. *Lancet Global Health* 8(11):e1380–89

Hassan F, Yamey G, Abbasi K. 2021. Profiteering from vaccine inequity: a crime against humanity? *BMJ* 374:n2027

Hoehn-Velasco L, Silverio-Murillo A, de la Miyar JRB. 2021. The great crime recovery: crimes against women during, and after, the COVID-19 lockdown in Mexico. *Econ. Hum. Biol.* 41:100991

Howard J, Huang A, Li Z, Tufekci Z, Zdimal V, et al. 2021. An evidence review of face masks against COVID-19. *PNAS* 118(4):e2014564118

Hsiang S, Allen D, Annan-Phan S, Bell K, Bolliger I, et al. 2020. The effect of large-scale anti-contagion policies on the COVID-19 pandemic. *Nature* 584(7820):262–67

Hum. Rights Watch. 2021. "We are all vulnerable here": Kenya's pandemic cash transfer program riddled with irregularities. *Human Rights Watch*, July 20. **https://www.hrw.org/report/2021/07/20/we-are-all-vulnerable-here/kenyas-pandemic-cash-transfer-program-riddled**

Ilin C, Annan-Phan S, Tai XH, Mehra S, Hsiang S, Blumenstock JE. 2021. Public mobility data enables COVID-19 forecasting and management at local and global scales. *Sci. Rep.* 11(1):13531

Innov. Poverty Action. 2021. *NORMalize mask-wearing scale-up*. Work. Pap., Innov. Poverty Action, New York. **https://www.poverty-action.org/masks**

Int. Labour Organ. 2018. *Women and Men in the Informal Economy: A Statistical Picture*. Geneva, Switz.: Int. Labour Organ. 3rd ed.

Int. Labour Organ. 2020. ILO warns of COVID-19 migrant "crisis within a crisis." *International Labour Organization*, June 24. **https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_748992/lang–en/index.htm**

Int. Monet. Fund. 2020a. *A crisis like no other, an uncertain recovery*. Rep., Int. Monet. Fund, Washington, DC

Int. Monet. Fund. 2020b. *World economic outlook, April 2020: the Great Lockdown*. Rep., Int. Monet. Fund, Washington, DC

Jain R, Dupas P. 2021. *The effects of India's COVID-19 lockdown on critical non-COVID-19 health care and outcomes: evidence from a retrospective cohort analysis of dialysis patients*. Work. Pap., Stanford Univ., Stanford, CA

Jakubowski A, Egger D, Nekesa C, Lowe L, Walker M, Miguel E. 2021. Self-reported versus directly observed face mask use in Kenya. *JAMA Netw. Open* 4(7):e2118830

Jamison JC. 2020. Lockdowns will starve people in low-income countries. *Washington Post*, April 20. **https://www.washingtonpost.com/outlook/2020/04/20/lockdown-developing-world-coronavirus-poverty/**

Jamison JC, Bundy D, Jamison DT, Spitz J, Verguet S. 2021. Comparing the impact on COVID-19 mortality of self-imposed behavior change and of government regulations: an observational analysis of 13 countries. *Health Serv. Res.* 56(5):874–84

Jones K, Gong E. 2021. Precautionary savings and shock-coping behaviors: effects of promoting mobile bank savings on transactional sex in Kenya. *J. Health Econ.* 78:102460

Karlinsky A, Kobak D. 2021. Tracking excess mortality across countries during the COVID-19 pandemic with the world mortality dataset. *ELife*, June 30. **https://elifesciences.org/articles/69336**

Khamis M, Prinz D, Newhouse D, Palacios-Lopez A, Pape UJ, Weber M. 2021. *Jobs Watch COVID-19: the evolving labor market impacts of COVID-19 in developing countries*. Brief, World Bank, Washington, DC. **https://documents.worldbank.org/en/publication/documents-reports/documentdetail/736581626933374446/jobs-watch-COVID-19-the-evolving-labor-market-impacts-of-COVID-19-in-developing-countries**

Kim J, Rose P, Tiruneh DT, Sabates R, Woldehanna T. 2021. Learning inequalities widen following COVID-19 school closures in Ethiopia. *RISE Programme*, May 4. **https://riseprogramme.org/blog/learning-inequalities-widen-COVID-19-Ethiopia**

Kim YE, Loayza NV. 2021. Economic loss from COVID-19 fatalities across countries: a VSL approach. *Appl. Econ. Lett.* **https://doi.org/10.1080/13504851.2021.1883521**

Kishi Dr R. 2021. *A year of COVID-19: the pandemic's impact on global conflict and demonstration trends*. Anal., Armed Confl. Locat. Event Data, Washington, DC

Kola L. 2020. Global mental health and COVID-19. *Lancet Psychiatry* 7(8):655–57

Kraemer MUG, Yang C-H, Gutierrez B, Wu C-H, Klein B, et al. 2020. The effect of human mobility and control measures on the COVID-19 epidemic in China. *Science* 368(6490):493–97

Krubiner C, Keller JM, Kaufman J. 2020. Balancing the COVID-19 response with wider health needs: key decision-making considerations for low- and middle-income countries. *Center for Global Development*, May 8. **https://www.cgdev.org/publication/balancing-COVID-19-response-wider-health-needs-key-decision-making-considerations-low**

Kumar M, Kumar P. 2020. Impact of pandemic on mental health in lower- and middle-income countries (LMICs). *Global Mental Health* 7:e35

Lancet Infect. Dis. 2021. COVID-19 vaccine equity and booster doses. *Lancet Infect. Dis.* 21(9):P1193

Le Nestour A, Moscovitz L. 2020. Five findings from a new phone survey in Senegal. *Center for Global Development*, April 24. **https://www.cgdev.org/blog/five-findings-new-phone-survey-senegal**

Lee JN, Mahmud M, Morduch J, Ravindran S, Shonchoy AS. 2021. Migration externalities, and the diffusion of COVID-19 in South Asia. *J. Public Econ.* 193:104312

Leffler CT, Ing E, Lykins JD, Hogan MC, McKeown CA, Grzybowski A. 2020. Association of country-wide coronavirus mortality with demographics, testing, lockdowns, and public wearing of masks. *Am. J. Trop. Med. Hyg.* 103(6):2400–11

Levine M, Meriggi N, Mobarak AM, Ramakrishna V, Voors M. 2021. How is COVID-19 affecting gender inequality in low-income countries? Insights from Sierra Leone. *IGC*, March 8. **https://www.theigc.org/blog/how-is-COVID-19-affecting-gender-inequality-in-low-income-countries-insights-from-sierra-leone/**

Lopez BF, Behrman JR, Vazquez C. 2020. *Economic costs of preprimary program reductions due to COVID-19 pandemic*. Tech. Note IDB-TN-2000, Inter-Am. Dev. Bank, Washington, DC

Lubell M. 2020. Israel to use anti-terror tech to counter coronavirus "invisible enemy." *Reuters*, March 14. **https://www.reuters.com/article/us-health-coronavirus-israel-idUSKBN21113V**

Lyu W, Wehby GL. 2020. Community use of face masks and COVID-19: evidence from a natural experiment of state mandates in the US. *Health Aff.* 39(8):1419–25

Ma L, Shapira G, De Walque D, Do Q-T, Friedman J, Levchenko AA. 2021. *The intergenerational mortality tradeoff of COVID-19 lockdown policies*. NBER Work. Pap. 28925

Mahler DG, Yonzan N, Lakner C, Aguilar RAC, Wu H. 2021. Updated estimates of the impact of COVID-19 on global poverty: turning the corner on the pandemic in 2021? *World Bank Blogs*, June 24. **https://blogs.worldbank.org/opendata/updated-estimates-impact-COVID-19-global-poverty-turning-corner-pandemic-2021**

Mahmud M, Riley E. 2021. Household response to an extreme shock: evidence on the immediate impact of the COVID-19 lockdown on economic outcomes and well-being in rural Uganda. *World Dev.* 140:105318

Malik K, Meki M, Morduch J, Ogden T, Quinn S, Said F. 2020. COVID-19 and the future of microfinance: evidence and insights from Pakistan. *Oxf. Rev. Econ. Policy* 36(Suppl. 1):S138–68

McQuaid CF, McCreesh N, Read JM, Sumner T, Houben RMGJ, et al. 2020. The potential impact of COVID-19-related disruption on tuberculosis burden. *Eur. Respir. J.* 56(2):2001718

McSweeney E, Chingono N. 2021. Western countries have "hoarded" COVID-19 vaccines. Africa is being left behind as cases surge. *CNN*, Febr. 5. **https://www.cnn.com/2021/02/05/africa/vaccine-race-africa-intl/index.html**

Medina L, Schneider F. 2020. Shedding light on the shadow economy. *World Econ.* 21(2):25–82

Meriggi N, Mobarak AM. 2020. This country fought Ebola. It may beat another disease. *New York Times*, June 16. **https://www.nytimes.com/2020/06/16/opinion/poor-countries-coronavirus.html**

Meyer CJ, Hardy M, Witte M, Kagy G, Demeke E. 2021. The market-reach of pandemics: evidence from female workers in Ethiopia's ready-made garment industry. *World Dev.* 137:105179

Mobarak AM. 2021. Saving lives saves livelihoods. *Foreign Policy*, March 9. **https://foreignpolicy.com/2021/03/09/coronavirus-pandemic-lockdown-regulations-caribbean/**

Mobarak AM, Mahbub R. 2020. Opinion: what the US can learn from how African countries handled COVID-19. *CNN*, Nov. 3. **https://www.cnn.com/2020/11/03/africa/africa-coronavirus-lessons-opinion-intl/index.html**

Moon S, Ruiz AA, Vieira M. 2021. Averting future vaccine injustice. *N. Engl. J. Med.* 385(3):193–96

Mueller B, Robbins R. 2021. Where a vast global vaccination program went wrong. *New York Times*, Aug. 2. **https://www.nytimes.com/2021/08/02/world/europe/covax-covid-vaccine-problems-africa.html**

Mueller B, Taj M. 2020. In New Jersey, Tanzania, Peru, TV lessons replace online learning. *New York Times*, Aug. 17. **https://www.nytimes.com/2020/08/17/world/coronavirus-television-schools.html**

Mukherjee S. 2021. Why does the pandemic seem to be hitting some countries harder than others? *New Yorker*, Febr. 22. **https://www.newyorker.com/magazine/2021/03/01/why-does-the-pandemic-seem-to-be-hitting-some-countries-harder-than-others**

Nachega JB, Sam-Agudu NA, Mellors JW, Zumla A, Mofenson LM. 2021. Scaling up COVID-19 vaccination in Africa—lessons from the HIV pandemic. *N. Engl. J. Med.* 385(3):196–98

Nature. 2020. How to stop COVID-19 fuelling a resurgence of AIDS, malaria and tuberculosis. *Nature* 584(7820):169

Nkengasong J. 2020. Let Africa into the market for COVID-19 diagnostics. *Nature* 580(7805):565

Nordhaus WD. 2006. Paul Samuelson and global public goods. In *Samuelsonian Economics and the Twenty-First Century*, ed. M Szenberg, L Ramrattan, AA Gottesman, pp. 88–98. Oxford, UK: Oxford Univ. Press

Oqubay A. 2020. Ethiopia's unconventional COVID-19 response. *Project Syndicate*, May 29. **https://www.project-syndicate.org/commentary/ethiopia-successful-unconventional-covid19-response-by-arkebe-oqubay-2020-05**

Osendarp S, Akuoku JK, Black RE, Headey D, Ruel M, et al. 2021. The COVID-19 crisis will exacerbate maternal and child undernutrition and child mortality in low- and middle-income countries. *Nat. Food* 2(7):476–84

Pandey G. 2020. Coronavirus in India: desperate migrant workers trapped in lockdown. *BBC News*, April 22. **https://www.bbc.com/news/world-asia-india-52360757**

Parodi E, Jewkes S, Cha S, Park J-M. 2020. Special report: Italy and South Korea virus outbreaks reveal disparity in deaths and tactics. *Reuters*, March 12. **https://www.reuters.com/article/us-health-coronavirus-response-specialre-idUSKBN20Z27P**

Perrigo B. 2020. White supremacist groups are recruiting with help from coronavirus—and a popular messaging app. *Time*, April 8. **https://time.com/5817665/coronavirus-conspiracy-theories-white-supremacist-groups/**

Peterman A, O'Donnell M. 2020. *COVID-19 and violence against women and children*. CGD Note, Cent. Global Dev., Washington, DC

Porter C, Favara M, Hittmeyer A, Scott D, Jiménez AS, et al. 2021. Impact of the COVID-19 pandemic on anxiety and depression symptoms of young people in the Global South: evidence from a four-country cohort study. *BMJ Open* 11(4):e049653

Rahman HZ, Matin I. 2020. *Livelihoods, coping, and support during COVID-19 crisis*. Rep., Brac Inst. Gov. Dev., Dhaka, Bangladesh

Rajkumar RP. 2020. COVID-19 and mental health: a review of the existing literature. *Asian J. Psychiatry* 52:102066

Ravindran S, Shah M. 2020. *Unintended consequences of lockdowns: COVID-19 and the shadow pandemic*. NBER Work. Pap. 27562

Reza HM, Agarwal V, Sultana F, Bari R, Mobarak AM. 2021. *Why vaccination rates are lagging in low- and middle-income countries: a view from Bangladesh*. Work. Pap., North South Univ., Dhaka, Bangladesh

Ritchie H, Ortiz-Ospina E, Beltekian D, Mathieu E, Hasell J, et al. 2020. *Coronavirus pandemic (COVID-19)*. Data, Our World Data, Oxford, UK, retrieved Dec. 1, 2021

Roberts S. 2020. Flattening the Coronavirus curve. *New York Times*, March 27. **https://www.nytimes.com/article/flatten-curve-coronavirus.html**

Romm T. 2020. Facebook will remove misinformation about coronavirus. *Washington Post*, Jan. 31. **https://www.washingtonpost.com/technology/2020/01/30/facebook-coronavirus-fakes/**

Rutkowski M, Mora AG, Bull GL, Guermazi B, Grown C. 2020. Responding to crisis with digital payments for social protection: short-term measures with long-term benefits. *World Bank Blogs*, March 31. **https://blogs.worldbank.org/voices/responding-crisis-digital-payments-social-protection-short-term-measures-long-term-benefits**

Samuelson PA. 1954. The pure theory of public expenditure. *Rev. Econ. Stat.* 36(4):387–89

Sandefur J. 2021. World Bank grants for global vaccination—why so slow? *Nature* 594(7864):475

Sherrard-Smith E, Hogan AB, Hamlet A, Watson OJ, Whittaker C, et al. 2020. The potential public health consequences of COVID-19 on malaria in Africa. *Nat. Med.* 26(9):1411–16

Shonchoy AS, Ishtiaq KS, Talukder S, Ahmed NU, Chowdhury R. 2021. A novel index-based decision support toolkit for safe reopening following a generalized lockdown in low and middle-income countries. *Sci. Rep.* 11(1):1–14

Singh KD, Kumar H. 2021. COVID-19 pushes India's middle class toward poverty. *New York Times*, April 16. **https://www.nytimes.com/2021/04/16/business/economy/india-covid19-middle-class.html**

Solís Arce JS, Warren SS, Meriggi NF, Scacco A, McMurry N, et al. 2021. COVID-19 vaccine acceptance and hesitancy in low- and middle-income countries. *Nat. Med.* 27(8):1385–94

Staab S. 2020. COVID-19 sends the care economy deeper into crisis mode. *UN Women*, April 22. **https://data.unwomen.org/features/COVID-19-sends-care-economy-deeper-crisis-mode**

Swanson I. 2020. State warns foreigners "attacked" in Ethiopia over coronavirus fears. *The Hill*, March 18. **https://thehill.com/policy/international/488322-state-warns-foreigners-attacked-in-ethiopia-over-coronavirus-fears**

Taub A. 2020. A new COVID-19 crisis: Domestic abuse rises worldwide. *New York Times*, April 6. **https://www.nytimes.com/2020/04/06/world/coronavirus-domestic-violence.html**

Tregoning JS, Flight KE, Higham SL, Wang Z, Pierce BF. 2021. Progress of the COVID-19 vaccine effort: viruses, vaccines and variants versus efficacy, effectiveness and escape. *Nat. Rev. Immunol.* 21:626–36

UN Dep. Econ. Soc. Aff. 2019. *International migrant stock 2019*. Dataset, Dep. Econ. Soc. Aff., United Nations, New York

UN Women. 2020. *Whose time to care? Unpaid care and domestic work during COVID-19*. Rep., United Nations Entity Gend. Equal. Empower. Women, New York

UNESCO (UN Educ. Sci. Cult. Organ.). 2021. *A snapshot of educational challenges and opportunities for recovery in Africa*. Pap., UNESCO, Paris

Victora CG, Adair L, Fall C, Hallal PC, Martorell R, et al. 2008. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet* 371(9609):340–57

Viscusi WK, Masterman CJ. 2017. Income elasticities and global values of a statistical life. *J. Benefit-Cost Anal.* 8(2):226–50

von Carnap T, Almås I, Bold T, Ghisolfi S, Sandefur J. 2020. *The macroeconomics of pandemics in developing countries: an application to Uganda*. CDG Work. Pap. 555, Cent. Global Dev., Washington, DC

Weiss DJ, Bertozzi-Villa A, Rumisha SF, Amratia P, Arambepola R, et al. 2021. Indirect effects of the COVID-19 pandemic on malaria intervention coverage morbidity, and mortality in Africa: a geospatial modelling analysis. *Lancet Infect. Dis.* 21(1):59–69

Westcott B. 2021. Analysis: China and Russia want to vaccinate the developing world before the West. It's brought them closer than ever. *CNN*, May 11. **https://www.cnn.com/2021/05/11/china/china-russia-covid-vaccine-dst-intl-hnk/index.html**

Whizz Educ. 2021. *Measuring the impact of COVID-19 on learning in rural Kenya*. Rep., Whizz Educ., London
WHO (World Health Organ.). 2020a. *COVID-19 and the need for action on mental health*. Policy Brief, World Health Organ., Geneva, Switz.
WHO (World Health Organ.). 2020b. *Pulse survey on continuity of essential health services during the COVID-19 pandemic: interim report, 27 August 2020*. Rep., World Health Organ., Geneva, Switz.
WHO (World Health Organ.). 2020c. *The impact of COVID-19 on mental, neurological and substance use services*. Rep., World Health Organ., Geneva, Switz.
WHO (World Health Organ.). 2021a. *Second round of the national pulse survey on continuity of essential health services during the COVID-19 pandemic: January-March 2021: interim report, 22 April 2021*. Rep., World Health Organ., Geneva, Switz.
WHO (World Health Organ.). 2021b. *WHO Director-General's opening remarks at 148th session of the Executive Board*. Speech, World Health Organ., Geneva, Switz.
Yusuf M. 2021. Kenyan schools reopen despite coronavirus concerns. *VOA News*, Jan. 4. **https://www.voanews.com/africa/kenyan-schools-reopen-despite-coronavirus-concerns**

Annual Review of Economics

Volume 14, 2022

Contents

Indexes

Errata

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