



FINANCE AND DEVELOPMENT

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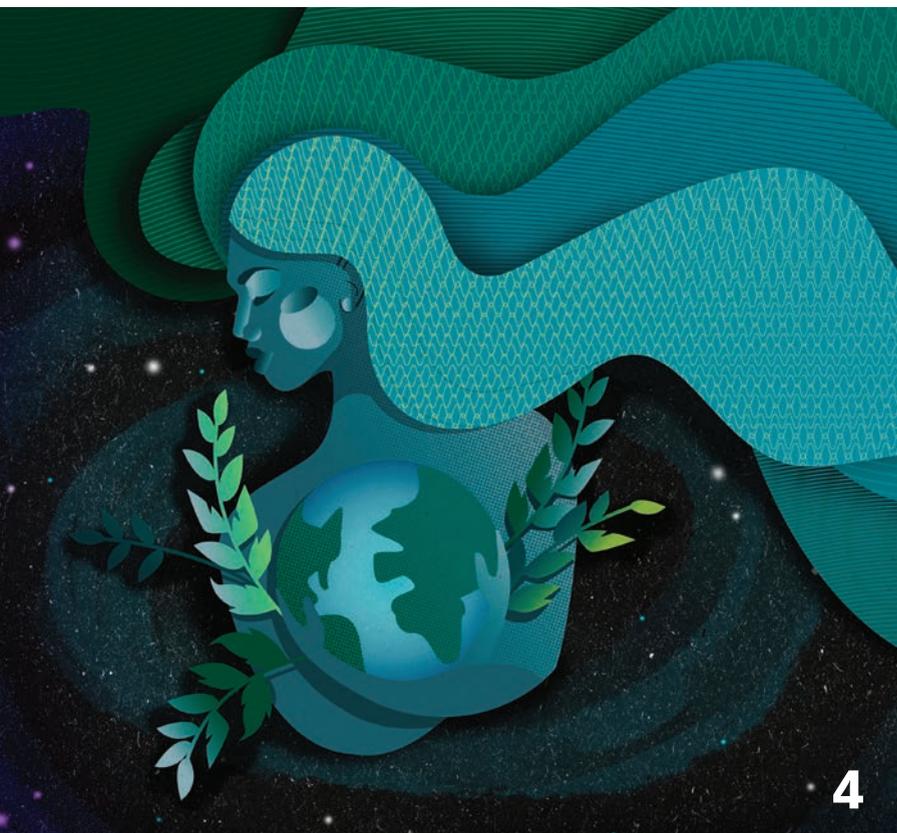
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Safeguarding

the World's Health and Well-being

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The Real Wealth

JUST AS GOOD HEALTH—mental and physical—is fundamental to individual well-being, public health is fundamental to stable, cohesive societies. That is the lesson we must take from the COVID-19 pandemic.

The inextricable link between human and economic health is another lesson. The pandemic plunged the world into the deepest economic contraction in generations, slowing progress on education, poverty eradication, and inclusive development. Overcoming the pandemic is a prerequisite to restoring jobs, livelihoods, and economic growth, say the IMF's Gita Gopinath and Ruchir Agarwal. This makes it critical for global economic and financial stability, and therefore of fundamental importance to the IMF.

That is why we focus this issue of F&D on global health and well-being. Our authors explore future global health threats and countries' vulnerabilities to them. They examine gaps in health care capacities within nations and the global health security system. And they consider the role of prudent public policy and responsible politics in health care.

Ngozi Okonjo-Iweala, Tharman Shanmugaratnam, and Larry Summers call for rethinking international collaboration, with additional investments of at least \$15 billion a year to avert future pandemics. Rather than viewing support for global health security as "aid for other nations," they suggest treating it as a strategic investment that benefits every nation—rich or poor. Tedros Adhanom Ghebreyesus underscores the need for public financing to provide universal health care. Michael Kremer and coauthors offer ideas to speed vaccinations in the next pandemic, including investments in manufacturing capacity and supply chains and research in areas with high social value. In a special feature, Miles Kimball and colleagues discuss their development of an index of national well-being to complement GDP.

The depth of the pandemic's shock—and the lessons from it—will perhaps spur individual countries and the international community to treat health as a public policy priority that will make for happier and more productive societies. As Mahatma Gandhi said, "Health is the real wealth..." 

GITA BHATT, editor-in-chief



ON THE COVER

Our December 2021 cover features the original artwork "Heal" by Bahamian artist Ben Ferguson Jr. Inspired by traditional "bush medicine" and the healing properties of nature, Ferguson says he portrayed the mind "in a state of achieving wholeness, healing, and a sense of well-being."

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E-mail: publications@imf.org

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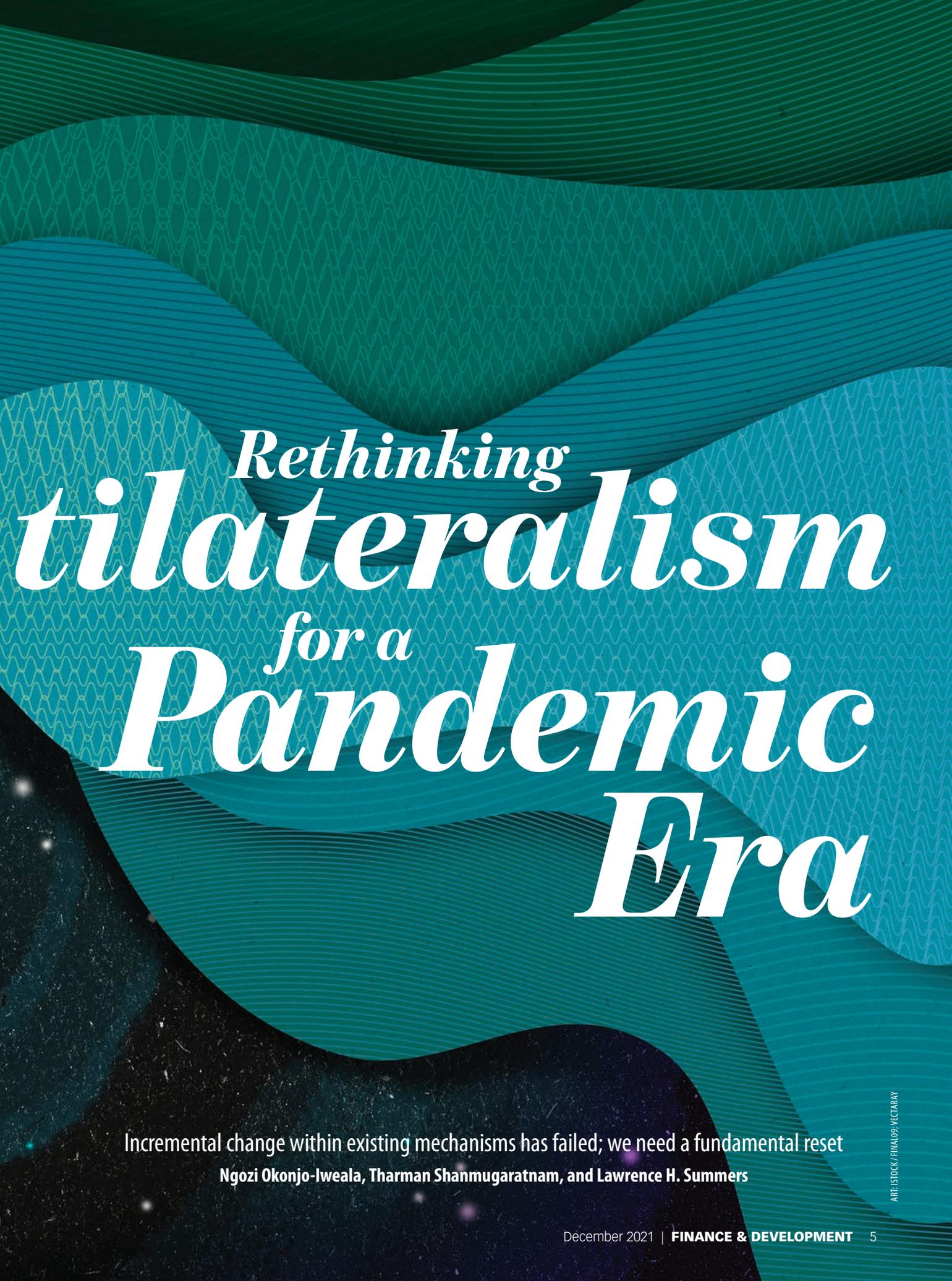
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Rethinking
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Incremental change within existing mechanisms has failed; we need a fundamental reset

Ngozi Okonjo-Iweala, Tharman Shanmugaratnam, and Lawrence H. Summers

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e are nowhere near the end of the pandemic. Delta will not be the last highly transmissible variant. Large unvaccinated groups and the unchecked spread of

the virus around the world raise the prospect of further mutations, possibly evading today's vaccines, that will create new waves everywhere.

Yet COVID-19 is also a forerunner of more, and possibly worse, pandemics to come. Scientists have repeatedly warned that without greatly strengthened proactive strategies, global health threats will emerge more often, spread more rapidly, and take more lives. Together with the world's dwindling biodiversity and climate crisis, to which they are inextricably linked, infectious disease threats represent the primary international challenge of our times.

Recognizing this new reality of a pandemic era is not fearmongering but rather prudent public policy and responsible politics. We must organize ourselves on a whole-of-society basis within nations and rethink how we collaborate internationally to mitigate its profound consequences for livelihoods, social cohesion, and global order.

COVID-19's only benefit has been to put the case beyond doubt. Our collective failure to heed scientific advice and invest in pandemic prevention and preparedness has inflicted a catastrophic toll. Official data put the number of deaths at over 5 million; credible unofficial estimates are a multiple of that number. Many more people have survived serious illness, with long-term consequences for their well-being and nations' human capital that have yet to be determined. The world has experienced the deepest economic contraction since World War II and a significant rollback in progress in education, poverty eradication, and inclusive development for a large swath of its population. The IMF has projected large cumulative losses in global GDP by 2025, with particular impact on the developing world.

From aid to strategic investment

Overcoming today's pandemic remains the immediate task. Rich nations must make good

on pledges to donate their projected substantial surplus vaccines, along with grants to bridge the \$23 billion shortfall needed to get jabs into arms and provide test kits and other medical supplies. All that is a very small price to shorten the pandemic everywhere.

But we also need a more fundamental reset to avoid blundering into pandemics again and again with enormous human and economic costs. The current system of global health security is not fit for purpose. It is too fragmented, overly dependent on discretionary bilateral aid, and dangerously underfunded. We must repair the system with urgency. The next pandemic could strike at any time, whether from a deadly influenza strain or another pathogen that jumps from animals to humans. It may even strike while the world continues to struggle with COVID-19.

We cannot avoid outbreaks altogether. But we can sharply reduce the risk that they will blow up into pandemics. The world has the scientific and technological capabilities and the financial resources to do so. However, to mobilize these resources, we need a new way of thinking about international cooperation.

Rather than financing global health security under the mantle of "aid for other nations," we must treat it as a strategic investment in global public goods that benefit every nation—rich or poor.

The Group of 20 major advanced and developing economies (G20) established a high-level independent panel (HLIP) to conduct a full review of the gaps in global public goods. It was aided by extensive consultation with experts, the global health organizations, and the Global Preparedness Monitoring Board, an independent group established by the World Health Organization (WHO) and World Bank. The gaps the HLIP identified are large.

We need a massively scaled-up network of genomic surveillance, integrating national, regional, and global capabilities. Such a network is critical to detecting and instantly sharing information on pathogens that could cause infectious disease outbreaks, identifying their genome sequences, and accelerating the development of medical countermeasures.

We must also close long-standing gaps in core healthcare capacities within nations to thwart both emerging and endemic infectious diseases and mitigate comorbidities. These capacities benefit individual nations in normal times but are also critical to pandemic prevention and preparedness globally. They therefore require both domestic and international financing. This, coupled with a broader strengthening of public health systems, will require many developing economies to spend an additional 1 percent of GDP, at least over the next five years. The additional spending must be complemented by enhanced external grant support for investments in lower-income countries that are in the nature of global public goods.

Global supply capacity

Crucial too is building the global capacity needed to radically speed up supplies of vaccines and other vital materials to avoid prolonging a pandemic and repeating the staggering inequalities of access that COVID-19 has revealed. We need a globally distributed development, manufacturing, and delivery ecosystem that is kept in use in normal times and can pivot swiftly to provide the medical countermeasures specific to each pandemic.

In the absence of a larger global supply capacity ready early in a pandemic, producing nations will remain prone to prioritize the needs of their own populations over global needs. The private sector currently has little incentive to invest in this ever-warm supply capacity on the scale required ahead of a pandemic, even if there is scope for dual uses to meet ongoing needs in normal times.

We can therefore build the necessary supply ecosystem only through a major public-private investment initiative. That will require a tightly coordinated network of global health organizations and national and regional agencies—such as the Biomedical Advanced Research and Development Authority (BARDA) in the United States, the Health Emergency Preparedness and Response Authority (HERA) in Europe, and the African Vaccine Alliance—collaborating closely with the private sector. Equally, we need clear global rules to keep supply chains open in a pandemic

and ensure that export restrictions and trade bottlenecks are tackled quickly.

To plug these key gaps in global public goods, we must invest collectively on a scale much larger than we have been willing to in the past. Using the best cost estimates by the WHO, McKinsey & Co., and other sources, the G20 HLIP estimated that the world needs, at an absolute minimum, additional international investments of \$15 billion a year in these global public goods to avoid future pandemics. This is a doubling of current levels, but COVID-19 demonstrates that the costs of a pandemic are several hundred times greater. The expected social returns on these collective investments are immense.

To plug these key gaps in global public goods, we must invest collectively on a scale much larger than we have been willing to in the past.

However, to succeed in averting the next pandemic, we must strengthen multilateralism. That cannot be achieved with incremental changes to existing mechanisms, which have failed to prevent and respond decisively to the current pandemic. We need major renovation and replenishment of both individual institutions and the global health architecture. The G20 panel has advocated three strategic shifts to enable proper and proactive financing of global health security.

First, we must put the finances of the WHO on a more secure multilateral footing and empower it to perform its core roles more effectively. There is no solution to pandemic security that does not involve a reformed and strengthened WHO at its center.

It plays the lead role in the surveillance of global health emergencies and in identifying gaps in the national core capacities set out in the International Health Regulations. It is also integral to the international coalition of health partners that must develop a globally distributed, end-to-end supply ecosystem for medical countermeasures.

Second, we must repurpose the international financial institutions (IFIs) for a new era. The IMF and World Bank were created at the end of World War II to assist countries with economic reconstruction or when they ran into financial difficulties of their own. The World Bank's success led to the establishment of the other regionally based multilateral development banks. Collectively, the IFIs are unique international institutions with the ability to multiply the impact of finance in ways that will be critical in the decades ahead. They leverage the resources of their shareholders in the capital markets, induce domestic funding and policy reforms by governments, and help catalyze private sector investments.

Yet the mandates of the Bretton Woods institutions must be updated for an era when the largest challenges facing countries lie in threats to the global commons, even as poverty alleviation and inclusive growth remain critical priorities. The IMF and World Bank must work closely with regional development banks and other international players, including global health organizations, to incentivize lower-income countries and regions to invest in the public goods needed to address these threats.

The business models of the World Bank and other multilateral development banks must also pivot toward mitigating risk rather than direct lending, so as to mobilize private capital and transform global savings into development finance. The potential for doing so has long been recognized, given the banks' triple-A credit ratings and scope for using risk guarantees and other credit-enhancement tools and that most developing economies now have access to capital markets to finance infrastructure. However, progress in moving away from a lending-based model has been slow. A bolder move is now required to use their

resources more optimally to support investments in global public goods.

The IFIs must also play lead roles in international financing of the response to pandemics. The IMF and World Bank have designed programs and streamlined processes during COVID-19 to enable more flexible disbursement of funds. Following the recent \$650 billion general allocation of Special Drawing Rights (SDRs) among its members, the IMF is also actively working with wealthier countries to channel excess SDRs to those that are more vulnerable via the Poverty Reduction and Growth Trust, among other ways. However, the whole process for an SDR allocation to be approved, and subsequently deployed to countries most in need, takes time. Several other mechanisms were also developed or enhanced in the midst of the pandemic. The IFIs must now improve and formalize them as part of their crisis-response toolkits so they can deploy resources at a much larger scale and more swiftly when necessary.

The shareholders of these key institutions must themselves adapt to the challenges of a new era. They must make timely replenishments of the grants and capital needed by the IFIs and ensure that the greater focus on global public goods does not come at the expense of spending on education, social protections, and other development priorities. They must also enable the IFIs to put out much more money in a pandemic, much faster and with less elaborate conditions, just as their treasuries and central banks became major lenders and investors of first resort in their own countries.

Shareholders should also support a new capital adequacy framework for the multilateral development banks, one that recognizes their preferred creditor status and very low default experience and enables enhanced leverage without compromising their triple-A ratings. Recommendations for doing so were made by an earlier G20 eminent persons group. The recent review initiated by the Italian G20 presidency is an important step in the right direction.

Overcoming fragmentation

Third, besides strengthening the WHO and repurposing the IFIs, we must establish a new multilateral financing mechanism for global health security. Currently, fundraising for this purpose is fragmented, based on the different mandates of the various global health organizations, and largely dependent on discretionary bilateral and

philanthropic aid. The result is a nonsystem of complex, unpredictable, and greatly inadequate funding for global public goods.

The G20 HLIP has therefore proposed establishing a multilateral financing mechanism aimed at mobilizing at least \$10 billion a year from the international community. It would be most practical for this to take the form of a financial intermediary fund hosted at the World Bank, which would act as trustee. At two-thirds of total additional international financing needed for global health security, the new mechanism would provide a much-needed layer of multilateral support on top of today's siloed landscape.

However, it is critical that resources mobilized for this new financing mechanism add to, and not substitute for, existing official development aid for global public health and other priorities. It should also be designed to catalyze funding from private, philanthropic, and bilateral sources. Importantly too, the new mechanism should not be an implementation agency on the ground. It should instead fund existing institutions and networks and prioritize or reprioritize allocations across the system based on the most pressing needs of the time. This will enable it to serve as an integrator rather than become a new silo that only furthers fragmentation.

Funding for this multilateral mechanism should be based on pre-agreed contributions from all countries, similar to the way nations periodically provide fresh funds to the International Development Association. When spread across a large number of countries on a fair and equitable basis, the contributions translate to barely 0.02 percent of the GDP of most countries, or less than 0.1 percent of annual government budgets. This is entirely affordable.

Greater and more sustained funding also requires better governance. Governance of global health itself rests with the WHO and its decision-making body, the World Health Assembly. What is missing is a mechanism that brings finance and health decision-makers together to govern and mobilize funding of global health security. We believe that a board that brings health and finance ministers together within an inclusive G20-plus group will fill that need most effectively. It should have adequate representation from developing economies, especially the inclusion of the African Union. The WHO, World Bank, IMF, and World Trade

Organization should be included in an ex officio capacity. A permanent, independent secretariat hosted by the WHO and drawing on the expert resources of the major international organizations should support the board.

Narrow window

Rethinking multilateralism has never been more urgent. The window for action is narrow. As the experience of earlier crises shows, the impetus to make bold change will fade once we are past the worst of the pandemic in the richest countries.

We must also act urgently to repair the deep and growing distrust of the global system in developing regions that have had little access to lifesaving supplies. Failure to reverse this trust deficit will have lasting consequences. It will make it very difficult to address climate change, future pandemics, and other problems in a dangerous world.

Rethinking multilateralism has never been more urgent. The window for action is narrow.

The Joint Finance-Health Task Force initiated by G20 Leaders on October 31, 2021, should be the first step toward establishing the new multilateral financing mechanism and the board required for effective coordination and stewardship of funding for global health security. The task force should seek to bridge differences pragmatically and achieve consensus by early 2022.

The collective actions we propose are critical to future human security everywhere. They will also help avert the much larger costs that nations will incur in future global health crises. It would be both economically and politically myopic, and morally indefensible, to wait for the next pandemic to overwhelm us. **FD**

NGOZI OKONJO-IWEALA is director-general of the World Trade Organization. **THARMAN SHANMUGARATNAM** is senior minister in Singapore and chair of the Group of Thirty. **LAWRENCE H. SUMMERS** is the Charles W. Eliot University Professor at Harvard University and a former US Treasury secretary. They cochaired the G20's High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response.



People wait in line for a COVID-19 vaccination in Cape Town, South Africa.

Pandemic Economics

A broad-based economic recovery requires an end to the pandemic

Ruchir Agarwal and Gita Gopinath

Last May, the IMF released a detailed and comprehensive road map to end the COVID-19 pandemic, save lives, and put the world back on track toward a broad-based economic recovery ("A Proposal to End the COVID-19 Pandemic," Agarwal and Gopinath, 2021). The road map was endorsed by multilateral institutions and key stakeholders. It was based on a simple, yet powerful premise: Ending the pandemic is a necessary prerequisite to restoring jobs, livelihoods, and economic well-being. One cannot be achieved without the other.

How has the world fared since the release of the road map? The global recovery has continued, but momentum has weakened. In six months, the officially recorded global COVID-19 death toll

has risen by about 50 percent and is now over 5 million, and the actual death toll is estimated to be several times higher. Of particular concern is the growing divergence in economic prospects between rich and poor nations. In the October 2021 *World Economic Outlook*, the IMF projected that aggregate output for advanced economies would regain its pre-pandemic trend path in 2022 and *exceed* it by 0.9 percent in 2024. By contrast, output for emerging market and developing economies, excluding China, is expected to remain 5.5 percent *below* the pre-pandemic forecast in 2024.

This divergence in economic prospects is a consequence of wide disparities in vaccination rates (which we call "the great vaccine divide") and policy support. As of the end of October, among advanced

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economies, about 65 percent of the population was fully vaccinated, and booster shots were available in many of them. By contrast, the vaccination rate was less than 2 percent among low-income countries. This is not just a problem for particular countries or regions, it is a *global* problem. As public health officials have stressed repeatedly, the pandemic is not over anywhere until it is over *everywhere*. Further unchecked transmission makes the emergence of new variants—including some that are resistant to existing vaccines—more likely, possibly putting the world back at the starting line in the race against the virus. If COVID-19 were to have a prolonged impact, we could see global GDP losses rise to \$5.3 trillion over five years relative to our current projection, with several million more lives lost.

Action plan

Our road map identified three broad targets and actions needed to meet those targets, as well as financing needs for each action. The targets: vaccinating at least 40 percent of the population in all countries by the end of 2021 and 70 percent by the first half of 2022; tracking and insuring against downside risks (due to the rise of new variants or supply-chain problems); and saving lives by ensuring widespread access to tests, treatments, personal protective equipment, and other critical health tools.

Progress toward the key actions needed to achieve those targets has been mixed, and we are still behind. As of the end of October, some 75 to 80 nations, mostly in Africa, were not on track to meet the end-2021 40 percent vaccination target. Fifty-five of these countries will likely have problems primarily with supply, whereas 24 will have both supply and absorption-capacity issues.

Our plan recommends the following near-term actions to end the pandemic and support a broad-based economic recovery.

- Immediately closing the 550 million dose gap to achieve 40 percent coverage by accelerating existing dose donations to the COVID-19 Vaccines Global Access (COVAX) facility, an initiative aimed at equitable distribution of vaccines, and pledging new donations; executing dose swaps with COVAX and the African Union (that is, deferring the delivery of doses intended for Group of Twenty [G20] countries to allow developing economies to move up in the queue); and eliminating restrictions on exports of vaccines and critical inputs.
- Committing to financing the new ACT-Accelerator budget of about \$23 billion to ensure that all countries can access the necessary volume of vaccines, tests, treatments, and personal protective equipment. (The ACT-Accelerator is a partnership of the world's international health organizations to fight COVID-19.)
- Maintaining collective accountability of progress against the targets through frequent engagement between Group of Seven advanced economies, the broader G20, and other key stakeholders.

Beyond the near term, it will be important to expand regional manufacturing capacity of vaccines in developing economies and monitor risks.

Better stewardship

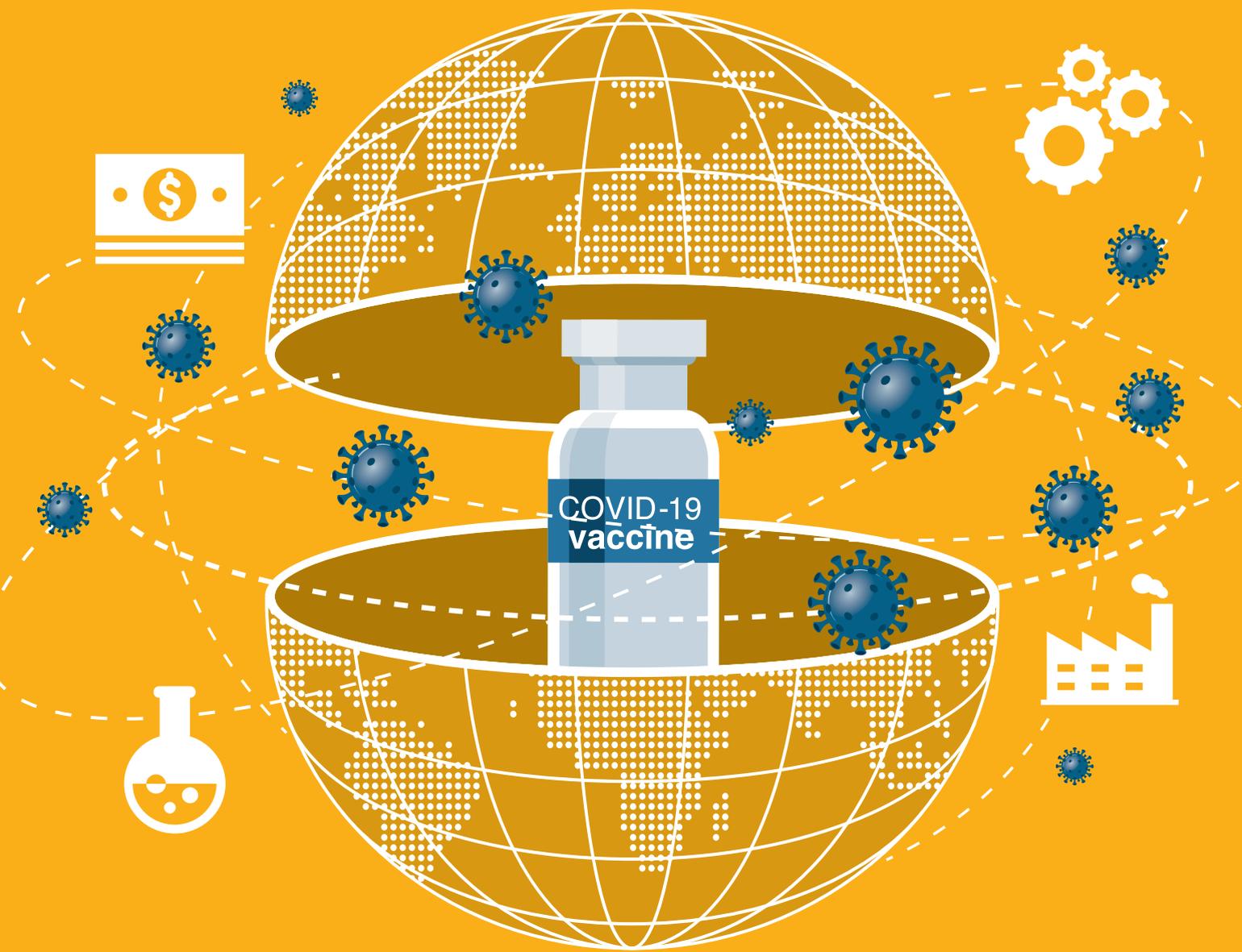
After nearly two years of the deadliest and most economically devastating pandemic in a century, what are the initial lessons we have learned?

First, the COVID-19 crisis has made it clear that pandemic policy is economic policy, that there is no durable end to the economic crisis without an end to the health crisis. Ending the pandemic is therefore critical for global macroeconomic and financial stability, which makes it of fundamental importance to the IMF and other economic institutions. Indeed, the IMF's projections and policy recommendations for the global economy rely crucially on the relative success of the race against the virus. Systemic risks posed by future pandemics and global health concerns should be more explicitly accounted for in economic analysis and surveillance.

Second, the world needs better stewardship of global public goods, including preparedness to fight future pandemics. This will require much greater coordination and collective action than we have managed to summon so far. The G20 High Level Independent Panel's report on pandemic preparedness provides several concrete steps in this regard (see "Rethinking Multilateralism for a Pandemic Era," this issue).

We are all in this fight together, and collectively we can and must do better to fight the problems facing the planet. **FD**

RUCHIR AGARWAL is a senior economist in the IMF's Research Department and **GITA GOPINATH** is the IMF's chief economist.

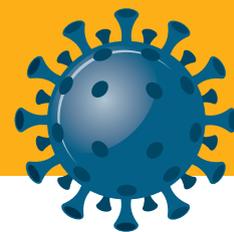


Accelerating Vaccinations

Expanded production and more money for research will get shots into arms faster

Arthur Baker, Esha Chaudhuri, and Michael Kremer

ART: ISTOCK/SORBETTO



Vaccines for COVID-19 were developed and produced at unprecedented speed. Yet more than nine months after multiple vaccines were shown to be safe and effective, less than half of the world's population and only 8 percent of people in Africa have received a shot. Such delays in vaccination during a pandemic are extremely costly in both human and economic terms. Each month in 2020 and early 2021 COVID-19 killed about 300,000 people; it is expected to reduce global GDP by \$12 trillion in 2020 and 2021, according to IMF projections, which works out to roughly \$500 billion a month. More comprehensive estimates of harm, including losses from interrupted investments in health and education, are many times larger (Cutler and Summers 2020).

Vaccination is arguably the most effective way to limit not only the toll on human life and health but also the economic and social harm of a pandemic. This is why getting people vaccinated quickly is so important. Governments and international organizations could take several steps to accelerate global vaccination during future pandemics, promote more equitable and efficient distribution, and reduce incentives for export bans and hoarding. Two particularly important steps are advancing investments in vaccine manufacturing capacity and supply chains and financing for areas of research for which social needs greatly exceed existing commercial incentives.

Risky and time-consuming

Two characteristics of vaccine production are particularly important for understanding pandemic preparedness policy. First, development is risky and time-consuming. The chance of success for any particular vaccine candidate is usually low. Early in the pandemic, we estimated that 15 to 20 candidates would be needed to yield roughly an 80 percent chance of at least one success, based on historical data. Until 2020, vaccines took years to develop and longer still to produce on a large scale. Even with the urgency of a global pandemic, as late as October 2020 many experts thought we would wait until late 2021 for a vaccine to be approved and estimated that the world would produce just 115 million doses by the end of the year (CGD 2020). As it turned out, unusually large investments by

countries including the United States and United Kingdom helped accelerate the development of multiple highly effective COVID-19 vaccines. The world was also lucky that vaccines for COVID-19 were easier to develop than those for diseases such as malaria or AIDS. Even when vaccine formulation proceeds much faster than expected, clinical trials take months. Second, finished production facilities are generally highly specialized for a particular vaccine, and each facility requires regulatory approval. It takes time to repurpose facilities, even during an emergency (about six months during COVID-19).

Vaccination is arguably the most effective way to limit not only the toll on human life and health but also the economic and social harm of a pandemic.

Before a pandemic hits, it makes sense to install a large amount of vaccine manufacturing capacity, so that the world population can be served quickly; to install capacity in parallel with clinical trials so that vaccination can begin as soon as a candidate is approved; and to install enough for multiple vaccine candidates, because we cannot know beforehand which will work, and repurposing capacity takes time.

During the COVID-19 pandemic, many firms and governments aimed to expand capacity, often by repurposing existing factories, which is faster than building from scratch. However, production was constrained both by a shortage of capacity available to repurpose and by shortages of generic inputs such as glass vials, lipid particles, and bio-reactor bags. This not only slowed vaccination but also led to concerns that by expanding capacity, rich countries were monopolizing limited supplies of inputs and capacity that could be repurposed. Installing standby production capacity and stockpiling inputs in advance of a future pandemic would address this problem.

How much manufacturing capacity is needed? It makes sense to install and maintain enough to





vaccinate the world with each of several vaccine candidates, since we don't know in advance which will succeed. This would cost billions of dollars (Kazaz, Webster, and Yadav 2021), but given the IMF's estimate of COVID-19's economic cost, expected returns would be high even with a moderate risk of future pandemics.

Social versus private value

The private sector won't do this alone, however. Installing and maintaining spare capacity is expensive. During a future pandemic, as with COVID-19, manufacturers will anticipate that political and social constraints on pricing will reduce their returns. The social value of additional capacity is therefore much greater than the private value to companies. We estimate that the marginal social value of existing COVID-19 vaccine capacity in early 2021 was \$500 to \$1,000 per course, compared with \$6 to \$40 per course in current contracts (Castillo and others 2021).

Governments should therefore offer incentives to install extra capacity and stockpile inputs. For example, Operation Warp Speed in the United States and the Vaccine Taskforce in the United Kingdom paid companies to install manufacturing capacity while clinical trials for COVID-19 vaccines were still underway. These programs paid for themselves many times over: COVID-19 cost the US economy an estimated \$26 billion a day in 2020 and 2021 (Cutler and Summers 2020). The implication is that Operation Warp Speed, which had spent just \$13 billion as of December 2020, will pay for itself if it cuts the duration of the pandemic by just 12 hours. More early investments in manufacturing capacity would have had even larger benefits (Castillo and others 2021). Governments can do this at a much greater scale and further in advance to prepare for future pandemics.

Standby capacity for future pandemics could also serve current needs, and facilities could be designed so as to be repurposed for different vaccine candidates. In a well-designed global procurement process for standby capacity, criteria for the selection of contracts would include factors such as ease of repurposing in addition to cost. However, it would be penny-wise and pound-foolish to assume in advance that this can be done on the cheap.

Vaccine nationalism

Stockpiling inputs and installing capacity in advance will also help reduce the risk of vaccine nationalism—export bans and hoarding of critical supplies that endanger the trading system most of the globe relies on for access to medical technology. During a pandemic, price controls create shortages, and shortages in turn create strong incentives for elected governments to deliver successful vaccines to the domestic constituents to whom they are ultimately accountable rather than make them available to other countries.

This is not just theory. During the COVID-19 pandemic, both the United States and India, the world's largest vaccine producers, restricted exports of vaccines or inputs in 2020 and 2021. Some EU countries restricted exports of surgical masks even to other EU members, and the United States was accused of seizing shipments bound for its allies. When the global shortage of masks ended, international tensions quickly faded.

Moral suasion alone is unlikely to prevent vaccine nationalism. In the language of game theory, changing national governments' behavior in pandemics will require changing the game they are playing by altering the global stock of vaccine capacity. Vaccinating the world in a few months would significantly weaken governments' incentives for hoarding and restricting exports. Even if countries vaccinated their own populations first, delays for the rest of the world would be much shorter.

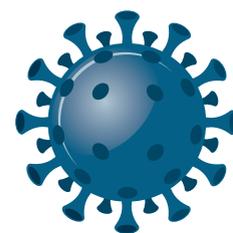
Freeing up trade by addressing shortages also has benefits for global efficiency and security. Few countries or even regions will be able to install large-scale capacity for a variety of vaccine platforms because different regions specialize in different platforms (any of which could fail), and supply chains are global. Unfettering trade will give countries the confidence to invest in standby capacity for a range of technologies, broadening the world's portfolio of vaccine candidates.

Supply capacity

Both national and multilateral investments in supply chain and vaccine capacity and stockpiles should be welcomed. During COVID-19 there was uncertainty about whether investments by one country to expand vaccine capacity would



Nobody knows which countries will be worst affected during a future pandemic, so it makes sense to agree to prioritize supplies for the hardest-hit countries and populations in advance.



have positive or negative effects on other countries. On one hand, these investments increase the global supply. On the other hand, if the supply of inputs cannot be adjusted quickly enough to meet new demand at existing prices, investments by one country may raise prices for other countries. However, in the long run we should be able to build as much capacity as we need, meaning we can significantly increase demand for capacity without a substantial increase in the per-unit price. So investments by one country to prepare for future pandemics will not impede access for others.

In fact, since most new disease outbreaks (such as Ebola or Zika) strike only particular regions, countries that are not affected might make their capacity available to others during emergencies. At the same time, pooled investments through multilateral organizations could allow countries to take advantage of ignorance about future pandemics. Nobody knows which countries will be worst affected during a future pandemic, so it makes sense to agree to prioritize supplies for the hardest-hit countries and populations in advance, substantially increasing security for all countries for any given level of capacity investment.

Despite vaccines being approved in December 2020, many countries do not expect to have fully vaccinated the majority of their populations until at least early 2022. In the future, we can avoid such a disastrous delay by investing strategically in advance.

Financing research

More financing for research is another urgent need. Commercial investment in certain areas of research and development of vaccines against potential pandemic pathogens is far too low to satisfy the social need, making public funding a priority. One such area is research on options for using existing vaccine supplies more efficiently, known as “dose stretching”.

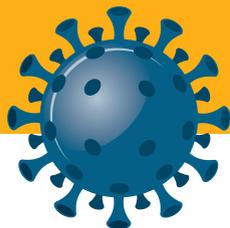
The traditional research and development process is designed to optimize health benefits for the individual receiving the vaccine through the

right balance between the efficacy of larger doses and their greater side effects. That balance may change during a vaccine shortage, when supply is also a public health issue. Moving to lower doses, increasing the intervals between doses, or using mix-and-match strategies could substantially accelerate vaccination, saving more lives.

Take the example of fractional dosing for COVID-19. Data from early clinical trials on the immune responses produced by lower doses of some vaccines, combined with evidence of a high correlation between certain types of immune response and vaccine efficacy, suggest that half or even quarter doses of some vaccines could be highly effective, particularly against severe disease and death (Więcek and others 2021). Using lower doses could have expanded vaccine supply by up to 1.5 billion doses a month in the second half of 2021 as well as potentially reducing side effects and thus vaccine hesitancy. Yet despite shortages, the high expected value of testing, and promising clinical trial data available since late 2020, no clinical trials of efficacy and very few further studies of immune response to fractional doses had been conducted as of late 2021 (Więcek and others 2021). The costs of further testing to optimize dosage are much lower than the expected public health and economic benefits. So in the future, studies to ascertain the optimal dosing regimen and evaluate mix-and-match vaccine doses should take place in parallel with standard clinical trials.

The optimal dosing regimen may also change as new variants emerge and the demographics of the unvaccinated population shift. For COVID-19, booster shots are one example of how vaccination regimens can change in response to an evolving pandemic situation. Overall public health benefits, not just individual-level efficacy, should be considered in these decisions.

Governments can subsidize more research with potentially significant social benefits when private



incentives are insufficient. Dose optimization is just one example; there are many research questions that could have had huge social benefits but were not pursued. Since much of the evidence on such questions is a global public good, even national governments will not invest the optimal amount, suggesting a role for global institutions to invest in research with high social value. For example, the Coalition for Epidemic Preparedness Innovations recently issued a call for proposals for research on fractional dosing for booster shots of COVID-19 vaccines.

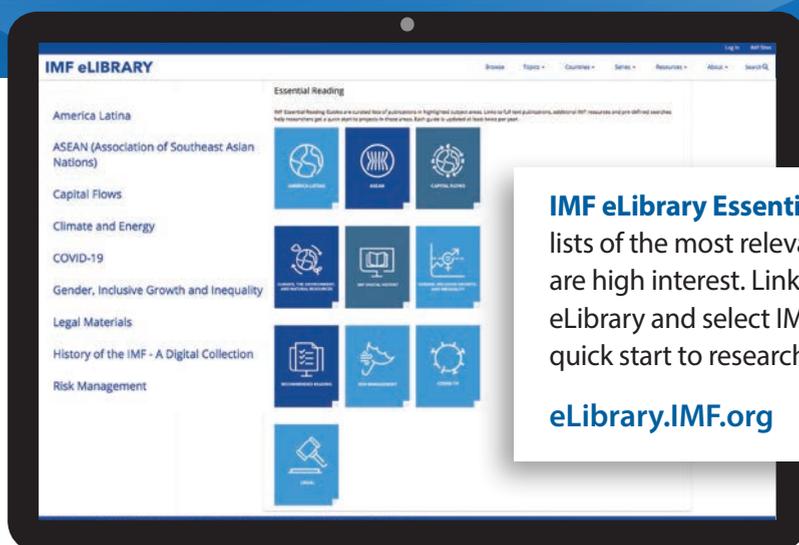
Current research and regulatory processes were not designed for pandemic situations, and it is worth considering how they could be updated to accelerate vaccine development and availability for future pandemics. Measures could include establishing scientific and ethical infrastructure to rapidly assess whether human challenge trials are appropriate; releasing preliminary data from early clinical trials to inform manufacturing capacity allocation decisions; establishing international licensing standards; and expediting the emergency use authorization process. **FD**

ARTHUR BAKER is the associate director for research and planning at the Development Innovation Lab at the University of Chicago, where **ESHA CHAUDHURI** is a research specialist. **MICHAEL KREMER** is a university professor in the Kenneth C. Griffin Department of Economics at the University of Chicago, faculty director of the Development Innovation Lab, and a 2019 Nobel laureate.

References:

- Castillo, Juan Camilo, Amrita Ahuja, Susan Athey, Arthur Baker, Eric Budish, Tasneem Chitty, Rachel Glennerster, and others. 2021. "Market Design to Accelerate COVID-19 Vaccine Supply." *Science* 371 (6534): 1107–9.
- Center for Global Development (CGD). 2020. "COVID-19 Vaccine Predictions: Using Mathematical Modelling and Expert Opinions to Estimate Timelines and Probabilities of Success of COVID-19 vaccines." Policy Paper 183, Washington, DC.
- Cutler, David M., and Lawrence H. Summers. 2020. "The COVID-19 Pandemic and the \$16 Trillion Virus." *JAMA* 324 (15): 1495–6.
- Kazaz, Burak, Scott Webster, and Prashant Yadav. 2021. "Incentivizing COVID-19 Vaccine Developers to Expand Manufacturing Capacity." CGD Notes, March 26, Center for Global Development, Washington, DC.
- Więcek, Witold, Amrita Ahuja, Esha Chaudhuri, Michael Kremer, Alexander Simoes Gomes, Christopher M. Snyder, Alex Tabarrok, and Brandon Joel Tan. 2021. "Testing Fractional Doses of COVID-19 Vaccines." Currently under review.

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Going the **LAST MILE**

Improving sub-Saharan Africa's logistics could be the key to successful vaccine delivery

Eugene Bempong Nyantakyi and Jonathan Munemo

Sub-Saharan Africa still has too few vaccines for too few people. Delivering more inoculations to the region deserves top priority in the effort to stamp out new variants that could further derail a global recovery. However, policymakers and the international community will likely have one other hurdle to overcome to successfully deploy vaccines: the region's poor trade and logistics quality.

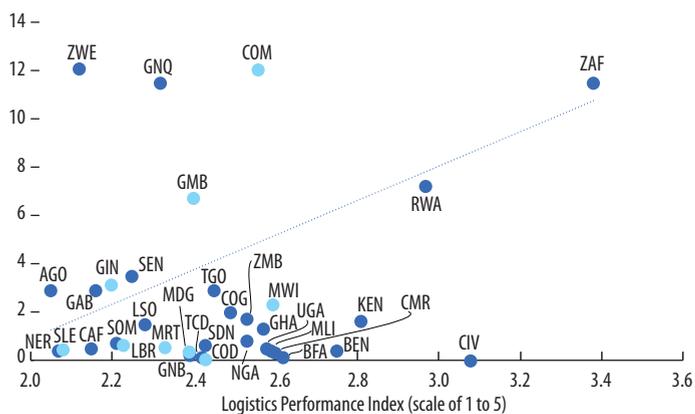
No journey is more critical to determining the fate of a pandemic than the distance a vaccine must travel from the production line to a person's arm. In sub-Saharan Africa, the last mile of this important race is all-important.

Data from the World Bank's Logistics Performance Index (LPI) Database—a good proxy for transport and distribution logistics—show that Africa's LPI score is only about 2.5 on average. The score ranges from 1 to 5, with higher scores representing better performance on logistics—the network of services that support the physical movement of goods both within and across a country's borders. The region's score trails all major regions of the world in six key categories of logistics performance, including timeliness and tracking. For more than a decade, its negative impact on the region's trade has been well documented. For instance, delays at customs are estimated to add 10 percent

Cause and effect

Countries with poorer logistics performance generally have lower vaccination rates.

(percent of population fully vaccinated)



Source: Share of people fully vaccinated is from Our World in Data (<https://ourworldindata.org/coronavirus#coronavirus-country-profiles>). Logistics Performance Index data are from World Bank, *World Development Indicators*.
Note: Countries that have destroyed or given away vaccines because they were unable to administer them fast enough are indicated in dark blue. Data labels use International Organization for Standardization (ISO) country codes.

to the cost of imported goods, which is higher than the average impact of tariffs in some cases.

But it is also now becoming clear just how much poor transport logistics could derail already slow attempts to vaccinate the region's population and do so quickly. Once fully thawed, some vaccines have a short shelf life. This raises the risk of destroying perfectly good doses when the region's logistics challenges are factored in. Looking closer at the reasons cited for vaccine destruction, the common thread is poor logistics and transport infrastructure. In Malawi, for instance, health authorities cited the short time between delivery and expiration of vaccines and the need to reduce hesitancy as the rationale for incinerating close to 20,000 doses of AstraZeneca vaccine.

Addressing vaccine hesitancy is critical to a successful mass vaccination campaign, and overcoming logistics challenges plays a large role. Skeptical individuals have little incentive to get a jab if they must travel miles and spend hours to reach the nearest vaccination centers—often lacking confidence that temporary health workers

will themselves show up. Places that are poorly connected by road also tend to have limited access to information and telecommunications technology, making access to official information about vaccines difficult. In addition, while bringing vaccine manufacturing closer to Africa to speed up supply is important for building capacity in the region, it matters less in the short term whether vaccines are shipped from Germany or South Africa to, say, the Democratic Republic of the Congo if, at the last mile, the distribution chain is broken by gaps in transport and logistics.

Before vaccines were deployed globally, a World Health Organization (WHO) assessment conducted to gauge global COVID-19 inoculation readiness showed that Africa has an average preparedness score of 33 percent for the COVID-19 vaccination program, far below the desired benchmark of 80 percent in key areas, including logistics quality and performance. Emerging data appear to confirm that logistics performance quality is positively correlated with the COVID-19 vaccination rate across Africa (see chart).

In this regard, it is interesting to compare vaccination rates of countries with a relatively low LPI (such as the Democratic Republic of the Congo) with those that have a relatively higher LPI (such as South Africa). The Democratic Republic of the Congo's low LPI score of 2.43 reflects its problem with a very poor transport network. This has made the delivery of vaccines to remote areas difficult and in part explains why close to zero percent of the population is fully vaccinated. In addition, the Democratic Republic of the Congo and the other landlocked African countries are naturally challenged by geography and economies of scale when it comes to connecting to global supply chains. This has led to logistics-induced delays in transportation and distribution, leaving Malawi, South Sudan, and the Democratic Republic of the Congo unable to deploy and administer vaccines on short notice. In contrast, South Africa, with a score of 3.38, stands out as the top performer, thanks to its large economy (which allows for economies of scale in supply chain connections), superior and much wider network of health services, access to the sea, and proximity to major transportation hubs. On the



In the short term, measures to substantially increase vaccine delivery and uptake are essential.

other hand, Zimbabwe, Equatorial Guinea, and Comoros have relatively better vaccination rates but lower LPI scores, suggesting that other factors contribute to the uptake of vaccines in Africa. For instance, when authorities in Zimbabwe announced that those who refuse COVID-19 vaccines could be denied public sector jobs and services, the vaccination rate increased significantly in big cities. It made Zimbabwe one of the African countries with the highest vaccination rates in spite of its poor logistics performance.

Covering the last mile

After addressing the issue of vaccine supply, closing gaps in logistics performance that persist across the continent is critical to altering the current course of the pandemic in Africa. In the short term, measures to substantially increase vaccine delivery and uptake are essential. The good news is that useful lessons can be found within the region. For example, when Côte d'Ivoire started its vaccination drive, centers equipped to vaccinate 300 people a day were struggling to inoculate 20 a day. Then the government adopted innovative means to overcome the last-mile challenge. It deployed mobile clinics and medical buses that traveled to the busiest areas to vaccinate people, albeit at a significant cost. There are now fixed or mobile vaccination centers across 113 districts, and nearly all are operating close to capacity. Ghana has done the same. This could be replicated across the region in the short term with support from development agencies.

The region can also leverage digital platforms for registration and information about vaccine availability—drawing lessons from South Africa. A new e-appointment system allows citizens to schedule their own COVID-19 vaccination appointments at a convenient time and at a center close by. This is expected to increase the vaccination rate by reducing commuting distance and allowing families to schedule appointments together. Vaccine campaigns should target large cities and densely

populated areas where transmission risks are more significant and disruption to economic activities is severe in the event of a mass lockdown.

In the medium term, it is critical to develop the infrastructure inputs to the supply chain that affect logistics performance, particularly in cold-chain capacity. The COVID-19 vaccine requires special treatment and handling in transit and when being administered. The AstraZeneca vaccine can be stored safely in refrigerated conditions for up to six months. Both the Pfizer and Moderna vaccines require temperatures of –20 degrees Celsius or less. It is therefore quite concerning that a WHO survey of 34 countries found widespread gaps in cold-chain refrigeration capacity in Africa. About 30 percent of countries surveyed have gaps in cold-chain refrigeration capacity in more than half of their districts. Only 28 percent of health facilities in sub-Saharan Africa are estimated to have access to a reliable power supply. This presents logistical hurdles in storing vaccines in most districts. Addressing these structural issues should be a development priority in the medium term.

Poor-quality transport and distribution logistics stifle trade and competitiveness and, as is now apparent, will also be a major impediment to pandemic vaccination once the current supply constraints are resolved. The COVID-19 crisis presents Africa with an opportunity to leverage financial assistance from the IMF and other multilateral institutions for investment in infrastructure and trade facilitation measures that support strong logistics performance. These investments will also improve trade and competitiveness and strengthen health systems to deal with current and future shocks. **FD**

EUGENE BEMPONG NYANTAKYI is chief research economist at the African Development Bank. **JONATHAN MUNEMO** is a professor of economics at the Perdue School of Business at Salisbury University, Maryland.



Reflections on a Healthy Society

Six thinkers explore lessons learned from the pandemic to cultivate a more resilient world



Michelle Bachelet

Leave no one behind is not just a mantra, it is a necessity. The pandemic has exposed and exacerbated inequalities within and between states and demonstrated the huge costs to people and prosperity of leaving those gaps unaddressed. Yet, due in significant part to short-sighted vaccine policies, we are faced with deepening economic hardship in the developing world, while richer countries welcome signs of an economic recovery.

To recover better, we need an economy that puts human beings and rights at the center of economic policy. One that invests in health, social protection, and other human rights to curb inequalities and discrimination; embraces progressive taxation, labor rights, and decent work; and promotes meaningful public participation and civic spaces.

This human-rights-based approach to the economy is an essential lever to relaunch and accelerate our path toward realizing the United Nations 2030 Agenda for Sustainable Development.

MICHELLE BACHELET is the United Nations high commissioner for human rights.



Jeffrey Sachs

The basic lessons of happiness are these: society (and therefore government policies) should attend to people's economic needs, physical health, mental health, social connections, sense of purpose, and confidence in government. The pandemic has threatened almost every dimension of well-being and indeed has fostered rising anxieties, clinical depression, social isolation, and in many places, a loss of confidence in government.

We need more government outlays in response to the pandemic and its aftermath, but this poses two challenges: first, poor countries cannot afford to increase the provision of public services, so they urgently need access to incremental financing and debt relief on adequate terms. Second, governments need much more professionalism and competence than many (perhaps most) have displayed in response to the pandemic during the past two years.

Aristotle wrote two books as a pair: *Nicomachean Ethics* and *Politics*. *Nicomachean Ethics* is mainly about personal virtues and the household and friends, while *Politics* is about civic life, public education, and sociality at the scale of the polis (the city-state). Virtuous citizens lead to a virtuous state, while a virtuous state (and government) promotes virtues in the population. And the virtues—wisdom, justice, moderation, honesty—are all supportive of a good life.

JEFFREY SACHS is the director of the Center for Sustainable Development at Columbia University.



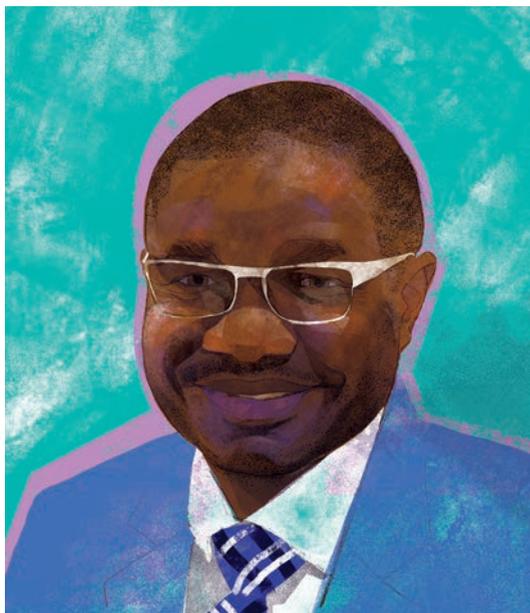
K. K. Shailaja

The worst crisis of the century has underscored the need to reassess existing health systems and formulate an effective and socially equitable strategy to combat health crises in the future. It is imperative that governments continue to strengthen their public health systems and augment the capacity to treat more infections. Protecting the physical and mental health of frontline workers should be given priority. At times of crisis, it is equally vital to galvanize the trust of the community through engagement and transparency in dissemination of information. The right to health and protection of human rights in providing care should be upheld for one and all. An inclusive response to the pandemic must be aligned with the United Nations 2030 Agenda for Sustainable Development in order to ensure that no one is left behind.

The emergence and reemergence of new and old diseases and the public health aftereffects of natural disasters are unavoidable. Health policymakers should monitor and maintain a well-functioning disease surveillance system informed by the application of principles of epidemiology to help reduce the impact of future diseases and outbreaks. This proactive approach should be further complemented by preventive health care services, along with health workforce education and training in disease surveillance and public health actions.

An integrated and collaborative One Health method needs to be promoted to share scientific and research data to tackle emerging challenges in global health and to attain optimal health for people, animals, and our environment.

K. K. SHAILAJA is the former health minister of Kerala, India.



Christian Happi

The world was not prepared to respond to the emergence of a new and deadly pathogen. With pathogens, we need to start playing offense and stop playing defense. Preventive measures must be put in place to ensure the health and wellness of citizens. This will require crucial investments in novel genomic tools and technologies for surveillance and real-time data capture and sharing.

Fortunately, we have seen the establishment of new health and wellness initiatives by private philanthropies, governments, and global health organizations, especially in the field of public health and outbreak preparedness. Examples of these initiatives include the World Health Organization's Hub for Pandemic and Epidemic Intelligence and an early warning system program called SENTINEL that is being co-led by the African Center of Excellence for Genomics of Infectious Disease at Nigeria's Redeemer's University and the Broad Institute of Harvard and MIT.

The pandemic has also highlighted the importance of investing in basic and translational scientific

research on infectious diseases, especially in Africa. Most pandemic-potential pathogens are found in Africa, which means that the continent could lead the world in the development of countermeasures and tools for preventing, detecting, and responding to outbreaks. But this has not been an investment priority for African leaders. As an example, if African countries had previously invested in vaccine research and development, they would not be waiting for vaccine donations.

Many countries on the continent also lack the local production capacity for biotechnology and the manufacture of medical supplies, drugs, and vaccines. This makes the continent vulnerable. Thankfully, we are seeing a renewed urgency toward investments in these sectors.

CHRISTIAN HAPPI is a professor of molecular biology and genomics and the director of the African Center of Excellence for Genomics of Infectious Diseases.



Kate Soper

The pandemic has added to global inequalities—in 2020, it pushed 124 million more people into poverty—and revealed the topsy-turvy nature of an economy that undervalues its most essential workers while massively rewarding its financial elite. It has also shown how environmental misuse is implicated in lifestyle illness and the spread of pandemic disease. At the same time, the lockdown experience shed light on the

Our collective health and well-being can be secured only through correcting the huge disparities of wealth and eco-privilege.



María del Rocío Sáenz Madrigal

I am a doctor by training but served for four years in government as the minister of health for Costa Rica—the first woman to do so. Those years in government gave me a 360-degree view of how the health sector and public policy intersect. After I finished my term as minister and took some leave, I was called back to serve as the executive president of the Costa Rican Social Security Fund. That allowed me to see the health system from a different perspective. Serving in those positions fundamentally shaped my view that while regulation and the provision of services are extremely important, we cannot forget the role of people, populations, and the communities we serve. They must be at the center of decision-making.

I think there are three lessons the pandemic has taught us. The first is that it has deepened preexisting gaps—access gaps, income gaps, inequality gaps. These are all very evident. The second, which is related, is that you cannot have a sufficient response without greater equity. Equity not only in terms of health outcomes, but equity in how policies are designed and implemented. The third, which I think is extremely important, is the role of community and of primary health care—strengthening the services that are close to the population. Countries with stronger primary care health systems and greater penetration at the community level have without a doubt shown greater resilience during the pandemic. [FD](#)

benefits to health and well-being of adopting slower-paced and less acquisitive ways of living, and it allowed more citizenly feeling to come into play.

If there is a lesson to be learned here, it is that our collective health and well-being can be secured only through correcting the huge disparities of wealth and eco-privilege of the current world order. The more affluent nations must now promote a green renaissance founded upon an alternative politics of prosperity. There is an opportunity here to advance beyond a way of living that is not just bad for the planet and ourselves, but also in many respects self-denying and overly fixated on work and moneymaking at the expense of the enjoyment that comes with having more time, doing more things for oneself, traveling more slowly, and consuming less stuff.

Nations whose environmental footprint grossly exceeds the planet's carrying capacity can no longer be aspirational models for the rest of the world. A cultural revolution along these lines will be comparable to the forms of social transformation and personal epiphany brought about through the feminist, anti-racist, and anti-colonial movements of recent history. It will not be easy to mount and will be fiercely opposed by those currently in power. But the gains it promises will be immense, and without them, the future is bleak for us all.

KATE SOPER is emeritus professor of philosophy at London Metropolitan University and author of *Post-Growth Living: For an Alternative Hedonism*.

MARÍA DEL ROCÍO SÁENZ MADRIGAL is a professor of health promotion at the University of Costa Rica.

Financing Future Health Systems

We must view universal health coverage as a public policy goal and an investment

Tedros Adhanom Ghebreyesus



PHOTO: COURTESY OF THE WORLD HEALTH ORGANIZATION

THE COVID-19 PANDEMIC is devastating evidence that when health is at risk, everything is at risk. That's true for individuals and families confronting a life-threatening illness, and it's true for countries—and the whole world—in the face of epidemics and pandemics.

Beyond the death and disease caused by the virus itself, COVID-19 has disrupted essential health services for millions of people, jeopardizing many of the gains made in recent years against maternal and child mortality, HIV, malaria, tuberculosis, and more. Millions have been forced into poverty, and global income has contracted.

Safeguarding people's health relies on resilient health systems that ensure everyone has access to the good-quality services they need, without facing financial hardship. This is what we mean by universal health coverage (UHC).

UHC is much more than “health care” provided by health workers in health facilities; it includes a full range of services to promote health and prevent disease at the population level—outbreak surveillance, safe water and sanitation, and anti-smoking

campaigns, just to give a few examples. Progress toward UHC therefore has many benefits beyond treating diseases, including improved health security and better protection against the ravages of future pandemics and epidemics.

At the United Nations General Assembly in September 2019, just a few months before the pandemic struck, all countries endorsed the Political Declaration on Universal Health Coverage, affirming that “health is a precondition for and an outcome and indicator of the social, economic and environmental dimensions of sustainable development and the implementation of the 2030 Agenda for Sustainable Development.”

That statement is even more relevant now than it was then. The pandemic has reminded us that health is not merely an outcome of sustainable development; it is the means.

How to sustain progress toward UHC

While the pandemic highlights the need for UHC, we must recognize the problems that predate it. Hundreds of millions of people continue to pay large portions of their household budgets out of pocket for health care. These costs can force households into poverty, wipe out their savings, and keep them from seeking care altogether.

Although COVID-19 demonstrates why UHC is so important, the pandemic may actually put it further out of reach for more people. The health crisis has triggered a global economic crisis that the world's poorest people can least afford. As a result, the already heavy debt load in some countries will only get worse, and without targeted relief, higher debt servicing costs may reduce public spending on social sectors, including health, despite a growing need for essential health services.

Public financing is the core of UHC. No country has made significant progress toward UHC without relying on public monies as its main funding source. Sustained progress toward UHC is, however, about much more than *how much* money is spent; *how well* funds are spent is the key.

How well public funds protect households from impoverishment caused by out-of-pocket health spending depends on the design of coverage policies, backed by financing that reinforces these policies through supportive budgetary and service purchasing arrangements. This entails more than just revenue: both the “engineering” and “architecture” of the entire health financing system must change.

COVID-19 has been a stress test of public financial management systems, exposing their strengths and weaknesses in responding to a health emergency. The best-performing systems have been those with a flexible budget structure that dedicates and releases funds through broad programmatic envelopes linked to policy objectives, rather than narrowly, using multiple detailed line items. The pandemic has also shown the importance of being able to move money quickly to frontline service providers through robust transfer mechanisms and formula-based allocations.

Priorities for action

The pandemic has unmasked the importance of public health by demonstrating how essential it is to human lives and livelihoods. Health and finance authorities must now work together to bolster health systems and economies in a mutually reinforcing way, through several specific actions.

First, we urge countries to rethink deficit spending policies, embracing a multiyear fiscal vision that

cushions human hardship and, where relevant, to consider actions such as debt relief and economic assistance. UHC will take more than just one year; it requires reforms sequenced over several years. It must be embedded in annual and medium-term government budgets. Health expenditure must be seen not simply as a cost, but as an investment in health security, productivity, and inclusive economic growth. We call on health and finance leaders to collaborate on budget priorities, supporting the COVID-19 response as well as non-COVID-19 health services. Macroeconomic and fiscal constraints will require reexamination of spending across sectors, including defunding ineffective programs.

Second, spending priorities must reinforce public health by increasing investment in common goods for health to control the pandemic, establishing strong health systems and bolstering societal foundations for mutual support of UHC and health security objectives. A large push is needed to establish effective public health capacities and interventions that serve all people while strengthening existing health system foundations to support preparedness for health security.

Third, we urge countries to adjust public financial management systems to align public spending on health with service delivery objectives and to ensure accountability for results. The COVID-19 crisis has magnified and exposed systemic bottlenecks in health spending. It has forced countries to adapt their public financial management systems to provide greater financial flexibility to the front lines and to tailor accountability systems to respond. Some mechanisms introduced during the COVID-19 response may be considered for future nonemergency health needs that will keep evolving and require flexibility of public finances.

Finally, and most important, equity must be at the center of UHC, by prioritizing protection against financial hardship for the poor and vulnerable. COVID-19 has exposed systemic inequities in access to health care, with the poor suffering disproportional losses. An equity-sensitive approach is critical, given that overall health coverage rates often mask growing inequalities. [FD](#)

TEDROS ADHANOM GHEBREYESUS is director-general of the World Health Organization.

WHO staff members Helene Barroy, Joe Kutzin, and Susan Sparkes provided support for this article.

Collaborating for success

The World Health Organization (WHO) has worked closely with international financial institutions in the past and will deepen this engagement in the future. Examples of this work include

- Joining forces with the World Bank on the sustainable financing accelerator of the Global Action Plan for Healthy Lives and Well-being for All, as well as the health financing workstream of the Access to COVID-19 Tools (ACT) Accelerator.
- Engaging with the IMF on sustainable financing issues under the framework of the WHO Montreux Collaborative.
- A joint review of extra-budgetary funds for COVID-19 by the WHO and the IMF was released in August 2020.
- Collaborating with both the IMF and World Bank this year to work on health budget execution issues, a new program to mobilize health and finance leaders to address bottlenecks in public expenditure management systems.

A group of Danish women enjoy water aerobics.

A Life Well Lived

Three countries provide lessons for improving health and promoting happiness

Analisa R. Bala, Adam Behsudi, and Anna Jaquierey

Denmark, Costa Rica and New Zealand stand out as three countries that are getting something right when it comes to maintaining the health and happiness of their citizens.

Case studies show that effectively delivering services at the community level, cultivating social trust, and accounting for well-being at the highest policy level all play an important role.

Living amid the despair caused by a global pandemic has taught us that happiness, as we know it in its many forms, is important for the functioning of societies.

“I’m with Aristotle on this one. Happiness, or a thriving life—or as the ancient Greeks called it, *eudaimonia*—is the *summum bonum*, the highest good,” says Columbia University economist Jeffrey Sachs, who coauthors the annual *World Happiness Report*, which ranks countries based on life evaluation surveys. “Happiness does not mean pleasure, or emotional highs, but rather a life well lived.”

Denmark: It’s a matter of trust

By her own count, Cordelia Chesnutt has taken at least 32 COVID tests. A negative test was a

requirement each time she wanted to pursue her side passion of playing badminton once Denmark lifted its lockdowns.

The tests, free and easy to schedule, were a small price to pay, she said, for ensuring the safety of others and, especially, maintaining a bit of happiness during the pandemic. It was also, to a large extent, an example of how many people in Denmark see their actions as a part of a collective effort.

Whether it’s based in enlightened self-interest or pure altruism, social trust is paramount in Denmark. Citizens trust that the government will enact policies in the public’s interest. Government trusts that citizens will maintain the social fabric. People trust that their fellow Danes will do what is required for the greater good. This social phenomenon played out during the pandemic, leading to a remarkably successful effort at stemming the virus at a relatively low human cost.

“It’s that I want to be safe, and it requires that everyone else follows the same rules and we trust that our government won’t go too far,” says Chesnutt, a 36-year-old Dane who works as a consultant on refugee issues.

Researchers often point to trust as the most important cultural trait when explaining Denmark’s



A Danish family at a COVID-19 testing site.

consistent top rankings on various measures of happiness and contentment. Rooted within society's trust is the country's robust social welfare system, providing generous unemployment, free health care and higher education, and heavily subsidized childcare.

"Essentially with all the social support from the government, you're redistributing a lot of money to strangers, and we know people are not likely to vote for that kind of system if they don't have at least some degree of trust in strangers," says Christian Bjørnskov, a professor of economics at Denmark's Aarhus University.

Bjørnskov, who recently published a book called *Happiness in the Nordic World*, said the cultural trait of trust is almost unique to Danish and other Nordic societies. But he argues that it's not necessarily the extensive social welfare that makes Danes content or happy but rather a combination of trust, tolerance, strong institutions, a long history of economic development, and a resilient democracy.

In at least one Danish town, officials have used happiness as a measure for setting an agenda. In 2014, the council of the picturesque fishing village of Dragør, near the capital city of Copenhagen, acted on a survey of its residents.

"We wanted to see what our community's priorities are, what are their dreams and, basically, what makes them happy," says Eik Dahl Bidstrup, who was mayor at the time.

The study, done in conjunction with the Denmark-based Happiness Research Institute, found the town's citizens wanted better infrastructure for their leisure time. The research resulted in

the construction of a new indoor swimming center, improvements to the town's sports facilities, more programming for senior citizens, and improvements to public space in the town's historic center and harbor.

"It's a lot about work-life balance. Work is very important to us, but our free time is just as important. It's an important priority for the community leaders to make sure there are good facilities, good possibilities for people to use their spare time," says Bidstrup, now the chairman of Krifa, a Danish labor union.

A lack of corruption is also key to a high level of trust.

"We don't have a corrupt political system. Most people have confidence in the political system," says Mogens Lykketoft, a member of the Danish Parliament who in the 1990s oversaw major tax and labor reforms as the country's longest-serving finance minister.

It is this lack of corruption, a long tradition of consensus building (no single party has held a majority since the early 1900s), and general efficiency of government services that allow most people in Denmark to accept high tax rates, he said.

"There is also underlying understanding of the fact that what the government provides in services for education, childcare, old-age care, health is more or less a contribution either to the efficiency of the business community or to the efficiency of the labor market," Lykketoft says.

Still, the system faces challenges. Difficulties integrating immigrants and refugees into the labor

market and the perceived strain on the social welfare system have been an argument for reducing social benefits, Lykketoft concedes. Although the government has put in place initiatives to address this challenge, the resulting debate over immigration has eroded trust in some corners of society.

During the pandemic, however, the country remained united, and policies to contain the virus averted the politicization that plagued many other democracies.

Michael Bang Petersen, a professor of political science at Aarhus University, led a data-driven project looking at how democracies reacted and coped with the pandemic. The project surveyed more than 400,000 people in Denmark and seven other countries. It showed that high and stable trust in Denmark's health authorities was a key reason for the country's success. More than 75 percent of eligible citizens as of late October were fully vaccinated. At the height of the pandemic, more than 60 percent of the adult population was being tested each week.

"I was a little bit worried when the test system was being rolled out. Is this something that people will see as an infringement on their rights?" Petersen says. "People instead saw it as something you did for each other. I'm being tested not because the state says that I need to be tested, but I am being tested so that I protect you, so that we can get back to a normal way of life much faster."

The experience from the pandemic has only reinforced the country's overall high levels of trust both in terms of people trusting the government (the survey found over 90 percent of Danes trust national health authorities) and vice versa.

"There is increasing evidence that there is a tight relationship between the functioning of political institutions and social trust," says Petersen. "Essentially you come to trust your fellow citizens when you know the political institutions in your country have your back if something goes wrong."

Costa Rica: The pure life

Pura vida, the "pure life." It's an expression you'll often hear in Costa Rica. One that represents the laid-back lifestyle the country is known for and gives a sense of why Costa Ricans are as happy as they are.

"If you are healthy, have work, and are able to spend time with friends and family, you are *pura vida*," says Luis Alberto Vásquez Castro, a former congressman for Costa Rica's Limón province.

The *2021 World Happiness Report* ranks Costa Rica the 16th happiest place on earth. Aside from the Czech Republic it is the only emerging market economy listed in the top 20. For a middle-income country, that's a lot of happiness per GDP dollar.

Professor Mariano Rojas, a Costa Rican economist attributes the country's high well-being to strong social relationships and a sense of community. "People are warm; the pace of life is slower. It's not a competitive society where everyone is trying to climb the career ladder."

The country also has a strong welfare system. Costa Ricans have access to free education and a guaranteed state pension. It is the only country in Central America where 100 percent of the population has access to electricity and a source of drinking water.

It is also one of the few countries in the region that offers universal health coverage.

Costa Rica has prioritized public health for decades, investing heavily in targeting the most readily preventable kinds of death and disability. In the 1970s, the country spent more on health as a proportion of GDP than even some advanced economies, including the United Kingdom.

Those investments paid off. By 1985, the nation's life expectancy was the longest in Latin America and matched that of the United States. Child mortality rates dropped from about 74 deaths per 1,000 in 1970 to 17 by 1989.

What sets Costa Rica apart, however, is its primary health care model.

Implemented in the 1990s, the model built on decades of experience with rural and community health programs, changing the culture of care delivery in the country. "It brings health to the communities," says María del Rocío Sáenz Madrigal, Costa Rica's former minister of health.

Every Costa Rican is assigned to an *equipo básico de atención integral en salud* (EBAIS)—a local primary health care team of physicians, nurses, and community health workers. Health workers visit each household annually in the area to which they're assigned to assess needs. The data they gather are combined with electronic health records and used to set targets, track progress, and focus resources on higher-risk areas.

When the system was first introduced, EBAIS teams were sent to the country's most medically underserved rural areas before expanding to urban centers. "That allowed the country to build a very

robust information system on the determinants of health—the conditions in which people live,” says Sáenz Madrigal. “It goes beyond attending to the disease. Investment in health starts with improving the conditions and quality of people’s lives. It’s a very comprehensive vision of what health and wellness is.”

Evidence shows the model works. Life expectancy rose from 75 in 1990 to 80 (well above the US). An enviable health outcome, yet the country now spends less on health care as a percentage of GDP than the world average (7.3 percent versus 10 percent in 2017).

Rojas thinks access to primary care pays. “People who are happy live longer. That’s why you need to spend less. It’s not only that health contributes to happiness. Happiness contributes to health.”

So which comes first—happiness or health? Sáenz Madrigal thinks that’s the wrong question.

“We have in Costa Rica what we call a social pact,” she says. “Regardless of the government that comes in, the one that follows must put in one more brick. The mistake we make many times is to say, ‘Everything that the previous government did is useless.’ It costs more to replace a brick than to build on one. That requires long-term vision and political will.”

Costa Rica has had a long democratic history of leaders who have made well-being a government priority. In 1869, the country became one of the first in the world to make primary school education both free and compulsory. Cristina Eguizábal, a political science professor, believes “Costa Rica has always had a very enlightened elite.”

“Costa Rican elites have been wise enough to maintain a certain level of well-being through a very robust fight against poverty,” she says. “Even though income inequality has widened, the percentage of people living in extreme poverty has fallen—until the COVID-19 crisis hit. That sense of security, empowerment, and equality is very important.”

And how did they become so wise? “Enlightenment has a dose of self-interest,” explains Eguizábal. “In the 1970s the country had one of the highest deforestation rates in Latin America. Energy in Costa Rica is mostly from hydropower, and dams were drying up. The government changed course because if it didn’t, the country would lose power.” Today, Costa Rica is a global green pioneer. “The greener your environment, the more jobs,” adds Eguizábal.



A rural Costa Rican man carves wood.

There is not just one, but many good reasons to be happy in Costa Rica, it seems.

Castro, the former congressman, confirms this: “Before being born, a Costa Rican is guaranteed life, education, food, social security, and the fact that he/she will only learn about war through a film...that is a country *pura vida!*”

New Zealand: Changing the conversation on well-being

In 2019, New Zealand’s Labor government, led by Prime Minister Jacinda Ardern, unveiled a budget aimed at tackling some of the long-term challenges the country faces in areas such as domestic violence, child poverty, and housing.

The so-called Wellbeing Budget 2019 set out to prioritize five key areas: mental health, child well-being, supporting the aspirations of the Māori and Pasifika populations, building a productive nation, and transforming the economy. It unveiled billions for mental health services and child poverty as well as record investment in measures to tackle family violence.

New Zealand, a nation of 5 million people, performs well in many measures of well-being relative to most other countries in the Organisation for



Economic Co-operation and Development. But it is also among the worst for family and sexual violence, and child poverty is also a challenge. In 2020, up to 210,500 children lived in poverty (18.4 percent), according to New Zealand's statistics agency.

A fundamental aspect of the country's well-being approach is the recognition that all aspects of what constitutes a good life must be considered holistically, whether it's access to health care and education or a strong sense of connection to one's community.

"The good news is that the conversation has changed," says Girol Karacaoglu, former chief economist at the New Zealand Treasury and now head of the School of Government at Victoria University of Wellington. He is also the author of the book *Love You: Public Policy for Intergenerational Wellbeing*.

"There's a realization that we need to worry about other things than income. New Zealand has taken this very seriously, and Budget 2019 is a good example of that."

The budget acknowledged that health and the economy go hand in hand. Kirk Hope, chief executive of BusinessNZ, sees this as a positive step.

"A lot of the investment is going into the health system. We need to get good outcomes for those

investments. Well-being is critical to business. You won't have a very productive workforce without it."

At the same time, a number of experts are saying that more work is needed to measure outcomes and empower communities.

"Process matters critically in achieving desired well-being outcomes—and the most important shift in process is the requirement to give communities more voice and resources to drive change," says Karacaoglu.

"The types of issues we are dealing with cannot be sorted out from the center—the center needs to play a listening and supporting role."

The shift toward a more holistic approach means a shift in the way government works on these issues and measures outcomes. A lot of work has to go into this process, and it takes time, says Dominic Stephens, Treasury's current chief economist.

"We're thinking more holistically about how to deliver better outcomes for people. But we're also continuing to build our understanding of well-being. This is hard."

Emily Mason, who has worked 20 years in social policy and runs a Wellington consulting firm called Frank Advice, says the measurement tools are there but the government isn't making use of them.

"Well-being as a concept is the right one but you need measures and decision-making infrastructure to



Playground in
Wellington, New Zealand.

make it work. You need the wisdom of community and of what has gone before, and to link that to data measurement, looking at each individual over the course of their lifetime. At its heart, well-being is an individual thing.”

“We have that statistical ability, but we’re not making full use of it.”

Among other things, the budget included an investment of \$NZ 1.9 billion in mental health and a particular focus on reducing child poverty, an area close to the prime minister’s heart.

Shaun Robinson, head of the New Zealand Mental Health Foundation, says a lot more needs to be done to deliver much-needed improvements in mental health. But the government is taking positive steps, including the introduction of early support services for mental health at GP practices and community centers.

“What we’re not doing is giving people the tools to take care of their own well-being and that of the people around them,” he says, adding that a recently unveiled 10-year mental health strategy does acknowledge this point and is a step in the right direction.

While some say the results of the well-being budget are yet to be seen, they also recognize the impact of the pandemic.

“Since 2019, the government has been consistent in its goals in subsequent budgets, despite being

hugely challenged by COVID-19,” says Karacaoglu.

Maree Brown, director of the Child Wellbeing Unit in the Department of the Prime Minister and Cabinet, says COVID-19 “upped the ante. ...The Child and Youth Wellbeing Strategy already had a strong focus on joined up responses to improve the well-being of children and young people with greater needs. COVID meant we had to redouble those efforts.”

The strategy, launched in August 2019, sets out a shared understanding of what young New Zealanders said they want and need for a strong sense of well-being, what the government is doing, and how others can help, Brown says.

She says local pandemic responses demonstrated the strengths that reside in communities—strengths the government should tap into.

“In the past, we’ve tended to design too many initiatives from the center. Increasingly, there’s a move to devolve resources and decision-making, to codesign with families and community stakeholders, and to resource Māori and other providers to develop solutions that work for their communities.”

“It’s a work in progress but absolutely the right direction to be moving in.” **FD**

Reported by **ANALISA R. BALA, ADAM BEHSUDI, and ANNA JAQUIERY.**



MEASURING THE ESSENCE OF *The Good Life*

The search continues for a better gauge of prosperity than GDP alone

Daniel Benjamin, Kristen Cooper, Ori Heffetz, and Miles Kimball

Gross domestic product (GDP), which measures the total output of goods and services in an economy, has flaws when used to gauge the well-being of a nation's residents.

For example, to the question of whether people in the United States are better-off in 2021 than they were before the COVID-19 pandemic, the answer would be yes, slightly, if per capita GDP is the yardstick. That's because real (inflation-adjusted) per capita GDP rose from \$58,333 in the fourth quarter of 2019 to \$58,454 in the second quarter of 2021.

But that affirmative answer is likely to ring hollow to many. The United States does not appear better-off. It experienced a fourth wave of COVID-19 infections in late 2021 that left thousands dead. Many businesses are still shuttered, and millions remain unemployed. The country is deeply divided socially and politically. GDP captures neither the enormous human costs of the pandemic, nor the nation's social and emotional disruptions.

The recognition that GDP cannot encompass many dimensions of well-being has prompted efforts to develop measures that reflect a more complete account of what people care about. The idea is not to give up on GDP—nor to replace it with some other one-dimensional measure, such as self-reported life satisfaction, which, like GDP, gives only a

partial and hence potentially misleading picture. Instead, a measure that captures many dimensions of national well-being and complements GDP is needed. Fleurbaey and Blanchet (2013) provide an overview of this idea as well as many other so-called Beyond GDP proposals and initiatives.

In this article, we discuss the Human Development Index (HDI), an alternate measure of well-being that has been influential in developing economies. We then turn to our proposed approach to measuring national well-being, which is based on aggregating people's survey responses about many dimensions of their welfare.

The Human Development Index

The HDI's roots are in the *capabilities* approach to well-being advanced by Amartya Sen (1985). Capabilities are the features of individuals and their state of life that determine the activities and internal experiences a person can effectively choose. The approach puts a direct value on freedom in the practical sense of what an individual can do. Martha Nussbaum (2011) elaborated on Sen's idea by offering a concrete list of core capabilities—including life span, health, freedom from violence and constraint, imagination and thought, emotions, freedom to chart one's own course in

Because GDP relies on market transaction data, it fails to include things human beings care about that do not run through the market.

life, good social relationships, the natural world, play, political participation, and property rights.

The HDI transforms several dimensions of well-being into a single yearly index to rate a country's performance. Sen was leery of aggregating measures of different capabilities. But when policymaking requires trade-offs, judging whether one policy is better than the alternatives requires an index. Moreover, having a single number makes it difficult for government officials to cherry-pick whichever statistic makes things look rosier. Creating an index requires weighting the capabilities relative to one another.

For GDP, prices provide the weights for the goods and services it includes. But because GDP relies on market transaction data, it fails to include things human beings care about that do not run through the market—such as leisure time, relationships with family and friends, and emotional experiences such as anxiety and sense of purpose. Moreover, although prices may represent the relative importance of different market goods and services to the well-being of an individual or household, they do not countenance the possibility that a dollar spent by a family in poverty might do more for national well-being than one spent by a billionaire's family.

Constructing the HDI

On its website, the United Nations Development Programme (UNDP) describes the HDI as “created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone.” But after those lofty words, the description turns to technical detail: “HDI is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable, and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.”

The technical details determine how the UNDP puts into practice its lofty goal: which dimensions of well-being (or capabilities) the HDI tracks, what it leaves out, and what relative importance it gives to

the things it does track. For example, according to the geometric mean used by the HDI, a percentage change in HDI is the equally weighted average of the percentage changes of its components.

The HDI is surely the best-known practical application of Sen's capabilities approach. It provides a single, simple number that both summarizes the state of a country at a point in time and is easy to construct and explain.

Getting to less arbitrary

Still, although it captures more dimensions of well-being than GDP does, the HDI is arbitrary in its choice of what to include and how to weight what it does cover. The goal of an enhanced well-being index is to include many more than three dimensions of well-being and to weight them based on the values of the people in the country.

A major reason the HDI focuses on longevity, education, and income is that when the index was introduced in 1990, these important dimensions of a good life were among the few variables being widely measured across countries in a reasonably comparable way. Unavailability of data has similarly constrained the reach of other Beyond GDP initiatives—such as the Genuine Progress Indicator and the Organisation for Economic Co-operation and Development's (OECD's) Better Life Index. But lack of current data should not constrain our vision of what a good index should look like.

Some Beyond GDP initiatives have gotten around these data constraints by using surveys, which can be conducted relatively cheaply around the world in real time. Indeed, real time is crucial to policymaking. For example, how the HDI performed during the pandemic is still unknown because, at the time of this writing, the latest numbers available are for 2019.

Some researchers have proposed using single-question survey measures of happiness or life satisfaction. However, research, including some of our own with Alex Rees-Jones of the University of Pennsylvania, suggests that answers to these survey questions do not capture the full range of what people

care about when they make choices. Partly to address this shortcoming, other Beyond GDP initiatives, such as those of the OECD and the UK Office of National Statistics, ask additional survey questions to measure dimensions of well-being other than happiness or life satisfaction. But multiple survey questions reintroduce the question of how to weight the dimensions of well-being relative to one another.

Our research makes clear the importance including multiple components in a measure of national well-being and the importance of getting the weighting right. Those issues are at the core of our efforts to construct a theoretically sound well-being index. The weights we recommend are relative marginal utilities—traditionally defined as the additional satisfaction an individual realizes from one more unit of a good or service, but in this case from one more unit of an aspect of well-being. We propose to estimate marginal utilities based on stated preferences in specially designed surveys, described below.

Some older results illustrate our approach, which we are still developing. In Benjamin, Heffetz, Kimball, and Szembrot (2014) we asked survey questions about 136 aspects of well-being—a list that aimed to comprehensively reflect all proposed aspects of well-being. (An actual index should comprise fewer aspects of well-being and avoid, or adjust for, conceptual overlaps.) The table shows estimated weights based on policy choices—described as “national policy questions that you and everyone else in your nation vote on.” Respondents chose between pairs of hypothetical policies, which involved trade-offs between aspects of well-being. Our statistical procedure inferred weights for the aspects of well-being based on respondents’ choices, so that an aspect of well-being is assigned higher weight if it has a bigger impact on the policy respondents preferred. Because of space constraints, the table illustrates the results using 18 of the 136 aspects of well-being: the three with the highest weights, other interesting aspects in the top 10, every aspect that seems closely related to HDI components, other aspects for which data are widely collected, and an aspect on the natural environment. We normalize the weight on the top aspect—freedom from corruption, injustice, and abuse of power—to 1.00.

Although many things could be said about the table, we limit ourselves to three points.

- Many of the top aspects are clearly capabilities in Sen’s sense, including the first one, which does not

guarantee a good life, but helps make one possible.

- A number of important aspects of well-being—with weights of at least 75 percent of the top aspect—are missing from many measures of national well-being, such as the HDI.
- The weights for many aspects of well-being that have received much attention are well below the weights for those at the top. For example, “people not feeling anxious”—one of four aspects collected in large samples of individuals by the UK Office of National Statistics—is weighted less than a quarter of the top aspect. For those relevant to the HDI, “people’s health” and “people’s financial security” have almost three-quarters the weight of the top aspect, but others—knowledge, skills, and access to information; understanding the world; long lives; and average income—have weights no higher than 54 percent of the top aspect.

Quantifying well-being

A personal well-being index is based on aspects of an individual’s welfare, each of which is assigned a weight based on surveys that determine people’s values and priorities.

Aspect	Weight
Freedom from corruption, injustice, and abuse of power in your nation (normalized to 1.00)	1.00
People having many options and possibilities in their lives and the freedom to choose among them	0.90
People being good, moral people and living according to their personal values	0.90
People’s sense that they are making a difference, actively contributing to the well-being of other people, and making the world a better place	0.82
People’s freedom from being lied to, deceived, or betrayed	0.77
Society helping the poor and others who struggle	0.77
People’s health	0.74
Freedom of speech and people’s ability to take part in the political process and community life	0.74
People’s financial security	0.72
The extent to which people feel the things they do in their lives are worthwhile	0.62
How happy people feel	0.59
The condition of animals, nature, and the environment in the world	0.56
People’s knowledge, skills, and access to information	0.54
People’s chances to live long lives	0.49
How satisfied people are with their lives	0.46
The average income of people in your nation	0.44
People feeling that they understand the world and the things going on around them	0.38
People not feeling anxious	0.23

Source: Benjamin, Heffetz, Kimball, and Szembrot (2014).

Note: The weights are derived from surveys of stated preference on 131 aspects of public policy. The weight on the top aspect is normalized to 1.00.



Policymakers and development practitioners should carefully consider which metrics they monitor.

Using stated preference

To construct *personal well-being indices*—which are aggregated to develop a *national well-being index*—our approach involves asking two types of survey questions about the aspects of well-being: ratings and trade-offs. In a *rating* question, respondents move a slider from 0 to 100 to indicate their level of an aspect of well-being over the past year. In a *trade-off* question, respondents choose between two options. In each trade-off option, the level of one or more aspects of well-being is slightly higher or slightly lower than the reported level in the *rating* question. In the illustration above, the choices between national policies are examples of trade-off questions.

In Benjamin, Heffetz, Kimball, and Szembrot (2014) we argue that for an individual, a well-being index can be constructed similarly to the way consumption is measured in the national accounts that are used in calculating GDP. Consumption calculations rely on quantities and prices. To compute a well-being index, reported levels of aspects of well-being from the *rating* questions are substituted for quantities, while the weights reported in the table are used in place of prices. The weights—derived from the *trade-off* questions that reveal the choices people make between aspects of well-being—represent people’s values and priorities.

In Benjamin, Cooper, Heffetz, and Kimball (2017) we lay out how much remains to be done to develop a full national well-being index that is consistent with modern welfare theory in economics. Here are three areas in which we have made the most progress to date.

First, large differences in how different people use any given scale for measuring their well-being make well-being measures seem subjective. We developed what we call “*calibration* questions” to test for systematic differences in people’s scale use—for example, some people use the whole scale, from 0 to 100, and others use only 50 to 100. We can use calibration ratings to correct for some such scale-use differences—both across individuals and even potentially across time for the same individual.

Second, we hypothesize that the trade-offs people make between different aspects of well-being are

likely to differ according to demographics—such as age and education—and how well-off people are overall. We can use such systematic tendencies to create reasonable weights without needing a huge amount of data to estimate each individual’s weights.

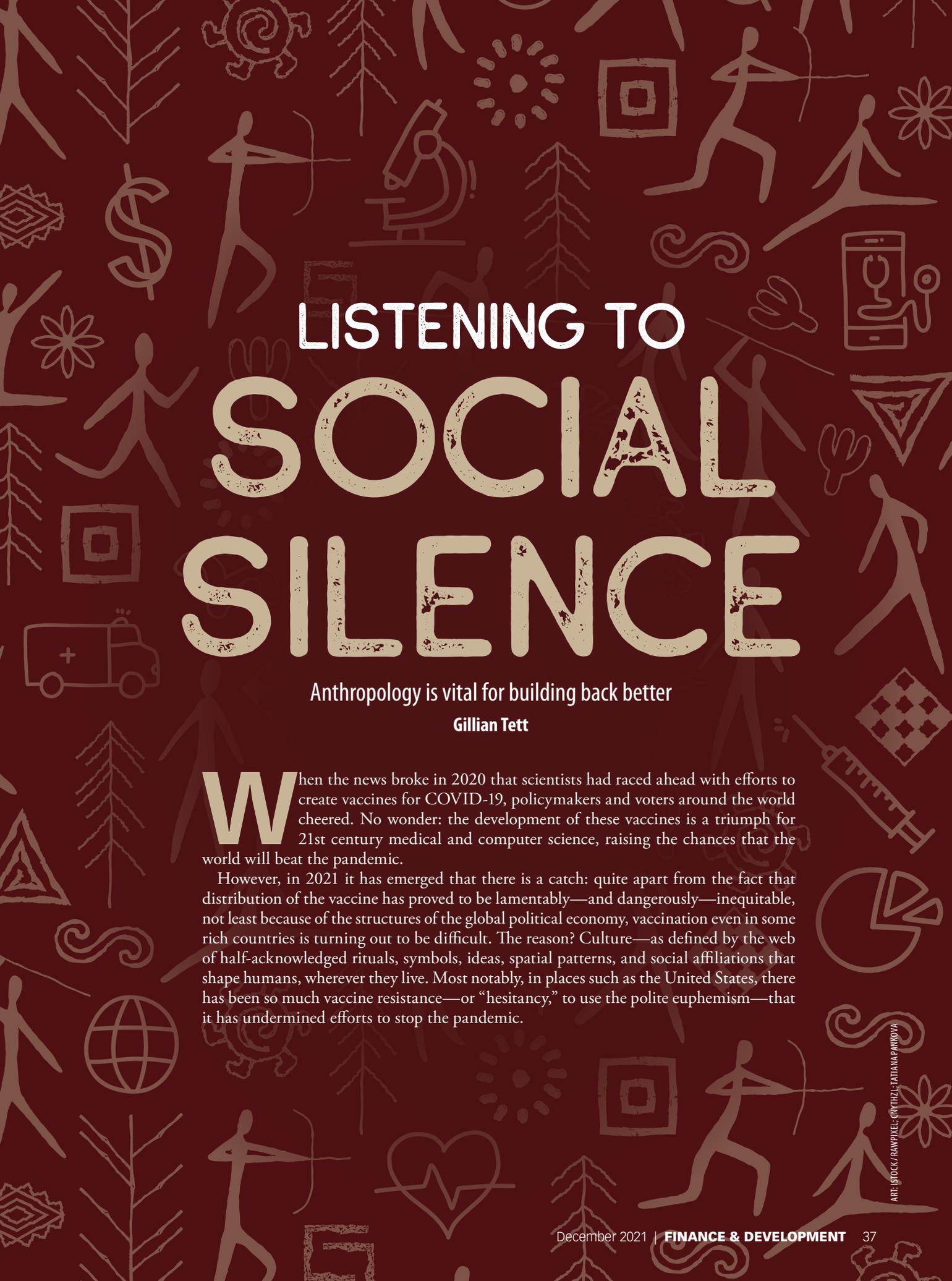
Third, we propose that the index take into account inequality—not just in income or wealth, but in personal well-being. We do not assume that an index of personal well-being can be simply added up across people to get a national index. That would imply, for example, that national well-being is at the same level whether everyone is at 50 or half the people are at 10 and half are at 90. If as a society we judge the more equal situation to be better, that society has some degree of aversion to well-being inequality, which requires employing a level of inequality aversion to transform the personal well-being indices before totaling them to obtain a national index.

“What gets measured, gets treasured” is an important maxim. In the well-being sphere, this means policymakers and development practitioners should carefully consider which metrics they monitor. Perhaps equally important, though, is properly weighting them. We can add a new adage: “What we give weight to, we value.” **FD**

DANIEL BENJAMIN is a professor at the University of California, Los Angeles. **KRISTEN COOPER** is an associate professor at Gordon College. **ORI HEFFETZ** is an associate professor at The Hebrew University of Jerusalem and Cornell University. **MILES KIMBALL** is a professor at the University of Colorado, Boulder.

References:

- Benjamin, Daniel J., Kristen B. Cooper, Ori Heffetz, and Miles S. Kimball. 2017. “Challenges in Constructing a Survey-Based Well-Being Index.” *American Economic Review* 107 (5): 81–85.
- Benjamin, Daniel J., Ori Heffetz, Miles S. Kimball, and Nichole Szembrot. 2014. “Beyond Happiness and Satisfaction: Toward Well-Being Indices Based on Stated Preference.” *American Economic Review* 104 (9): 2698–735.
- Fleurbaey, Marc, and Didier Blanchet. 2013. *Beyond GDP: Measuring Welfare and Assessing Sustainability*. Oxford, UK: Oxford University Press.
- Nussbaum, Martha. 2011. *Creating Capabilities: The Human Development Approach*. Cambridge, MA: Harvard University Press.
- Sen, Amartya. 1985. *Commodities and Capabilities*. Oxford, UK: Oxford University Press.



LISTENING TO SOCIAL SILENCE

Anthropology is vital for building back better

Gillian Tett

When the news broke in 2020 that scientists had raced ahead with efforts to create vaccines for COVID-19, policymakers and voters around the world cheered. No wonder: the development of these vaccines is a triumph for 21st century medical and computer science, raising the chances that the world will beat the pandemic.

However, in 2021 it has emerged that there is a catch: quite apart from the fact that distribution of the vaccine has proved to be lamentably—and dangerously—inequitable, not least because of the structures of the global political economy, vaccination even in some rich countries is turning out to be difficult. The reason? Culture—as defined by the web of half-acknowledged rituals, symbols, ideas, spatial patterns, and social affiliations that shape humans, wherever they live. Most notably, in places such as the United States, there has been so much vaccine resistance—or “hesitancy,” to use the polite euphemism—that it has undermined efforts to stop the pandemic.

ART: ISTOCK/RAWPIXEL, GUYHEZ, TATIANA PANKOVA



And while some jurisdictions—such as France—have managed to overcome initial vaccination hesitancy (at least to some degree), the fact that there even are such battles illustrates a crucial, but oft-ignored, point about policymaking today. Effective responses to fast-moving (or even slow-moving) challenges require more than reliance on so-called hard sciences, such as medical research or the powers of big data. You need “soft” science too, to understand human behavior and culture.

Or to put it another way, it is a profound mistake to try to solve public policy problems today just by relying on one set of intellectual tools, deployed with tunnel vision. You need lateral vision, to appreciate the wider human context and how elements that lie outside your model, big data set, or scientific trial could affect what is happening. Culture, as defined above, matters, along with environmental and political systems—and not just the pieces of our cultural systems that we openly notice (the “noise”) but also the pieces we tend to ignore because they are embarrassing or familiar or too complex to discuss (the “silence”).

We need lateral vision to deal not only with pandemics but also with a host of other issues around economic development and policymaking—climate change, pensions, and so on. Trying to devise effective policy purely on a technical basis, such as with a narrowly bounded economic model or with engineering science, is akin to walking through a dark wood at night looking only at a compass dial. No matter how technically brilliant your tool might be, if your eyes are fixed on it alone, you will trip over a tree root. Context matters.

How can policymakers adopt that lateral vision? I would suggest that one way to do this is to borrow some ideas from a field I trained in, before becoming a financial journalist: cultural anthropology. This might sound odd to some policymakers, given the discipline’s often rather dusty, exotic image—its adherents viewed as academic versions of Indiana Jones who spend their time traveling to remote locations to study colorful rituals that seem far removed from 21st century economic challenges.

However, this stereotype is not just wrong—it also creates a gigantic missed opportunity. Yes, anthropologists are dedicated to studying human culture, in all its glorious spectrum of difference. But they do not do this in a patronizing manner (unlike the early 19th century anthropologists, who had a deplorably racist, sexist, and imperialist bent). Instead 21st

century anthropologists believe that it is important to study different cultures, with respect, because that process not only yields empathy for strangers, which is crucial in a globally integrated world, it also helps us understand our own cultures better—wherever we initially hail from. It is a win-win.

After all, as the Chinese proverb goes: “A fish cannot see water.” People cannot clearly evaluate the underlying cultural assumptions they have absorbed from their surroundings unless they step back and compare them to those of others—or jump out of the fishbowl. Immersing yourself in the lives of others and tasting a little culture shock, as anthropologists do, gives you a more objective sense of your own society’s strengths and flaws—and “social silences.” As an added bonus, peering at other cultures can introduce you to new ideas and ways of solving problems. Last but not least, since anthropologists tend to take a worm’s-eye view (that is, look at things from the bottom up, in a holistic way), taking a good look at other cultures offers a different vantage point than bird’s-eye (that is, top-down) analyses.

This sounds abstract. But consider for a moment what might have happened if policymakers had adopted an anthropologist’s lens when COVID-19 erupted. To some extent, Western governments and voters would not have been so badly tripped up if they had known more about the spread of epidemics in other cultures. Assuming that diseases such as SARS, Ebola—and COVID-19—were problems exclusive to the other side of the world, Wuhan, or to people who seemed so “weird” or “exotic,” led to dangerous complacency. Nor would Western governments have had so much hubris about their own health care systems. Looking at the way the West developed medicines, conveyed health care messages, and promoted public health with an insider-outsider eye would have made it easier to see the shortcomings.

An anthropologist’s mindset could have helped Western governments import valuable lessons from other regions. Take masks. Anthropologists working in Asia have long argued that the efficacy of masks does not rest simply on physical factors—how fabric can stop germs—the act of putting one on is a powerful psychological prompt that reminds people to change their behavior and signals a person’s commitment to protecting a social group, which is crucial in a pandemic. This suggests that policymakers grappling with a pandemic should use every



IF WE IGNORE THE CULTURAL AND ENVIRONMENTAL CONTEXT OF PEOPLE'S LIVES, WE ALL SUFFER.



signal possible to encourage people to embrace this practice, even if it flies in the face of Western ideas about individualism. But this is not what initially happened in some places. In the United Kingdom, for example, the government discouraged mask wearing early on, and even after it later changed tack, the prime minister, Boris Johnson, shunned masks in public. Although that stance eventually changed, policymakers in Britain (and elsewhere) might have paid more attention to consistent messaging if they had known more about the Asian experience.

Similarly, governments should have recognized earlier the importance of cultural context when trying to disseminate health care messages and change behavior, since people rarely think about risk the way scientists do. Anybody who knew anything about Ebola in West Africa in 2014 understood this point well, since the disease was beaten—after earlier missteps—only when the messaging became more sensitive to cultural context and behavioral science was blended with anthropology, medical science, and computing. To cite one example, when global health groups initially built centers to treat Ebola victims in 2014, these featured opaque walls, which made it impossible for victims' families to see what was happening to their loved ones, and messages about Ebola were presented in terms that local people could not understand. When the messaging became more sensitive and the walls of treatment centers were redesigned to be transparent, compliance with doctors increased. Listening to local voices is crucial.

Some of these lessons about the need to be culturally sensitive have been adopted with COVID-19. Although vaccination messages were initially presented almost exclusively through the voice of scientists, for example, governments in the United States and Europe have (belatedly) realized that these “elite” messages do not resonate with some people and have switched to community voices. But this lesson now needs to be applied to numerous other policy challenges too. Climate change is perhaps the most important example. Unless governments and scientists can present environmental messages in ways that resonate in different cultures, with the right incentives, they will not

rally voter support for green policies or persuade people to embrace behavioral changes, let alone motivate them to collaborate for the good of others. Top-down models of green policies are not enough: you need a worm's-eye view as well, with empathy for people's lives, to build a just transition and avoid a backlash against green reforms.

Consider attitudes toward renewable energy. In the eyes of Western urban elites, it seems self-evident that energy sources such as wind and solar are morally superior to fossil fuels such as coal. However, these privileged urbanites live far from rural locations that could be blighted by the construction of wind turbines. Nor do they suffer the loss of identity (and livelihood) that can occur in a coal mining town when the local mine shuts down or the economic hardship of poor people when the cost of transportation rises. Empathy is needed for effective strategies to fight climate change, as well as awareness that most ordinary citizens do not see the world the way engineers and economists do.

Don't get me wrong: I am not saying that economists, doctors, computer scientists, and financiers should jettison their tools, nor that cultural anthropology is a magic wand that imparts wisdom. Like all intellectual traditions, the discipline has shortcomings, most notably that its insights can be hard to scale, and since it is mostly a qualitative, not quantitative, lens on the world, the messages can be difficult to communicate. Defining culture can seem like chasing soap in the bath: it is everywhere, but nowhere.

The key point is this: if we ignore the cultural and environmental context of people's lives, we all suffer. Conversely, if we incorporate it into our analysis, we can create more effective policy tools, with better checks and balances. The key is to combine computer, medical, economic, and financial science with social sciences and blend a worm's- and bird's-eye view. This will help us study both the noise in our lives and the silence—and build back better. **FD**

GILLIAN TETT is trained as a cultural anthropologist but now chairs the editorial board of the *Financial Times*, US. She is the author of *Anthro-Vision: A New Way to See in Business and Life*.



DATA-DRIVEN

Chris Wellisz profiles MIT's Amy Finkelstein, who tests economic models with large data sets

Ever since she produced a report on elephants in the first grade, Amy Finkelstein knew she would be a scholar like her parents, both PhD biologists. But it wasn't until her senior year at Harvard College that she chose economics.

Majoring in political science, she decided to take a course in applied microeconomics. It was 1994, and the topics reflected some of the contentious issues of the day in the United States, including how cash welfare payments affected labor force participation and whether people moved around the country in search of more generous welfare benefits.

"That was a totally transformative experience for me," Finkelstein recalls. "It opened my eyes to the idea that one could use data to inform what had otherwise seemed like ideological debates."

In the years since, Finkelstein, who now teaches at the Massachusetts Institute of Technology (MIT), has established herself among the country's preeminent health economists. In a series of groundbreaking studies, she delved into the mechanics of an industry that accounts for 18 percent of US gross domestic product and has been at the center of fierce debates over the government's role in providing health insurance. Her work has earned her the MacArthur Fellowship and the John Bates Clark Medal, awarded every year by the American Economic Association to the American economist under 40 judged to have made the biggest contribution to the field.

Finkelstein's extensive body of work ranges across a wide variety of issues, large and small, from estimating the welfare benefits of alternative social insurance programs to the effectiveness of mammogram screening. The common thread: using large data sets to test economic models—and arriving at conclusions that often challenge conventional wisdom.

"What I love about economics is the models and frameworks—the lens it gives you for how to think about social policy problems," she says. "But I'm not a theorist, and at the end of the day what I like to do is take those models and see how they work in the real world and what the quantitative implications are."

Finkelstein is a torchbearer for what fellow MIT economist and 2021 Nobel laureate Joshua Angrist has called the "credibility revolution" in empirical economics, which focuses on designing studies that seek to replicate some of the certainty of experiments in the natural sciences.

"That approach has percolated widely into many fields in economics," says MIT's James Poterba,

who was one of Finkelstein's thesis advisors. "Amy has been very influential in pushing that forward in the field of health economics."

Unusually for someone with comparatively little economics training, she won a Marshall Scholarship to study for a master's degree in economics at the University of Oxford. But the technical nature of the coursework—which seemed to have little relevance to solving real-world problems—left her uncertain about pursuing a doctorate.

White House interlude

So she accepted a junior post at the White House Council of Economic Advisers in the Bill Clinton administration. Working for a year alongside economists who could bring their academic training to bear on practical issues like the minimum wage "made it very clear that I absolutely wanted to get a PhD in economics," she says.

It also introduced her to markets for insurance against all types of risks, from unemployment to natural disasters. She found them fascinating because they often seemed to defy the laws of supply and demand, offering scope for government efforts to correct market flaws and improve human welfare.

She applied to MIT, where her dissertation on the impact of policy changes on health insurance markets laid a foundation for much of her subsequent work. She went on to collaborate on a number of articles with Poterba, including studies of so-called information asymmetries in insurance markets, whereby buyers of policies have more information about their riskiness—their likelihood of filing a claim—than insurance companies.

For years Finkelstein considered herself an insurance economist, not a health economist. But over time, she gravitated toward health, initially drawn to the rich data and fertile ground to study the impact of various policies on insurance markets but ultimately because she grew fascinated by the subject.

In a 2007 paper, she probed the reasons for the dramatic increase in US health care costs, using data from the 1965 introduction of Medicare, the insurance program for the elderly. To isolate the impact of Medicare, she took advantage of the fact that before 1965, different regions of the country had widely varying rates of private health insurance. Her conclusion: Medicare resulted in an increase in hospital spending that was six times greater than earlier research would have predicted.



Finkelstein says she keeps a mental list of questions that interest her and an eye out for settings that will help her find the answers. That is what happened in 2008, when the host of a TV comedy show she was watching joked about the state of Oregon's decision to use a lottery to choose a limited number of people to be enrolled in Medicaid, the health insurance program for low-income adults. The lottery provided an ideal opportunity to conduct a randomized controlled trial, the gold standard for scientific research.

"Oh my God, an RCT!" Finkelstein recalls thinking. "We've got to get the data!"

Commonly used in medicine to test new drugs and vaccines, randomized controlled trials were relatively rare in health care policy. Finkelstein saw an opportunity to compare one group—chosen at random for Medicaid coverage—with a similar group who signed up for the lottery but weren't enrolled.

Team research

She joined forces with Katherine Baicker, a health economist who now heads the University of Chicago's Harris School of Public Policy. They quickly assembled a team that included doctors, an epidemiologist, health services researchers, statisticians, and partners in the state government.

"She has appreciated the power of the team research model in economics, which has become very popular," Poterba says.

Finkelstein traveled to Oregon multiple times, to meet with people in the health care system and the state government and watch focus group interviews with study participants. The team conducted mail surveys as well as in-person interviews and health exams over the first two years after the lottery.

Their conclusions: Medicaid significantly increased the probability of using medical care of all kinds—primary care, preventive care, emergency room visits, and hospital admissions—increasing total health care spending by about 25 percent. Medicaid also bolstered financial security and reduced people's risk of suffering from depression.

The Oregon experiment coincided with a debate over the costs and benefits of expanding Medicaid as part of the Affordable Care Act, which was enacted in 2010. Supporters argued that expanded coverage would reduce costs by improving health and so cutting down on inefficient use of hospitals. Many critics said Medicaid provided little

benefit that recipients couldn't get on their own. Finkelstein's results cast doubt on both arguments.

Similarly, in a 2016 paper, Finkelstein and her coauthors took on the widely accepted view that health care responds little to the competitive market forces of other industries.

They looked at which hospitals Medicare patients (or their doctors) chose for conditions and procedures such as heart attacks and hip replacement surgery, which accounted for almost a fifth of Medicare spending. They found compelling evidence that higher-quality hospitals had greater market share, which tended to grow over time, suggesting that market forces played a bigger role than previously thought.

"She's a strong believer in the evidence, and if the evidence goes against the conventional wisdom or it goes against the theory. . . you ought to pay attention to it," says Harvard's Lawrence Katz, who taught the undergraduate course that inspired Finkelstein's love of economics.

Finkelstein's interest gradually shifted from the impact of health policy on consumer behavior and welfare to looking at how health care providers respond to incentives. And while she generally sticks to the measured language of scholarly publications, the title of a 2021 paper, co-written with Stanford University's Liran Einav and Neale Mahoney, seems intended to provoke controversy—"Long-Term Care Hospitals: A Case Study in Waste."

Until the early 1980s, there were only a few dozen such hospitals in the United States. But when a new payment system limited Medicare reimbursements for so-called acute care hospitals, it made an exception for long-term care hospitals (LTCHs), which are reimbursed at far higher rates than comparable skilled nursing facilities. The result: the number of LTCHs eventually mushroomed to more than 400.

Finkelstein and her collaborators found that when LTCHs come into a market, they essentially care for patients who would otherwise have gone to a skilled nursing facility. They were paid about a thousand dollars a day more and had "no measurable benefits on, say, mortality or the chance you'll be home in 90 days," she says.

After crunching 17 years of data, they concluded that Medicare could save about \$4.6 billion a year by reimbursing LTCHs on the same basis as skilled nursing facilities—with no harm to patients.

Finkelstein says the paper is an example of what MIT professor and Nobel laureate Esther Duflo



“I really appreciate it when academics in other disciplines or even my own write a user-friendly version of what they’ve learned.”

calls the “plumbing approach” to economics—identifying specific flaws that can be fixed relatively easily, as opposed to coming up with big systemic solutions that may have disappointing results or unintended consequences.

The paper generated interest in Congress and meetings with legislative staff, but no concrete action. The industry pushed back, saying that patients in LTCHs receive benefits that weren’t reflected in the study, such as reduced pain and greater comfort.

“That’s a perennial problem in health economics research,” Finkelstein says, “because often we can’t measure all aspects of health.”

Making a mark

Finkelstein says she’s not frustrated by the lack of immediate impact on policy. She hopes to make a mark in other ways, by influencing the work of other economists and training and supporting the next generation of scholars.

To that end, she and Katz established J-PAL North America, which the two codirect, in 2013. A branch of the Abdul Latif Jameel Poverty Action Lab (J-PAL) cofounded by Duflo, J-PAL North America provides staff, money, and training to help scholars conduct randomized controlled trials across a range of areas, from health care and housing to criminal justice and education.

“Some of the junior people that we were helping start their first RCTs are getting tenure or have gotten tenure and now are moving into leadership positions and able to give back themselves,” she says.

She gets high marks for teaching and mentoring students, some of whom have become collaborators. One is Heidi Williams, who was a research assistant for Finkelstein and now teaches at Stanford University. Williams and Finkelstein have collaborated on studies that examine how moving from one place to another can affect a person’s level of health care spending, their health, and the chances of opioid addiction.

Williams marvels at Finkelstein’s ability to solve knotty problems of methodology, like how to account for the impact of variables that cannot be directly observed.

“I learned as much from collaborating with her as I did as a student and a research assistant,” Williams says.

Finkelstein is also what Poterba calls “a very important provider of public goods within the profession.” In 2017, she founded *American Economic Review: Insights*, a journal that she continues to edit. Published by the American Economic Association, it’s an effort to overcome the lengthy review and revision process of traditional journals and to get relatively short articles into print quickly. She and Williams are codirectors of the Health Care Program at the National Bureau of Economic Research.

Given her intense focus on academic work, it’s perhaps not surprising that Finkelstein met her future husband, Benjamin Olken, at an economics seminar when both were graduate students. He is now a professor at MIT specializing in the public sector in developing economies.

In her limited spare time, Finkelstein says she likes to read nonfiction books aimed at a general audience.

“I really appreciate it when academics in other disciplines or even my own write a user-friendly version of what they’ve learned,” Finkelstein says. “So I thought it would be fun to try.”

She is now working on a book with longtime collaborator Liran Einav of Stanford and Raymond Fisman of Boston University. The book is aimed at lay readers and will seek to “explain how you can be a real libertarian and still think there’s scope for government intervention in insurance markets,” she says.

Finkelstein said she and her collaborators joked that the book, titled *Risky Business*, should have been called *Is Insurance Different from Broccoli?*—a reference to a quip by the late US Supreme Court Justice Antonin Scalia, who wondered whether Americans, if required to buy health insurance under the Affordable Care Act, could also be made to buy broccoli.

She sees the book as an extension of teaching. “Except now instead of teaching students, we’re trying to reach a general audience.” **FD**

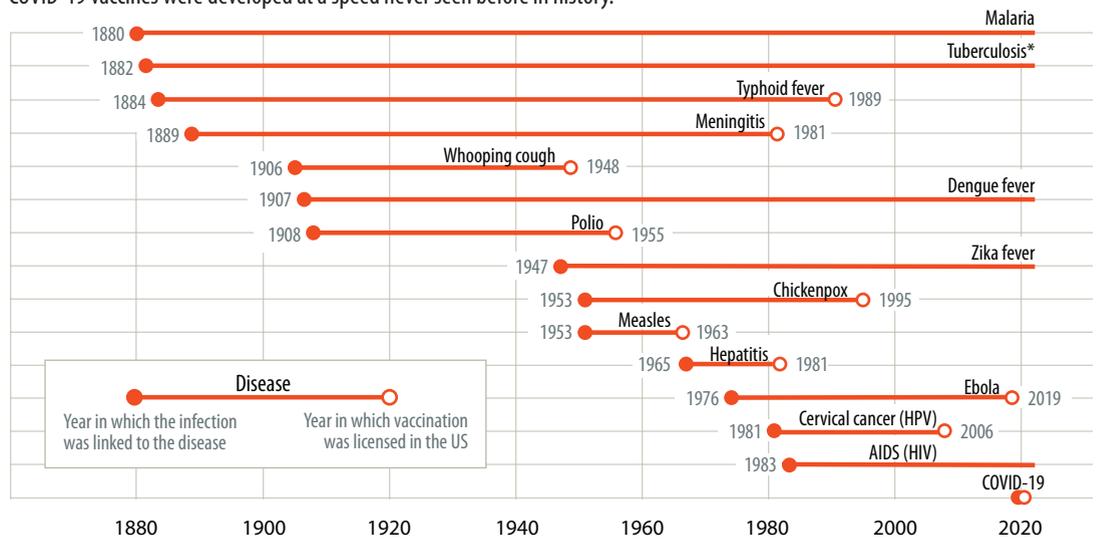
CHRIS WELLISZ is a freelance writer and editor.

THE JOURNEY OF THE COVID-19 VACCINE

The development of COVID-19 vaccines has been miraculous, but the path to inoculating the world presents many obstacles

From lab to jab

COVID-19 vaccines were developed at a speed never seen before in history.



Sources: Our World in Data; and IMF staff analysis.

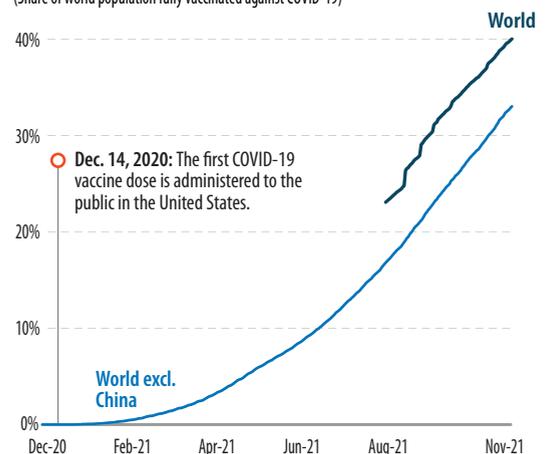
Note: *The only vaccine against tuberculosis is bacillus Calmette-Guérin (BCG), but there is no effective vaccine to prevent tuberculosis in adults. There is a partially effective vaccine against Dengue virus (CYD-TDV). Not all cervical cancers are caused by the HPV virus, but the HPV vaccine does protect against other cancers caused by the HPV virus. The hepatitis vaccine in the chart is for hepatitis B.

IN 1882, Dr. Robert Koch discovered the bacteria that cause tuberculosis (TB), at a time when it killed one of every seven people in the United States and Europe. But a vaccine wasn't developed until 1921, and it offers only moderate protection against severe TB in infants and young children. No vaccine effectively prevents TB in adults, and the disease claims 1.5 million lives a year.

In contrast, COVID-19 was identified in January, 2020. By December 2 of that year a vaccine developed by BioNTech and Pfizer was approved for emergency use in the United States. Other vaccines have since come on the market. While TB and COVID-19 are different diseases, with unique challenges, the exceptional public financing and regulatory support for COVID-19 vaccine research, development, testing, and manufacturing have been a game changer.

Shooting up

About one year down and 40% of the world is now vaccinated. (Share of world population fully vaccinated against COVID-19)



Source: Our World in Data. Last updated November 10, 2021.



A tale of three worlds

Secured vaccines, administered vaccines, and subnational administration of doses paint three very different pictures of the world's vaccination progress.

The journey of the COVID-19 vaccine has only just begun, however. The challenge now is to immunize the world and continue to conquer new variants. There has been good progress on the first front so far—total vaccination rates have risen and continue to rise rapidly.

A look at the data behind the high-level numbers, however, reveals some worries that must be addressed quickly to reach the global vaccination target of 40 percent in every country by the end of 2021 and 70 percent by mid-2022.

On the surface—in terms of secured or expected delivery of doses—things appear to be going well. Most advanced economies have contracted more than enough vaccines to cover their entire population and even many developing countries have managed to do the same directly or indirectly through vehicles like COVAX.

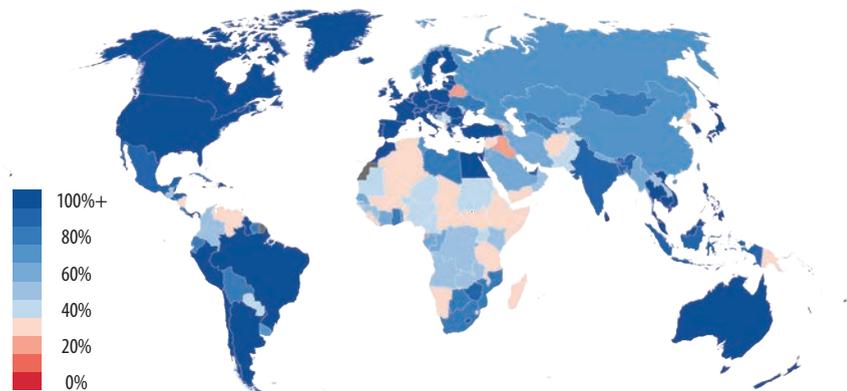
There is a problem, though, with doses delivered: a disconnect between vaccines on paper and those at port. For example, COVAX, which delivers vaccines to developing economies, has contracted and received donation pledges for over 3 billion doses, but only about 440 million of those have been received so far.

The result of this is a deep inequity in doses administered across countries: high-income countries have vaccination rates exceeding 65 percent, while many low-income countries barely top 3 percent. This is why the IMF is urging immediate action to prioritize deliveries to those developing economies with low vaccination rates.

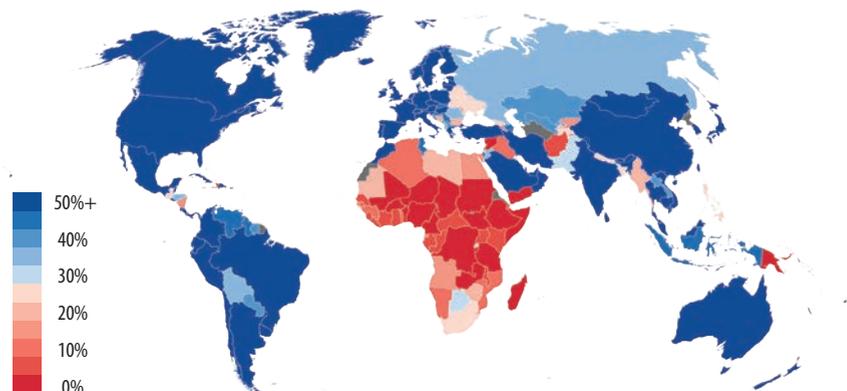
Data at the subnational level reveal another problem—uneven distribution of vaccine coverage. As seen in some advanced economies, once the near term supply challenge is addressed, demand and vaccine hesitancy may become the next big obstacle for developing countries. **FD**

ANDREW STANLEY is on the staff of *Finance & Development*.

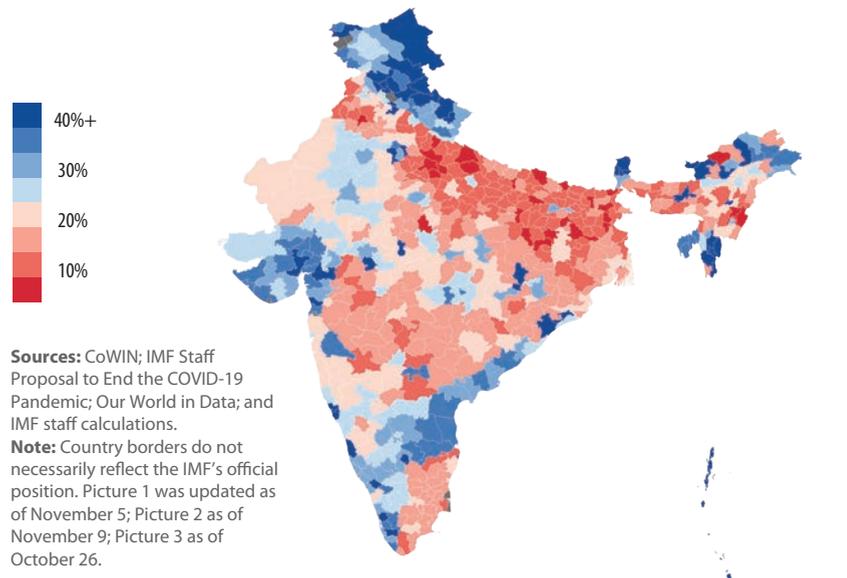
Picture 1: Secured vaccines and/or expected vaccine supply (percent of population)



Picture 2: Vaccine coverage—at least one dose administered (percent of population)



Picture 3: Subnational—population fully vaccinated in India by district (percent of population)



Sources: CoWIN; IMF Staff Proposal to End the COVID-19 Pandemic; Our World in Data; and IMF staff calculations.
Note: Country borders do not necessarily reflect the IMF's official position. Picture 1 was updated as of November 5; Picture 2 as of November 9; Picture 3 as of October 26.

ART: ISTOCK/TOMOGRAF

A doctor inside the emergency ward of Pikine Hospital in Dakar, Senegal.



TOWARD **BETTER PANDEMIC PREPAREDNESS**

Infectious disease outbreaks are inevitable—but we can mitigate their effects by investing in prevention and preparedness

Jay Patel and Devi Sridhar

Benjamin Franklin once famously said, “An ounce of prevention is worth a pound of cure.” He also warned, “By failing to prepare, you are preparing to fail.” The importance of prevention has been all too evident in the catastrophic COVID-19 pandemic: so many lives lost, livelihoods disrupted, and economies shuttered. The pandemic has been painful, and

it has been humbling, shattering expectations of which countries were best prepared for such a public health emergency. Despite their affluence and seemingly better preparation, many developed economies have experienced vastly higher death rates from COVID-19 than several developing economies, something few would have predicted before the virus spread around the globe.

PHOTO: GETTY IMAGES / JOHN WESSELS / AFP

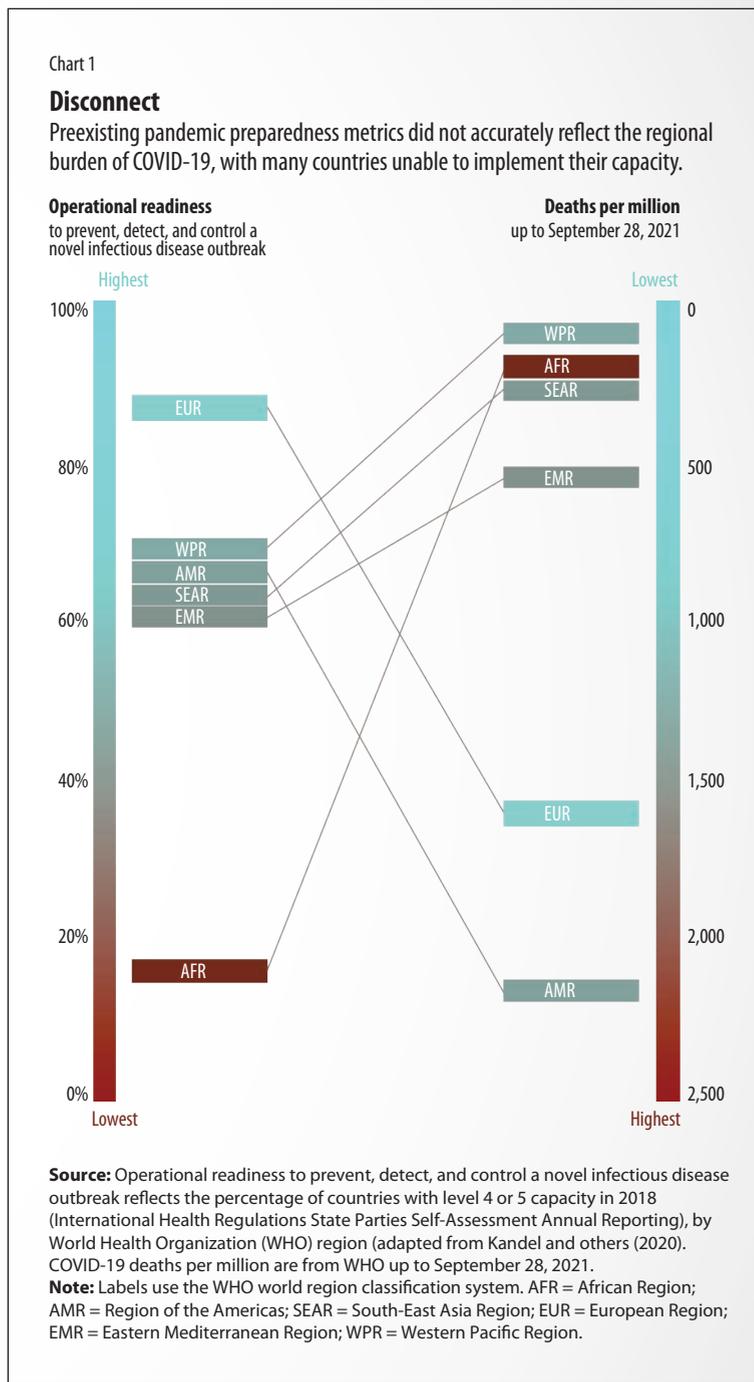
We may not know how countries will perform in the next pandemic, but we can be certain that at some point, the world will once again face a dangerous infectious disease outbreak—perhaps sooner than we think. Even if the next pandemic is inevitable, we do not need to stumble into it blindly. Instead, purposeful actions now to invest in health care and strengthen delivery systems will ensure that we are better prepared to respond to the next global health challenge.

Metrics upended

In 2019, the Global Health Security Index ranked the United States as the country best prepared to manage an infectious disease outbreak and the United Kingdom as the next best prepared. Two years after the pandemic erupted, the United States has endured the highest global death toll from COVID-19, with more than 700,000 deaths, while the United Kingdom has recorded seven times more deaths than the 20,000 that its government chief scientific adviser suggested in March 2020 would be a “good outcome.” The Global Health Security rankings, based on more than one hundred questions about dozens of indicators and sub-indicators, were no match for the novel coronavirus.

Similarly, based on a 2018 self-assessment of implementation of its International Health Regulations (IHR), the World Health Organization (WHO) deemed 86 percent of countries in Europe to be at the highest levels of pandemic preparedness, making the region the most prepared—at least on paper—to manage a novel infectious disease outbreak. In practice, Europe experienced the second highest death rate from COVID-19 of any region, at 1,294 per million people. Conversely in Africa, where the WHO considered just 15 percent of countries to be adequately prepared, fewer than 205 deaths per million have been reported (Chart 1).

Predictive metrics did not capture how experience with prior viral outbreaks would help West African countries combat COVID-19. In Liberia, reforms made in the wake of the 2014–16 Ebola outbreak to standardize and improve community-based health care proved beneficial when the first coronavirus cases were identified. In Sierra Leone, public health teams adapted targeted quarantine measures used for suspected and confirmed Ebola patients to isolate COVID-19 cases. Cross-country collaboration fostered in prior



outbreaks also demonstrated value: in February 2020, Senegal’s Institut Pasteur de Dakar was one of only two laboratories in Africa able to test for SARS-CoV-2, with free tests yielding results within 24 hours or less. Staff at the Dakar lab shared their expertise and offered training to

Chart 2

The case for investment

Investing in pandemic prevention and preparedness delivers substantial returns.

Opportunities for G20 commitments

\$15 billion



Minimum annual international financing

or

■ = \$10 billion

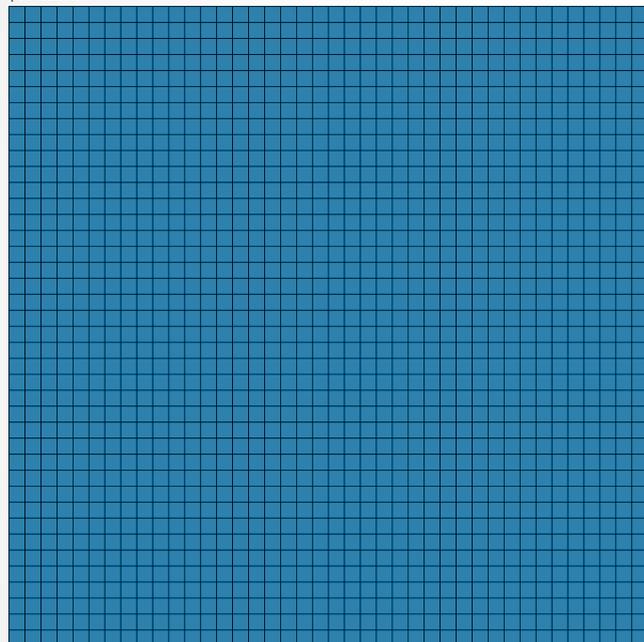
\$75 billion



Minimum five-year international financing with sustained investments over subsequent years

Estimated cost of COVID-19

\$16 trillion



Source: G20 commitments are based on *A Global Deal for Our Pandemic Age* by the G20 High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response. The estimated economic loss from the COVID-19 pandemic is the minimum estimate from McKinsey & Company.

others outside Senegal, and by April 2020, 43 African countries had the capacity to effectively diagnose COVID-19.

Meanwhile, some of the world’s strongest health systems, including Italy’s Servizio Sanitario Nazionale, and some of the largest, including Brazil’s Sistema Único de Saúde, were shown to be woefully overstretched in the face of the pandemic, almost to the point of collapse. Even now, the provision of routine essential health care services remains fragile in these countries.

What went wrong in countries with seemingly resilient health infrastructures? As crystallized by American physician Paul Farmer, effective health care requires four key elements: “staff, stuff, space, and systems.” Amid the early escalation of community transmission, the UK government attempted to rapidly boost capacity by building seven emergency hospital facilities. It spent \$736 million on these Nightingale Hospitals, which largely went unused even as existing hospital capacities neared a breaking point. The reason: adding space, stuff, and systems was futile without enough trained staff on hand.

In contrast, faced with early signs of local COVID-19 transmission, countries across sub-Saharan Africa and East Asia took a more bottom-up approach toward capacity building, thereby largely avoiding the need for lockdowns in 2020. Over four decades, Thailand had recruited a large network of volunteers, which was mobilized to assist in the logistical aspects of the response, providing coverage even in the most remote areas. In Vietnam, engaging existing local governance structures facilitated effective community-based coordination of quarantines and self-isolation. In Japan, rapidly training public health nurses allowed for thorough retrospective and prospective contact tracing, helping to identify the main clusters of transmission within the first few weeks of the outbreak. Implementing supportive interventions and conferring power on local government helped many countries curb transmission of the virus and avoid harsher, more sweeping measures.

Investing in prevention and preparedness

The COVID-19 pandemic has made the economic case for investing in health abundantly clear. Going forward, we must view health security as an investment rather than a cost; consider that by 2025, COVID-19 will have a global economic burden of \$16–\$35 trillion, according to estimates from McKinsey & Company and an independent G20 panel. If better preparedness reduced this cost even modestly, the return on investment, in absolute terms, would be substantial (Chart 2).

Policy differences aside, societies with a prevalence of chronic noncommunicable diseases and stark structural inequities fared poorly against the novel coronavirus. Rooting out both requires

a long-term strategic plan but would be a key step toward securing a more sustainable world. Investing in health pays dividends twice over: first, in times of acute public health emergencies, including the growing challenge of antimicrobial resistance, and second, in building healthier and more equitable societies—both essential components of health security. Fortunately, for governments seeking short-term progress within election cycles, the latter delivers swift and continuous value in everyday health care. Finland’s government, for example, recognized that a good public health strategy for COVID-19 required agile and generous financing, but would offer payback from better fiscal protection and a speedier economic recovery.

Another lesson of the COVID-19 pandemic is that science delivers when governments provide a supportive environment for it. Most health experts would not have described a pathogen triggering a pandemic as *unprecedented* but might use the term to describe the speed of scientific innovation and discovery throughout the COVID-19 pandemic. The development of multiple safe and effective COVID-19 vaccines was not the result of good luck but the fruit of decades of investment in scientific research. Governments built on their prior investments to accelerate the development and distribution of vaccines at a time when the world desperately needed therapeutic solutions. When addressing global health crises in the future, government support for science and technology, including amid periods of uncertainty, will be imperative.

The COVAX Facility, intended to ensure global vaccine equity, has underdelivered on its commitments. The mechanism to procure vaccines for low-to middle-income countries lacks the financial power to bring down prices, forcing COVAX to the back of the queue and reducing it to relying on donations. To echo a quote on the cover of a past issue of the *Lancet*: “rich countries behaved worse than anyone’s worst nightmares,” hoarding excess supplies of vaccines and, in the case of Canada, ordering doses equal to 10 times its population. Building and scaling up vaccine manufacturing hubs in low-income regions would help end the acute phase of the pandemic sooner and provide an infrastructure for combating other infectious diseases.

On a global level, the pandemic revealed deficiencies in health security agreements such as the IHR, which legally binds 196 countries to develop

Another lesson of the COVID-19 pandemic is that science delivers when governments provide a supportive environment for it.

capacities to rapidly report and respond to disease outbreaks. As seen in the pandemic, many countries complied only in part, due to an incomplete awareness of the regulations or a deliberate flouting of them. Better compliance with the IHR surely would have resulted in responses that were timelier and more effective in safeguarding public health.

Although the pandemic exposed its shortcomings, the IHR remains indisputably central to the global health architecture for pandemics, and when adhered to, can be meaningful in any health emergency. Adjustments are needed, especially to adopt a more nuanced alerting mechanism and empower the WHO to continually review and improve member states’ compliance with the overall regime. For a revamped IHR to succeed, the WHO must have the financial support, authority, and trust needed to ensure better compliance with these potentially life-saving regulations. An increase in funding of \$1 billion a year in assessed contributions for the WHO would be a start.

Successes and failures in the COVID-19 pandemic have shown us what we must do to be better prepared for the next pandemic. And, as Benjamin Franklin warned, if we fail to prepare for that event, we must be prepared to fail again—and to suffer the consequences. **FD**

JAY PATEL is a researcher at the Global Health Governance Programme, University of Edinburgh, where **DEVI SRIDHAR** is professor and chair of global public health.

This article draws on Devi Sridhar’s forthcoming book, Preventable: The Politics of Pandemics and How to Stop the Next One.

References:

Group of Twenty (G20). 2021. “A Global Deal for Our Pandemic Age.” Report of the High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response.

Kandel, N., S. Chungong, A. Omaar, and J. Xing. 2020. “Health Security Capacities in the Context of COVID-19 Outbreak: An Analysis of International Health Regulations Annual Report Data from 182 countries.” *Lancet* 395 (10229): 1047–53.

McKinsey & Company. 2021. “How Might the COVID-19 Pandemic End?” July 19.



PANDEMIC LESSONS

The Global Fund's Peter Sands believes that economists should pay more attention to global health

C OVID-19 took everyone, including economists, by surprise. Pandemics pose significant macroeconomic costs, but only recently have garnered the attention they deserve.

This disconnect troubles Peter Sands, executive director of the Global Fund to Fight AIDS, TB and Malaria, whose background is in both finance and health. Previously, he was CEO of Standard Chartered, the lead non-executive director on the board of the UK Department of Health, and a board member of the Global Business Coalition on AIDS, TB and Malaria.

In an interview with Ruchir Agarwal—head of the IMF's Global Health and Pandemic Response Taskforce, established to enhance the Fund's contributions to fight COVID-19—Sands reflects on global health, pandemics, and why economists should care.

F&D: Early in the pandemic, you wrote “When Finance Fails,” which investigated economists’ failure to anticipate the COVID collapse. Why did that happen?

PS: After I left Standard Chartered, I spent time as a research fellow at Harvard looking at the economics and finance of global health, particularly around pandemics. I was especially fascinated that almost no one in the financial or economic world, including the IMF, seemed to take the risk of such outbreaks seriously. Specifically, I identified 15 countries that had suffered infectious disease outbreaks and looked at the country reports published by the IMF, S&P, and the Economist Intelligence Unit two years prior and two years after those outbreaks. While outbreaks were mentioned in 63 percent of the IMF reports published *afterwards*, not a single report published *before* an outbreak highlighted the risk. And this was not unique to the IMF reports.

What causes this blind spot? For one, humans, even economists, are not good at estimating low-probability, high-impact events. We either exaggerate or ignore them. People tend to examine the risks they understand, and because institutions like the IMF didn't feel comfortable with issues related to epidemiology, they didn't look at them. There was a chasm of understanding between the worlds of health and economics, both highly specialized and technical, whose people can't speak each other's language.

F&D: What unique perspectives can the IMF bring to assessing the impact of such outbreaks ahead of time?

PS: Relatively minor outbreaks occur regularly, but every now and then one surges, as we've seen with COVID-19. It is possible to assess a country's vulnerability to outbreaks and its ability to deal with them, just as the IMF assesses a country's ability to deal with other macrocritical challenges, such as liquidity shocks. The IMF could draw on others for the epidemiological side but look at how an outbreak could affect the economy. This requires skills and capacities that are core strengths of the IMF.

F&D: Has COVID-19 highlighted the macrocritical aspects of health? Are you optimistic that institutions like the IMF will now pay more attention to them?

“As a banker, I heard people say, ‘time is money.’ In the global health world, time is life.”

PS: If large institutions like the Fund haven’t worked out that infectious diseases can have massive macroeconomic and financial effects because of COVID-19, I don’t know what will convince them. It’s even bigger than the global financial crisis. The pandemic revealed how transmissions between diseases and economies work, such as who wins and loses—some of which is surprising. But I don’t think anybody can now say, “If I’m going to assess future economic risks, I can ignore the threat of a potential pandemic.”

F&D: From your vantage point at the Global Fund, what are the key near-term priorities to save lives and support a broad-based economic recovery?

PS: The Global Fund was set up to fight the last big pandemic, HIV/AIDS, which killed nearly 40 million people. Our core strength is fighting the biggest infectious diseases. We responded to the COVID-19 crisis very quickly, making money available in March 2020. Since then, we’ve deployed about \$4 billion. The Global Fund has been the primary provider of support to low- and middle-income countries for non-vaccine health elements, such as testing, PPE [personal protective equipment], and oxygen.

To beat the pandemic, it is necessary to go bigger and faster. The logic of fighting infectious diseases is to hit them fast because there’s a nonlinear impact both on beating them and if you let them run rampant. A lopsided response must be avoided. Vaccines are our most potent weapon, but vaccines alone will not defeat COVID. A more comprehensive response that encompasses a wider range of elements is needed.

F&D: Has the pandemic affected the world’s ability to tackle other major diseases?

PS: COVID-19 is the worst thing that ever happened to the fight against HIV, TB, and malaria. The Global Fund recently published its 2020 results report; for the first time in our 20-year history, there were reverses in key results across all three diseases. To put this into perspective, in most

low- and low-middle-income countries, HIV, TB, and malaria kill more people than COVID. We need a response that deals with both the direct impact of COVID and its knock-on impact on these other diseases.

F&D: Could COVID-19 catalyze support for a comprehensive approach to global health, not just disease by disease but across a broad spectrum?

PS: People need to be protected from a whole slew of pathogens. It makes no sense to save someone from COVID-19 only for them to die of TB. Another lesson is the value of an end-to-end perspective, with people who are involved in the deployment of new medical tools working with those developing and launching them.

The third lesson is the value of time. As a banker, I heard people say, “time is money.” In the global health world, time is life. But the global health world doesn’t always work like that; it is more measured. We have responded to COVID at an unprecedented pace. We should translate that urgency into our response to other diseases.

F&D: There’s been recent good news on approval of a malaria vaccine. Are you optimistic about other areas in the months and years ahead?

PS: The COVID-19 experience—which broke previous assumptions about how long it takes to develop responses such as rapid diagnostic tests and vaccines—is challenging expectations about how long it takes to develop these for other diseases as well. The approval of RTS,S, the new malaria vaccine, took years, and the Global Fund put money into its development. And there are other examples. We’ve talked with people in the TB world who are excited about the possibility of a vaccine in four to five years. I’ve been asking, If we can develop a vaccine in just a year for a virus we’d never seen before, why are we excited about waiting four to five years for a vaccine for a disease we’ve had for hundreds of years? We need a different sense of urgency. **FD**

This interview has been edited for length and clarity.

A New Public Health Order for Africa

Regional solutions are what we need to get us through the next pandemic

John Nkengasong



PHOTO: COURTESY OF JOHN NKENGASONG

WE ARE IN THE MIDST of a third wave of COVID-19. In countries able to access vaccines, morbidity and mortality rates have fallen. But in Africa, where less than 3 percent of the population is fully vaccinated, the number of cases per week is at record highs. As of November 3, 2021, there were 8.5 million confirmed cases and over 218,000 COVID-19 fatalities across the continent.

The pandemic has overwhelmed health systems, taking scarce resources away from fending off concurrent epidemics and managing an already high disease burden. This burden is related to factors including rapid population growth; infectious and noncommunicable diseases; high maternal morbidity; and environmental, climatic, and ecological changes. Africa is fighting these battles with about 3 million health care workers—that's 3 doctors per 10,000

people, compared with nearly 30 for the Americas and more than 40 for Europe.

Homegrown solutions

The 2014–16 Ebola virus outbreak in West Africa provided several lessons. The continent clearly needed stronger surveillance and governance systems and better national pandemic management capacity and capability—in addition to significantly more predictable funding. But to succeed, coordination, communication, and collaboration through the African Union were crucial.

The Africa Centres for Disease Control and Prevention (Africa CDC) has played a pivotal role in coordinating the African Union's continental response strategy during the current pandemic. The strategy was released less than six weeks after the first confirmed case on the continent and created several unprecedented mechanisms.

The pan-African Partnership to Accelerate COVID-19 Testing was launched by the African Union Commission (AUC) and Africa CDC in April 2020. Because of the vaccine gap, African countries have largely relied on testing to get ahead of the virus. Thanks to the partnership, the number of countries with testing capacity increased from 2 to 43 in just three months. More than 90 million test kits were procured and thousands of lab workers trained.

The African Union partnered with Africa CDC, the United Nations Economic Commission for Africa, and the African Export-Import Bank to create a medical supplies platform. The platform makes it easier for governments to locate and purchase vital personal protective equipment by acting as a one-stop shop for procurement, which has improved Africa's bargaining power while supporting African manufacturers.

The AUC and Africa CDC also launched the Trusted Travel Platform to simplify the verification of COVID-19 test results and public documentation for travelers. Beyond COVID-19, the system could also be used for the African Continental Free Trade Area.

The African Vaccine Acquisition Trust was established to complement initiatives such as COVAX—a global risk-sharing mechanism for pooled procurement and equitable distribution of COVID-19 vaccines. The Trust has secured enough vaccine doses to cover one-third of the African population.

The case for regionalization

The examples mentioned show that regional institutions have an important role to play that goes beyond backstopping countries. They can innovate and help adapt responses to regional needs, and are close enough to decision-makers to secure the required political support—all important elements of success.

Our work at Africa CDC is guided by the need for a new public health order for Africa and a focus on five core areas for the continent's mid- to longer-term health security:

- **Strong regional institutions** to guide priorities, coordinate policies and programs, and drive standard-setting and disease surveillance;
- **Local production of vaccines, therapeutics, and diagnostics** to drive down procurement costs and increase response speed;
- **Investment in the public health workforce and leadership programs;**
- **Strong, high-level partnerships**, including between donors and governments and the public and private sectors and with public health institutions; and
- **A greater role for regional organizations in pandemic governance**, by decentralizing institutions and through regional representatives in key agencies to ensure that the specificities and needs of each region are considered in the planning of central mechanisms such as surveillance systems.

This new public health order requires more predictable, long-term funding. Funding needed for national public health institutes differs widely based on size, function, and country, but a starting budget of at least \$20 million is required. Most important, tens of billions of dollars will be needed to train nurses, physicians, epidemiologists, and other health care workers. Continental manufacturing of vaccines, diagnostics, and therapeutics will also require up-front investments in infrastructure, materials, and staff.

These calculations do not include the additional funding needs identified on a global level. For example, support for global institutions such as the World Health Organization; access to vaccines, diagnostics, and therapeutics; global surveillance and alert systems; and rapid surge funding for (early) response activities.

While there should be more domestic funding, it will not be sufficient for the needs of low- and many lower-middle-income countries, at least not in the foreseeable future. It must be bolstered by favorable financing options, supported by strong partnerships and investments in pandemic preparedness and response, and backstopped by a fund that can pay for surge expenses as needed.

Regional institutions have an important role to play that goes beyond backstopping countries.

Both the Independent Panel for Pandemic Preparedness and Response and the G20 High Level Independent Panel on Financing the Global Commons for Pandemic Preparedness and Response recommend a global fund. The G20 panel estimates that it will cost at least \$75 billion over the next five years to fill gaps in pandemic prevention and preparedness.

People-centered health systems

The continuing threat of COVID-19, the effort to rebuild what has been lost over the past year and a half, and the task of ensuring that the next pandemic is managed more effectively require a fundamental rethink of our approach to global public health.

We need people-centered health systems that are inclusive. Equity starts by regionalizing health systems so that when a crisis hits, regions have the capacity and ability to respond.

COVID-19 is a tragedy whose lessons are too significant to ignore. If we take those lessons learned and translate them into a new public health order, we can lessen the effects of future pandemics on our lives and livelihoods. **FD**

JOHN NKENGASONG is director of the Africa Centres for Disease Control and Prevention.



DEMENTIA STORM

ON THE HORIZON

The rising incidence of dementia around the world calls for global collaboration and decisive financing

Nathaniel Counts, Arindam Nandi, Benjamin Seligman, and Daniel Tortorice

The world has been appropriately preoccupied with the COVID-19 pandemic for nearly two years. But this immediate crisis should not stop us from preparing for another impending public health threat: Alzheimer's disease and related dementias. Without investment in more effective and accessible treatments and prevention strategies, dementia will slow economic growth and undermine global health and economic equity. Nations must act now to prepare for this underappreciated global health challenge.

Dementia results in significant declines in not only cognitive performance but also overall psychological and physical functioning, inevitably interfering with

an individual's ability to remain independent. The conditions grouped together under Alzheimer's disease and related dementias (Alzheimer's dementia, vascular dementia, Lewy body dementia, and frontotemporal dementia) have different underlying pathologies but share important features. All are progressive and ultimately fatal, and all are irreversible and lack treatments. Symptoms of Alzheimer's disease and related dementias are relatively rare in people younger than 50, but their prevalence practically doubles every five years thereafter.

The first step in addressing a problem is understanding its scope. A common measure of the burden of disease is disability-adjusted life years,

which accounts for the impacts on both functioning and life expectancy. Though this is an imperfect measure that can reinforce ableism and ageism, it still provides a chilling snapshot of the damage wrought by dementia.

Dementia is currently the sixth greatest contributor to disability burdens globally among people ages 55 and up. The burden of disability escalates with population aging: dementia contributed 33.1 million disability-adjusted life years in 2019, and if the burden continues to grow at the same rate as in the past decade, it will contribute 55.1 million in 2030, 81.1 million in 2040, and 115.8 million in 2050. Ultimately, the global burden of dementia will more than triple over the next 30 years and it will become the fifth greatest contributor to global disability in this age group (Bloom and others 2021).

Worse yet, the center of gravity for the global disease burden of dementia is shifting from advanced economies to low- and middle-income countries, reflecting changes in the global distribution of older adults. Lower-middle-income countries will account for nearly 30 percent of the growth in dementia-related disability-adjusted life years from 2019 to 2050. Upper-middle-income countries will also account for a growing share (12 percent growth during 2019–2050). By contrast, the share in advanced economies will decrease by 30 percent. By 2050, poorer countries are projected to contribute more to the global disease burden of dementia than wealthier ones (Bloom and others 2021).

Dementia's economic burden

In addition to the human toll, dementia imposes a substantial economic burden. Researchers have made several efforts to estimate the economic and societal burdens of this group of diseases and forecast the potential future costs. We selected five representative studies that forecast the economic or societal burden of dementia to illustrate the predicted burden (see table).

All the studies forecast substantial increases in the societal and economic burden of dementia in the coming decades. Many find that the burden will more than double between 2020 and 2050, with one study forecasting a nine-fold increase. The per capita estimates of forecast economic and societal burden vary depending on the costs included, the methods used to quantify and extrapolate those costs, and the context in which the burden was estimated. All studies

examined direct medical costs, such as outpatient and inpatient care and long-term care costs; some also included nonmedical costs, such as transportation to appointments. Many studies also tried to include costs associated with informal caregiving.

These findings of dementia's growing economic and societal burdens do not account for some key aspects of their full extent. For example, none of these studies examined the effects of dementia on productive activities outside of the market (for example, uncompensated childcare that older adults provide) or take into account the extent to which individuals value averting dementia. The actual social and economic burden is thus likely to be larger than the studies predict.

These impacts of dementia impede economic growth. The findings above indicate that the rising burden of dementia will deplete the labor force and reduce productivity as individuals take on informal caregiving roles for those with dementia, as well as reduce the capital supply available to invest elsewhere as dementia care consumes substantial resources. These effects will impact global economic equity as the burden begins to shift to lower- and middle-income countries.

Inadequate funding

Given the growing economic and societal burden of dementia, global investment in its treatment, supportive care, and prevention is seriously lacking. Cancers have more than 50 times as many interventional clinical trials registered on ClinicalTrials.gov as dementia, even though the latter contributes approximately eight times more to disability. If dementia received investments comparable to cancer, it would likely initiate a cascade of much-needed treatment breakthroughs.

Funding for addressing dementia care is, unfortunately, inadequate. Multiple randomized controlled trials demonstrate the benefits of interdisciplinary, team-based care for caregivers and patients. Despite the extensive evidence of their benefit, these approaches to mitigating the costs of dementia are under-implemented. Wider implementation may be hampered by fee-for-service health care payment models, which undervalue team-based care.

In terms of research and development (R&D) for new treatments, dementia has one of the highest failure rates in clinical development. An analysis of 150 trials completed between 1998 and 2017 for Alzheimer's disease found 146 failures; only 4 were

The growing cost of dementia

Five studies forecast the rising burden of dementia on society and the economy.

Article	AD/Dementia	Country	Types of Costs	Total Costs Forecast (2020 US\$, billions)	Per Capita Forecast Costs (2020 US\$)
Cimler and others (2019)	AD	European Union	Direct medical costs (inpatient and outpatient costs, AD-related treatment), long-term care, informal care costs (opportunity cost)	2015: 281 2030: 510 2040: 636 2050: 766 2060: 862 2070: 906 2080: 933	2015: 553 2030: 988 2040: 1,239 2050: 1,511 2060: 1,735 2070: 1,857 2080: 1,935
Jia and others (2018)	AD & Dementia	China/Global	Direct medical costs (inpatient, outpatient, out-of-pocket costs) Direct nonmedical costs (social sector costs, formal long-term-care fees, nourishment) Indirect costs (opportunity cost, caregiver mental health, and patient comorbidities)	AD Costs China 2015: 183 2020: 272 2030: 554 2040: 1,092 2050: 2,064 Dementia Costs Global 2015: 1,046 2020: 1,452 2030: 2,774 2040: 5,274 2050: 9,959	AD Costs China 2015: 571 2020: 820 2030: 1,585 2040: 2,979 2050: 5,439 Dementia Costs Global 2015: 3,259 2020: 4,388 2030: 7,933 2040: 14,388 2050: 26,247
Sado and others (2018)	Dementia	Japan	Direct medical costs (inpatient and outpatient costs) Formal long-term-care costs, informal care costs (mixed replacement cost and opportunity cost)	2015: 144 2020: 168 2030: 206 2040: 221 2050: 219	2015: 1,129 2020: 1,325 2030: 1,704 2040: 1,947 2050: 2,071
Wimo and others (2017)	Dementia	Global	Direct medical costs Direct social care costs Informal care costs (opportunity cost)	2015: 893 2030: 2,180	2015: 2,784 2030: 6,246
Hurd and others (2013)	Dementia	United States	Care purchased in marketplace (out-of-pocket costs, Medicare, long-term-care assistance) Informal costs (replacement cost or forgone wages of caregivers)	Replacement Cost 2010: 385 2020: 456 2030: 646 2040: 914 Forgone Wages 2010: 318 2020: 377 2030: 534 2040: 757	Replacement Cost 2010: 1,244 2020: 1,377 2030: 1,847 2040: 2,493 Forgone Wages 2010: 1,029 2020: 1,140 2030: 1,528 2040: 2,066

Sources: As cited in the table.

Note: AD = Alzheimer's disease. All costs are adjusted to 2020 US dollars and calculated as per capita costs based on the populations in the region. Because of differences in discount rates, not all forecasts may be directly comparable.

approved by the US Food and Drug Administration (PhRMA 2018). This equates to a 2.7 percent success rate, while the success rate of drug development programs overall (those eventually leading to FDA approval) has been pegged at 13.8 percent (Wong, Siah, and Lo 2019).

The disease process for dementia is still not well understood, which could also be holding back R&D. Moreover, while hundreds of candidate therapies demonstrate effectiveness in animal models, the findings do not seem to translate well to humans. R&D is also not well

coordinated globally, and data sharing has been limited. Finally, clinical trials for dementia are often prohibitively expensive because of the difficulty in recruiting participants.

Learning from COVID-19

But there are lessons to be learned from the COVID-19 pandemic, which has demonstrated the need for greater planning to escape the woefully suboptimal cycles of neglect and panic: neglecting health challenges until they are upon us, and then panicking to belatedly address them.

Unlike COVID-19–type pandemics, which are characterized as low-probability and high-visibility, the gathering storm of dementia is high-probability and low-visibility. COVID-19 showed that the global community is able to tackle the most complex research challenges rapidly and effectively when the economic peril of inaction is obvious and we invest sufficient resources.

Health care systems worldwide need to begin reconsidering their approach to delivering care to people with dementia. Support for interdisciplinary team-based care for patients and families living with dementia should be a priority, especially in high- and middle-income countries. Disease management programs, which implement standardized approaches to delivering and coordinating care for people with particular chronic diseases, and innovative financing mechanisms (for example, value-based or outcome-based contracting) are examples of how such care can be scaled up in many settings.

With respect to the development of novel therapies, governments of advanced economies must lead an effort to ramp up spending on dementia. These countries currently bear most of the economic and societal costs of dementia because of their populations' age structure and thus have the most to gain in the short term. Increased investment would also bolster their economies, offering additional financial benefits.

Advanced economies should invest in three areas to boost dementia R&D: direct funding (especially basic research); stronger incentives for private investment in R&D; and support for patient access to the fruits of R&D, including the absorption of patient costs—particularly in low- and middle-income countries. This support may extend to development of the health care infrastructure. As part of any such initiative, governments of advanced economies should build a global R&D ecosystem that can develop necessary clinical trial infrastructure and repositories of biological samples (biobanks). These governments should encourage investment in many simultaneous drug development projects, which, by diversifying across projects, would mitigate the extreme risk of a lone development project. The necessary capital could be raised through the establishment of a megafund with a government guarantee on the principal investments. Investments in the megafund could work like bond financing: investors get their original investment back plus interest from the

proceeds of successful drug developments (Fagnan and others 2013).

Such investments are critical to improve global economic equity. Informal caretaking is a large part of the reality of living with dementia, particularly as the disease progresses. Family members often perform that role, and it is intense, difficult, and often heartbreaking work. Women typically bear a disproportionate burden of caregiving in many countries, halting their progress toward equity in the labor force. Equity is particularly relevant in low- and middle-income countries, as many of the risk factors for dementia are associated with systemic disadvantages (including air pollution and lack of access to education or nutritious foods). The economic burden is thus concentrated among those already in the most challenging financial situations, feeding the cycle of poverty. Rich-country efforts to link, scale, and invest from richer countries can help the poorer ones realize their full productive capacity in the coming years.

'What? So what? Now what?'

In sum, the problem is that dementia is gradually becoming an overwhelming societal burden. Why does this matter? In addition to the enormous health and social burden, dementia is an economic nightmare about to metastasize as the world, especially poorer countries, experiences unprecedented population aging. How do we address this problem? We need optimal—that is to say, massive—investments in care, prevention, and R&D, led by advanced economies that incentivize private investment and prioritize poorer economies' access to the dividends. It is not just the humanitarian thing to do—it also makes eminently good economic sense. **FD**

NATHANIEL COUNTS is senior vice president for behavioral health innovation at Mental Health America, **ARINDAM NANDI** is associate II at the Population Council, **BENJAMIN SELIGMAN** is clinical instructor at UCLA's David Geffen School of Medicine, and **DANIEL TORTORICE** is an associate professor at the College of the Holy Cross.

This article was written by the Data for Decisions, LLC, dementia research team, which comprises David E. Bloom, Janina Broker, Simiao Chen, Rachael Han, Jessica Klusty, Sabrina Malik, and Daniel V. Vigo, in addition to the four listed authors.

References:

For complete references cited in the article and table, please see F&D Online at www.imf.org/fandd



THE AFRICAN CENTURY

The right actions today will ensure that sub-Saharan Africa thrives in a post-COVID world

Abebe Aemro Selassie

Fast-forward to 2081.

The demographic boom currently unfolding in most sub-Saharan African countries will likely have transformed many of the region's economies into the largest and most dynamic in the world.

Wishful thinking? Perhaps. But 30 to 40 years ago, not many would have thought that possible of China, India, Indonesia, or Turkey.

Three factors will have an influential role in making this vision materialize:

- The demographic transition that is underway: By 2050, many sub-Saharan African countries will be among the few with a rising working-age population. Much investment and consumption demand will follow factors which are certain to entice considerable innovation.
- The ongoing digital revolution—which offers much scope for the diffusion of know-how, new

business opportunities, and more efficient service delivery.

- How effectively the region's economies deal with the transition to a low-carbon economy and the adverse consequences that climate change is set to unleash.

This future is hard to envision now amid the unprecedented challenges of the pandemic. But it is one within reach given the region's tremendous potential and is certainly the goal that needs to anchor policies.

The very near-term challenges are undeniable. Vaccination rates lag significantly behind those of high-income countries, averaging about 2½ percent of the population across sub-Saharan Africa by early October 2021. Most countries in the region have limited fiscal space to address investment needs, and near-term growth prospects remain below pre-pandemic projections.

Although the current focus is rightfully placed on addressing these near-term challenges, our priorities should not lose sight of countries' long-term potential. Transformative economic and structural reforms, coupled with significant external concessional financing, will be necessary to recover from the pandemic and maximize long-term potential.

Making the most of the demographic dividend

The population of sub-Saharan Africa is projected to double from 1 billion to 2 billion by about 2050. This will account for half of global population growth, with the working-age population growing faster than any other age group. These projections—while not uniform across the continent—should be placed in the context of the opposite trend in advanced economies, which typically see aging populations, an inverted population pyramid, and a reduction in population once immigration is excluded.

This trend represents perhaps the region's single greatest opportunity. It embodies a growing pool of human talent and ingenuity coupled with large market size—historically important drivers of economic dynamism. This, however, is not a given and will require astute policy choices to ensure that the potential is realized.

Investment in human capital will be critical. While country circumstances differ across the

region, this means mostly increased high-quality educational opportunities for a growing population, both at the primary and secondary levels, as well as developing tertiary education to meet the demands of growth sectors. It also means expanding investment in health care, including broader access to a variety of vaccines (potentially through regional production hubs), ensuring widespread access to at least a minimum level of health services, and family planning.

Accelerating health and education provision won't be easy. Infrastructure needs to be built. Teachers, doctors, and other service providers need

Our priorities should not lose sight of countries' long-term potential.

to be trained, and the trainers themselves must be trained. Given the speed of population change in many countries, the challenge will only increase if authorities delay. Multiyear plans will be vital, balancing the trade-off between investing in ramping up services to capacity against prioritizing their provision in the near term.

These investments are even more critical during a COVID-19 recovery. The pandemic has increased pressure on health care facilities in most countries in Africa. Meanwhile, young people have missed out on education due to social distancing and low capacity for distance learning given limited access to digital communication tools—particularly in rural areas, where many people work. Closing gender gaps in access to education and job opportunities would also help the demographic transition (through lower fertility) and boost productivity.

Training the next generation is not enough. New job entrants must be matched with job opportunities; the growth of good jobs must not only expand to encompass a greater share of the existing population, it must also keep up with a relentless increase in new job seekers. These challenges can be met by unleashing the potential of the private sector. Policymakers should cultivate a growth-friendly business climate and promote private sector investment. Doing so would catalyze large incentives for capital accumulation to complement the increasing labor supply.

Digitalization in Africa

The global diffusion of digital technologies promises new opportunities. Digital reforms and infrastructure will help the region to leapfrog—boosting resilience and efficiency, expanding access to global markets, improving public service delivery, increasing transparency and accountability, and fostering the creation of new jobs.

Digitalization provides opportunities to improve both government efficiency and transparency (and hence governance). Examples of the former include offering services such as online tax filing and business creation, introducing computer systems into customs administration, and providing social assistance through mobile money. Transparency can be improved by publishing information online, e-participation, and automation of service delivery (reducing in-person contact that could generate corruption). These opportunities could build trust, increase revenue collection, and improve spending quality.

Rapidly advancing technology in automation, artificial intelligence, and communications is also dramatically changing the nature of the private sector. The pace of change may mean that historically prevalent development paths—following a ladder of development that starts with light manufacturing and advances to increasing levels of sophistication—are no longer viable or desirable. Instead, services such as business process outsourcing, e-commerce, and fintech are likely to become increasingly important. Fintech, for

example, could raise growth and promote financial inclusion by providing services to customers previously unserved, but it should be balanced against risks to financial stability. More broadly, digitalization promotes entrepreneurship by allowing firms to grow rapidly with less physical capital and a limited geographic footprint. Nevertheless, automation and artificial intelligence could generate downward pressure on the labor share of income if they replace rather than enhance labor, hence potentially reducing labor demand.

As with the demographic dividend, investment in human capital is critical. Education will need to integrate information technology into students' learning when they are very young—vocational and tertiary education must emphasize the technical skills necessary to ride the wave of digitalization. One aspect of this wave may be helpful in this regard: online education. Access to these resources could help young people in sub-Saharan Africa reach beyond the limits of their national education structure as it develops over time.

Without investment in key infrastructure, the impact of digitalization—even in countries that are more advanced in this area—will be limited, and there is a risk that the fruits will be enjoyed by the elite instead of generating the broad-based benefits expected by all. Basic infrastructure to generate power and provide reliable electricity to households at reasonable prices is a vital prerequisite. Further, access to high-speed internet for a wide section of society will necessitate undersea cables with the capacity for sufficient bandwidth and telecommunications infrastructure that can spread the connection across the country. This should be complemented by a well-regulated telecommunications sector that charges competitive and accessible prices to consumers.

Managing climate change risks

Climate change poses a great threat to many countries in the region. Impacts vary across countries: some are facing droughts; others rising sea levels, cyclones, and floods; and most are dealing with rising temperatures and rainfall anomalies. But one thing sub-Saharan African countries have in common is limited climate resilience and coping mechanisms, along with reliance on rain-fed agriculture. Consequently, climate change is weighing

A Partnership for 60 Years

This year marks the 60th anniversary of the IMF's African Department. Founded in 1961, 17 years after the Bretton Woods conference, the department's creation responded to the needs of the wave of newly independent African countries. Over the years, the IMF's toolkit has undergone several major evolutions, moving from short-term balance of payments support to more protracted challenges, greatly increasing access to concessional financing, and ramping up capacity development efforts. The Fund's engagement with the region has never been greater than during the COVID-19 crisis, with nearly \$27 billion in financial assistance provided to 39 African countries. Three-quarters of this lending came from the Poverty Reduction and Growth Trust—the IMF's vehicle for zero-interest loans to low-income countries.

Seizing on these transformative changes requires significant investment in both human and physical infrastructure.

on economic activity in sub-Saharan Africa more than elsewhere.

Accelerating adaptation to climate change is key to tackling these challenges. This means targeted investment in infrastructure, people, and coping mechanisms, which not only raises resilience to climate change but boosts productivity and reduces inequality. Consider better and more widespread irrigation to protect crops from drought and more robust buildings and drainage to protect from cyclones. Investing in health care and education makes people more physically resilient and better informed to deal with climate risks. Social assistance and access to finance help people build more robust homes and invest in climate-smart agriculture, health care, and education. These also act as buffers that help people and businesses cope after a shock. Good macroeconomic policies—increasing fiscal space, enhancing economic diversification, and pursuing exchange rate flexibility—will also limit the impact of climate shocks.

The global transition to low-carbon economies creates additional challenges. The region's oil and gas exporters will face lower revenues and less related investment. Consequently, rapid economic diversification of these economies that raises incomes and yields inclusive job opportunities for their rapidly growing populations is crucial. At the same time, reduced global supplies of these resources and pressure to rely on green energy will also call for a transition of the whole region to greener industrial activity and energy generation—through policies spanning from financial regulations to large-scale investment in renewable energy such as solar and wind power. Here, facilitating technology transfers from more advanced economies will be critical, especially in the context of rapid economic expansion that will accompany rapid population growth. Pressure to preserve and enhance the region's carbon sinks and reservoirs, at the cost of potential logging and mining opportunities, will also rise.

Finding the financing

Seizing on these transformative changes requires significant investment in both human and physical

infrastructure. However, COVID-19 has left many sub-Saharan African countries with limited fiscal space and higher debt burdens.

Authorities must intensify efforts to develop fiscal revenues, undertaking necessary reforms to ensure efficient tax policy, comprehensive public financial management, and transparency and good governance. Multilateral development banks and development partners must also step up financing efforts with grants and concessional loans where possible. Rechanneling Special Drawing Rights from advanced economies with strong balance of payments positions may provide longer-maturity loans to aid in this regard.

The increase in debt across the continent during the past two years places much greater concern on the uptake of new debt. It is more important than ever that countries ensure a good return on investments financed with debt and target high-quality projects backed with comprehensive feasibility studies and robust and transparent public procurement.

Playing the long game

Although the short-term response to COVID is the clear priority, effectively managing the recovery should keep long-term trends in mind.

The region faces challenges, but it also has great potential for growth in the coming 60 years. Countries should make the most of this potential by increasing access to fiscal revenues and maximizing the return on targeted investment in both physical—including basic infrastructure that provides greater access to electricity and is weather resilient—and human capital. International partners should play their part in supporting these efforts by providing technical assistance and financing.

Despite the widespread adverse consequences of the pandemic, countries in the region must take this opportunity as a catalyst for reforms that will provide the foundation for a century of inclusive growth for the African continent. [FD](#)

ABEBE AEMRO SELASSIE is director of the IMF's African Department.

What Are Global Public Goods?

Global institutions must coordinate to preserve the goods that benefit us all

Moya Chin



THE COVID-19 PANDEMIC, refugee crises, climate change—these global problems have exposed the need for public goods that are likewise global. What are public goods, and how can they be supplied globally?

Public goods are those that are available to all (“nonexcludable”) and that can be enjoyed over and over again by anyone without diminishing the benefits they deliver to others (“nonrival”). The scope of public goods can be local, national, or global. Public fireworks are a local public good, as anyone within eyeshot can enjoy the show. National defense is a national public good, as its benefits are enjoyed by citizens of the state. *Global public goods* are those whose benefits affect all citizens of the world. They encompass many aspects of our lives: from our natural environment, our histories and cultures, and technological progress down to everyday devices such as the metric system.

No one can be prevented from using the metric system, and whenever someone uses its usefulness to others is not diminished. The nature of their benefits sets public goods apart from the private goods we see in the store or the club goods we can pay a fee to access, but this also means they cannot be found in a store nor accessed via a simple

fee. Creating public goods is much more difficult than supplying private goods, and providing *global* public goods poses a unique challenge.

Why are public goods undersupplied?

Simply put, incentives are lacking. For a profit-seeking individual to supply a public good, the expected benefit to that individual must exceed the cost. For public goods, the opposite typically applies for several reasons:

- **Individuals cannot be charged for their use.** Because of the nature of public goods, the supplier cannot prevent individuals from using them. Once supplied, all people can use a public good whether or not they contributed to its provision. This is known as the “free rider problem.”
- **For most public goods, the benefit to each individual is small.** This is often the case when one person’s use of a good affects others. These “spillovers” or “externalities” can render the benefit for any single individual too small (if the spillovers are positive) or too large (if the spillovers are negative). This is the case for goods such as *global health*—by choosing to be vaccinated, a person stays healthy (individual benefit that may be small for those not at risk) and prevents others from getting sick (a large positive spillover).
- **For many public goods, the benefits are realized far in the future while the costs are realized today.** People tend to overvalue the present relative to the future. This short-sightedness can distort the costs and benefits from goods such as *education* (the cost of schools is paid today, while the benefit is realized when the students become adults) and the *natural environment* (the cost of mitigating climate change is paid today, while the benefit is mostly for future generations).

For these reasons, public goods will tend to be undersupplied if left to the private sector.

To date, the solution to the problem of providing public goods has been coordination, which ensures that everyone contributes to the provision of a public good and that the costs and benefits are weighed without distortion. Formal institutions,

notably governments, are the main coordinators in the provision of local and national public goods.

Governments are most successful in providing public goods when they have strong institutions. By enforcing regulation and taxation, governments mobilize resources to provide public goods and eliminate the free rider problem. An inclusive government values the welfare of all its citizens—those within its borders and across generations. Such governments are able to realize the full societal benefit of public goods (the sum of individual benefits as well as the spillovers) and to balance the needs of present and future citizens.

Are global public goods different?

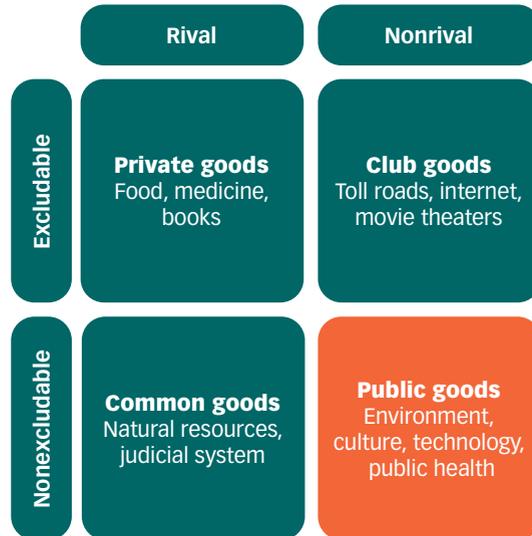
Theoretically, global public goods are no different from local or national public goods. They are non-excludable and nonrival. They are characterized by free rider problems, spillovers, and short time horizons. Why, then, are more local and national public goods provided than global public goods? Why is there more funding for national defense than for combating global climate change?

The failures of governments that underprovide public goods are amplified when it comes to global public goods. Global institutions—where they exist—often lack the legal authority to enforce regulation and taxation or the institutional capacity to coordinate the needs of all citizens in the world and across generations. The coordination challenge is also bigger. Global institutions deal with national governments, as opposed to individual citizens. Many national governments struggle to provide public goods even within their own countries.

The ratification of the Paris Agreement was both a success and a testament to the limitations of international coordination. By making allowances for countries' different needs and responsibilities, the agreement takes into account the welfare of each country. The commitment by developed economies to provide \$100 billion in climate financing each year mobilized resources for emerging market and developing economies. However, the withdrawal of the United States in 2020 and the chronic underprovision of climate financing highlight the agreement's limited ability to enforce contributions and to eliminate the free rider problem.

Supply and demand

It is not inevitable, however, that the world will continue to fail to provide global public goods. Many

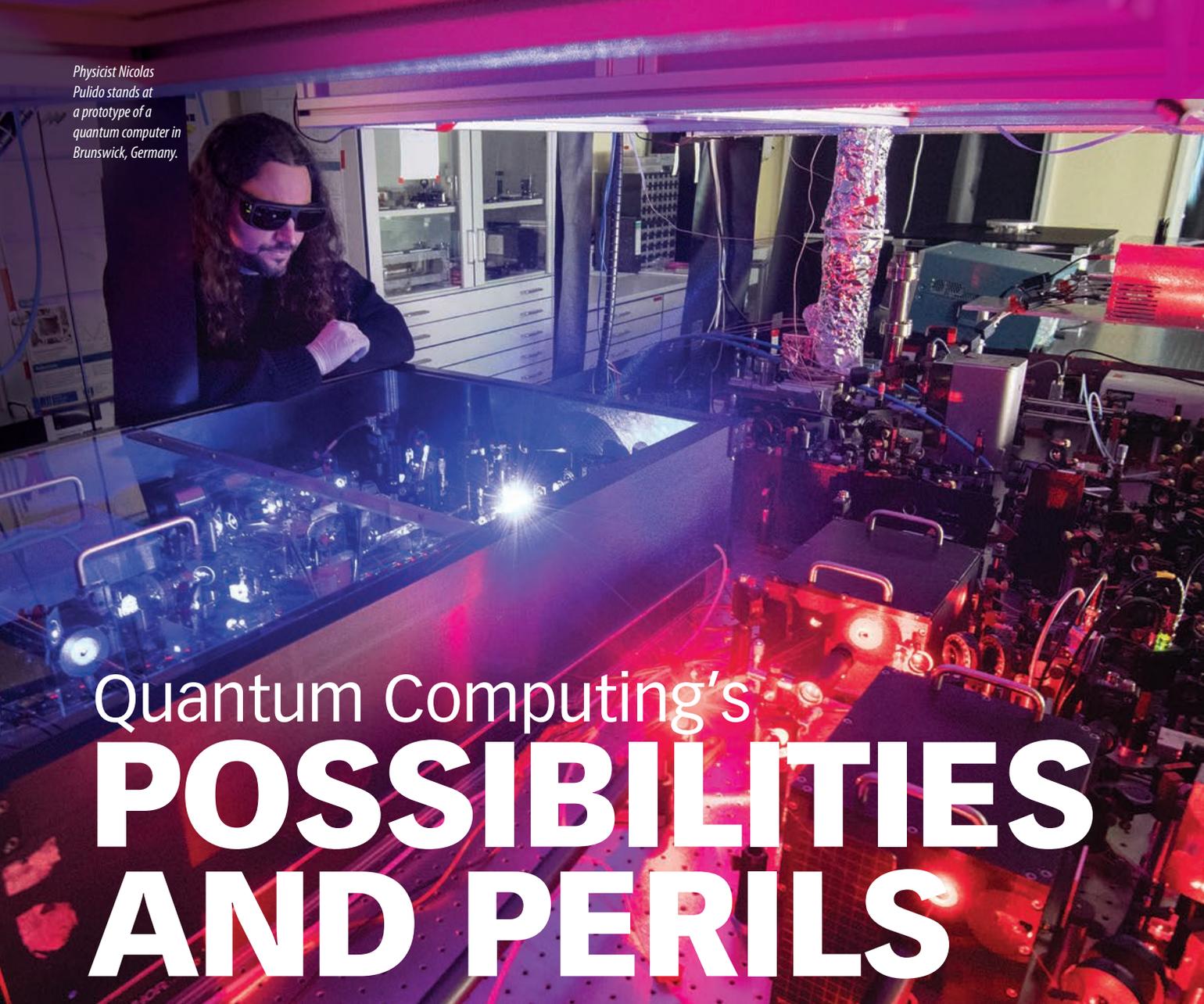


Note: Goods listed are examples; this is not an exhaustive list.

institutions that provide public goods today did not appear on their own, but formed in response to demand. Public education in the United States developed in response to citizen demands in a technologically advancing world. The IMF was established after the Great Depression and World War II as countries recognized the need to promote global financial stability.

There is reason to believe that the demand for global public goods is growing. Whether it is trade, capital flows, or migration, the world is far more interconnected now than it was in 1945, when many global institutions such as the United Nations, IMF, World Bank, and World Health Organization were founded. The importance of global public goods in our everyday lives becomes more salient with each new crisis—COVID-19 has increased demand for global public health, refugee crises for global peace, climate change for sustaining the global environment. These crises require a global framework that recognizes a shared obligation, clearly delineates each country's responsibility, and enforces these commitments. For global institutions to foster coordination, they need comprehensive governance structures to ensure that decisions are legitimate and represent all present and future citizens of the world. If the momentum that is building today can be harnessed and mobilized to build this global framework, the provision of global public goods may become a reality. **FD**

MOYA CHIN is an economist in the IMF's Institute for Capacity Development.



Physicist Nicolas Pulido stands at a prototype of a quantum computer in Brunswick, Germany.

Quantum Computing's **POSSIBILITIES AND PERILS**

Quantum computers could crack the cryptography that underpins financial stability

José Deodoro, Michael Gorbanyov, Majid Malaika, and Tahsin Saadi Sedik

Soldiers in ancient Greece would send secret dispatches by wrapping a strip of parchment around a staff and writing across it. Their messages could be deciphered only by someone with a staff of the same thickness. It is one of the earliest examples of cryptography. Today's secrets, such as internet communication, digital banking, and electronic commerce, are protected from prying eyes by powerful computer algorithms. Yet these hitherto impenetrable cryptographic codes could soon be history.

Quantum computers can reach a level of optimization that would crack many of today's encryption keys in less time than it takes to generate them

using conventional digital computers. Financial institutions should future-proof their cybersecurity systems without delay. Failure to do so will imperil financial stability.

A quantum revolution

Quantum computing is the use of quantum phenomena such as *superposition* and *entanglement* to perform computations. The basic unit of a quantum computer is the quantum bit (or *qubit*, for short). It is typically realized by the quantum properties of subatomic particles, such as the spin of electrons or the polarization of a photon. Whereas each binary bit used in today's digital computers represents a value of

Quantum computers have the potential to massively out-process digital computers that follow classical laws of physics.

either zero or one, qubits represent both zero and one (or some combination of the two) at the same time. This phenomenon is called superposition. Quantum entanglement is a special connection between pairs or groups of quantum elements. Changing the state of one element affects other entangled elements instantly—regardless of the distance between them.

Increasing the number of qubits delivers an exponential rise in calculation processing speed. Two traditional binary bits are needed to match the power of a single qubit; four bits are required to match two qubits; eight bits are needed to match three qubits; and so on. It would take about 18 quadrillion bits of traditional memory to model a quantum computer with just 54 qubits. A 100 qubit quantum computer would require more bits than there are atoms on our planet. And a 280 qubit computer would require more bits than there are atoms in the known universe.

Quantum computers have the potential to massively out-process digital computers that follow classical laws of physics. William Phillips, the Nobel Prize-winning physicist, has compared the leap from today's technology to quantum with that from the abacus to the digital computer itself. Until recently, this so-called *quantum advantage* or *quantum "supremacy"* was just a theory. In 2019, however, Google used a quantum computer to perform a specific computation task in just 200 seconds. The same task would, the company said, have taken the most powerful digital supercomputer at that time 10,000 years.

The possibilities

Complex computational tasks are like finding the way out of a maze. A traditional computer would try to escape by following every path in sequence until it reached the exit. Superposition, by contrast, allows a quantum computer to try all the paths at once. This drastically reduces the time to find a solution.

By solving problems with more accuracy and speed than digital computers, quantum computers have the potential to accelerate scientific discovery and innovation, revolutionize financial market modeling and simulations, and empower machine learning and artificial intelligence. They could be used to model subatomic particles, molecular

interactions, and chemical reactions. This could revolutionize chemical engineering and material science and allow the design of new materials, such as solid-state batteries. Quantum computers could also help us understand climate change.

Quantum computers could transform the financial system, too. They could perform more accurate Monte Carlo simulations—used to predict the behavior of markets through pricing and risk simulations—almost in real time. There would be no need to simplify these models with unrealistic assumptions. Quantum computers could also solve optimization tasks—such as allocating capital, determining portfolio investments, or managing the cash in ATM networks—in a fraction of the time it takes digital computers. Quantum computers could also speed the training of machine learning algorithms. The time it takes digital computers to do this increases exponentially with each dimension that is added. Not so with quantum computers.

And the perils

There are risks, however. The computing power of these mighty quantum machines could threaten modern cryptography. This has far-reaching implications for financial stability and privacy. Today's cryptography is based on three main types of algorithms: *symmetric keys*, *asymmetric keys* (also known as *public keys*), and *hash functions*. With symmetric keys, the same key is used to encrypt and decrypt a message. Asymmetric cryptography uses a pair of related keys (one private and the other public). A message encrypted by one key can be decrypted only by that key's pair. These algorithms are widely used for digital authentication, digital signatures, and data security. Hash functions convert digital input into a unique set of bytes of fixed size. They are used to store passwords securely and to support digital identities.

These cryptographic algorithms have mostly succeeded in safeguarding data. Even today's most advanced digital supercomputers and cryptanalysis techniques cannot break them fast enough. However, quantum computers will be able to solve hard mathematical problems exponentially faster than digital supercomputers. This will make

Financial institutions must take immediate steps to prepare for a cryptographic transition.

asymmetric cryptography obsolete and will weaken other cryptographic keys and hashes. Theoretically, a fully functioning quantum computer could break an asymmetric key in a matter of minutes. Public keys are especially vulnerable because most of them are based on the factorization problem: it is hard for digital computers to find two prime numbers from their product. Quantum computers, by contrast, can do it effortlessly.

Asymmetric keys are widely used to secure communications over the internet. Successful attacks against these algorithms would compromise connections used by the financial system, including mobile banking, e-commerce, payment transactions, ATM cash withdrawals, and VPN communications, to name just a few. Vulnerable applications that rely on public-key cryptography also include popular digital assets such as Bitcoin and Ethereum, as well as password-protected web applications. The best known of these protocols, HTTPS, is used by 97 of the world's top 100 websites.

For some applications, it may be too late already. Any information assumed secure today could be captured and stored to be deciphered later once sufficiently powerful quantum computers are created. In fact, almost any encrypted personal or financial message sent and stored today could be deciphered retroactively by a powerful quantum computer. Most financial institutions and regulators are not yet alert to these novel risks.

Race against the machine

The race to develop new quantum-safe encryption standards and algorithms has begun already. In the United States, the National Institute of Standards and Technology is running a competition to develop quantum-safe encryption algorithms. It hopes to announce a winner by 2024. The European Telecommunications Standards Institute is also taking a lead. These efforts are feeding into the activities of other standard-setting bodies. Because of retroactive risks, however, financial institutions have a narrow window to implement the new standards.

Financial institutions must take immediate steps to prepare for a cryptographic transition. They should start by assessing retroactive and future risks

from quantum computers, including from information that may already have been captured and can be exploited years later. Financial institutions should then develop plans to migrate current cryptography to quantum-resistant algorithms. This includes taking an inventory of public-key cryptography they use themselves as well as that used by any third-party suppliers. Vulnerable algorithms will need to be transitioned to post-quantum cryptography. Financial institutions should also build cryptographic agility so that algorithms can be upgraded smoothly. Experiences of algorithm replacements, even though much simpler than the transition to post-quantum standards, show that they can be extremely disruptive. They often take years or decades to accomplish.

The IMF has an important role to play in raising the awareness of its members about the risks to financial stability from quantum computers and in promoting quantum-safe standards and practices. The Fund should encourage member countries to collaborate closely in developing quantum-safe encryption standards to ensure interoperability and adopt encryption migration plans for their financial sectors.

Today's quantum computers are very sensitive. Any environmental disturbance, such as heat, light, or vibration, pulls qubits out of their quantum state and turns them into regular bits. This produces computation errors. Still, machines that compute with fewer errors and are capable of cracking codes are not far off. Financial institutions should recognize the risks and secure their systems before it is too late. After all, history is full of cautionary tales of supposedly unbreakable codes being cracked by new technology. **FD**

JOSÉ DEODORO is the data collection platform owner and **MAJID MALAIKA** a lead digital transformation and cybersecurity risk expert in the IMF's Information Technology Department. **MICHAEL GORBANYOV** is a senior economist in the IMF's Strategy, Policy, and Review Department and **TAHSIN SAADI SEDIK** a deputy division chief in the IMF's Asia and Pacific Department.

This article is based on IMF Working Paper 21/71, "Quantum Computing and the Financial System: Spooky Action at a Distance?"

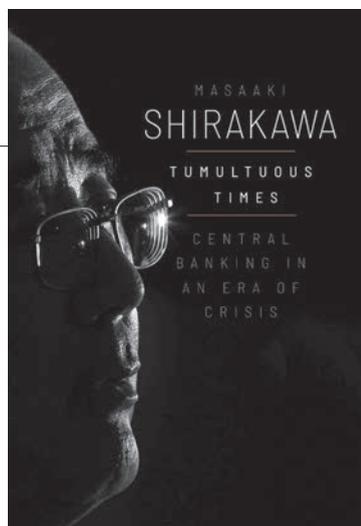
Managing Upheavals

MASAAKI SHIRAKAWA'S four decades at the Bank of Japan (BOJ), from 1972 to 2013, were shaped by varied, and often tough, economic circumstances. The post-war economic miracle faded, a bubble economy inflated and burst, and lost decades ensued. There were challenges from abroad, including the global financial crisis and the economic rise of China—in 2000, China's economy was one-quarter the size of Japan's, but by 2015 it was twice as big.

These developments, and others examined by former BOJ Governor Shirakawa, made for tumultuous times. Monetary policy has been constrained by limits on policy rates for a quarter century. The shadow of zero rates was already apparent by 1995. But since 1999, monetary policymaking in Japan has been dominated by the zero lower bound, forcing the BOJ to explore unconventional monetary policy instruments and expand its balance sheet. Japan provided an early guide for such policy initiatives later followed by many other advanced economy central banks.

Shirakawa provides an insider's account of central bank policies and candidly recounts interactions within the government and Parliament. Two of the lengthiest chapters reflect the anxieties of a central bank governor operating in a highly political environment. A section titled "My last month in office" comes at the end of a chapter on the long and difficult process that led to a joint statement by the government and the BOJ. But one of the most powerful pearls of political insight in the book is hidden at the end of a chapter on demographics. There, the author acknowledges that the young Shirakawa overlooked the political and social relevance of demographics. The older Shirakawa realizes that, as the electorate ages, a gray hair democracy has emerged, making reform more difficult.

My favorite chapter is "What Should We Expect of the Central Bank?" Here Shirakawa examines the theory and practice of central banking, going



Masaaki Shirakawa

Tumultuous Times: Central Banking in an Era of Crisis

Yale University Press,

New Haven, CT, 2021, 536 pp., \$40.00

beyond monetary policy. It argues that the first goal of the central bank is financial stability, even before price stability. This challenges the conventional view that price stability should be the primary goal of monetary policy.

The older Shirakawa realizes that, as the electorate ages, a gray hair democracy has emerged, making reform more difficult.

The book is full of insightful information in short, self-contained chapters. If you are interested in learning about central banking in a country with a declining population, low growth, and low interest rates, then *Tumultuous Times* is indispensable reading.

Milton Friedman once wrote: "Monetary theory is like a Japanese garden. It has esthetic unity born of variety; an apparent simplicity that conceals a sophisticated reality; a surface view that dissolves in ever deeper perspectives." The same can be said of Shirakawa's thoughtful, multifaceted book. **FD**

VITOR GASPAR, director, IMF Fiscal Affairs Department

A Glorious Future for Money?

AMONG ALL the technological change in today's digital economy, disruption is also occurring in one of the most fundamental technologies of our societies: money itself.

In his new book, *The Future of Money: How the Digital Revolution Is Transforming Currencies and Finance*, Eswar Prasad puts this disruption into broader context. He argues that for all the digital innovation in finance in the past decades, we are standing on the precipice of what may be an even more dramatic change, with broad social, economic, and political implications. He shows convincingly that amid fintech, cryptocurrencies,

the financial system—particularly in emerging market and developing economies. He describes Bitcoin, Ethereum, and the distributed ledger technologies underlying them—but also the disappointment around their actual use in payments to date. CBDCs, Prasad argues, are an even bigger breakthrough. They could serve as a backstop to privately managed payment systems, further enhance financial inclusion, improve monetary policy transmission, and even fight corruption. But he is equally cognizant of the risks around the bypassing of banks, loss of privacy, and Orwellian oversight of citizens by authorities—risks that can be mitigated through proper design and legislative oversight.

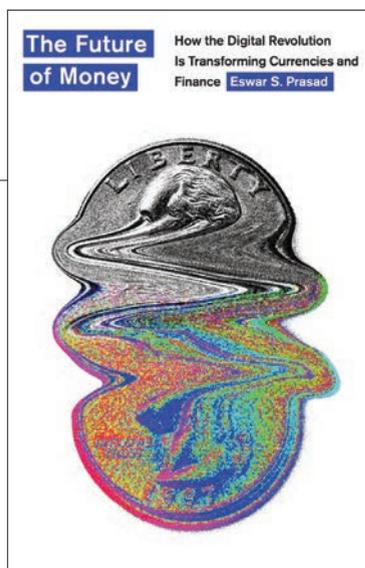
The book gives a sweeping overview of developments in payments, from the specifics of Ant Group's business to the e-krona project and Venezuela's Petro. It is interspersed with great anecdotes, like ABBA singer Björn Ulvaeus's battle against cash in Sweden (and the crime he says it fuels), to the acerbic dismissal of regulatory sandboxes (controlled testing environments for innovative services) by former New York Department of Financial Services Superintendent Maria Vullo. ("Toddlers play in sandboxes. Adults play by the rules.") As we would expect from an international macroeconomist like Prasad, there is also plenty of discussion on the implications of fintech and CBDCs for cross-border payments and the role of the US dollar as a reserve currency.

The Future of Money is an engaging read, and a contribution to a genre. It fits nicely into a class with Felix Martin's highly entertaining *Money: The Unauthorized Biography* and Lana Swartz's illuminating *New Money*. Like them, it recognizes that the design of money is not just a technical matter, but a deeply important societal issue that affects us all.

And Prasad stresses that as central banks run the gauntlet of policy choices around tomorrow's money, both issuance and non-issuance of CBDCs are conscious policy actions. To make the right choices, a broad dialogue with a well-informed public is key. **FD**

JON FROST, senior economist, Innovation and the Digital Economy, Bank for International Settlements

The views expressed here are those of the author and not necessarily those of the Bank for International Settlements.



Eswar S. Prasad
**The Future of Money:
 How the Digital Revolution
 Is Transforming
 Currencies and Finance**
 Belknap Press,
 Cambridge, MA, 2021, 496 pp., \$35.00

and stablecoins—and the potential demise of cash—one of the most far-reaching innovations would be central bank digital currencies (CBDCs), a new form of central bank money.

The book gives an impressive overview of the many changes digital technologies have already wrought. From the dramatic growth of mobile money in East Africa and China to the emergence of peer-to-peer lending and microinsurance, fintech has already shaken up finance and included hundreds of millions of new users in

Better Borrowing

MANY AFRICAN COUNTRIES need to lift investment and living standards but have low domestic revenue and high public debt. The pandemic has exacerbated this challenge, with a further increase in debt-to-GDP ratios that poses both near-term issues and the question of how Africa should best use debt to achieve its long-term potential.

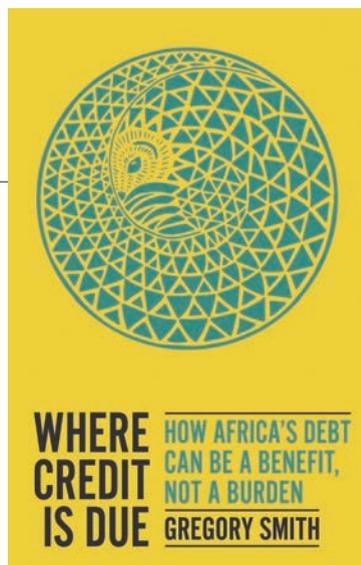
Economist Gregory Smith's new book outlines an approach he calls "borrowing with purpose" that involves linking public borrowing with clear development strategies, better coordination among official creditors, more responsible and "virtuous" actions by private creditors, and flexibility by the "umpires and architects" of the international system.

Smith provides a wealth of information on Africa's public debt landscape, problems associated with high debt, and proposals for avoiding—or resolving—debt crises and gaining the most from debt while minimizing risks. "Country stories" in each chapter discuss the situations of particular African countries.

Africa's debt has risen since 2010 after significant reductions through the Heavily Indebted Poor Country and the Multilateral Debt Relief initiatives as well as workouts with official and private creditors. This recent debt is less concessional and more commercial than before and involves diverse lenders, including China, Africa's regional institutions, and others. In addition to raising commercial bank loans, countries increasingly are able to access global financial markets and issue Eurobonds, which help finance their budgets in the face of declining foreign aid and provide a signal for attracting other capital flows, but also carry new risks.

Smith devotes a chapter to China's lending to Africa, shedding light on the scale, terms, nature, purposes, and risks of this lending and discusses China's debt relief to African countries over the decades.

The international community's debt relief to Africa during the debt crises of the 1980s and 1990s was insufficient, Smith argues, partly because of gaps in understanding how much debt is too much. He criticizes the adjustment programs supported by multilateral institutions during this period but does not develop the idea fully. Looking ahead, the main message is to aim for an "evolution, not a revolution" of the international system for debt workouts, as the G20 Common Framework and other efforts try to do.



Gregory Smith

**Where Credit Is Due:
How Africa's Debt Can Be
a Benefit, Not a Burden**

Hurst Publishers,
London, UK, 2021, 240 pp., \$34.95

Borrowers, creditors, savers, and the umpires and architects of the international system should take action toward "better borrowing," which would help countries' development while minimizing crisis risks. Smith says to borrow prudently, use debt for productive investment, conduct active debt management, increase debt transparency,

The main message is to aim for an evolution, not a revolution, of the international system for debt workouts.

deepen domestic markets, and provide more flexible external financing—recommendations that will resonate with readers, who might also have appreciated insights on *how* to achieve them.

The book's commonsense approach and engaging style draw in the reader who, nonetheless, might benefit from operational definitions of such terms as "calmer" capital, "smarter" investment, and policies that are "fine." Some IMF readers may flinch at the use of "bailouts" to refer to Fund programs. But these are details.

Overall, the book is a valuable addition to the literature and well worth reading for those interested in African debt issues. **FD**

VIVEK ARORA, deputy director, IMF African Department

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