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2021 REPORT
**Innovation
and Inequity**

BILL & MELINDA
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GOALKEEPERS

Goalkeepers is dedicated to accelerating progress toward the Global Goals.

In 2015, 193 world leaders agreed to 17 ambitious goals to end poverty, fight inequality, and stop climate change by 2030. Goalkeepers focuses on accelerating progress toward the Global Goals, with a particular focus on Goals 1–6.

COVID-19 has only reinforced the fact that progress on these Goals is possible but not inevitable. What we do matters—and over the past year, we’ve seen the results of people around the world innovating, adapting, and building resilient systems over the long term.



Cover
Kenya

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Introduction



Last year, we feared the worst when it came to the Global Goals. But even amid the devastation of the COVID-19 pandemic, we've seen that hope can grow from seeds planted years earlier. Here's what we've learned.

**By Bill Gates and
Melinda French Gates**
Co-Chairs,
Bill & Melinda Gates Foundation

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2021 Goalkeepers Report.
⇒ <https://gates.ly/GK2021>

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Los Angeles, California

A year ago, we sat down to write an unusual Goalkeepers Report. After years of steady progress on the United Nations' Sustainable Development Goals (SDGs), the first wave of the COVID-19 pandemic was devastating families, health systems, and economies. We feared it was triggering an unprecedented reversal of progress across nearly every measure of health and prosperity that we track each year in this report.

Indeed, it has been an unprecedented year: Millions of people around the world have died from COVID-19. Millions more have felt the shocks of a global economy in crisis. And still the pandemic rages, with ever more contagious and severe variants spreading around the globe.

In so many ways, the pandemic has tested our optimism. But it hasn't destroyed it.

Under the most difficult circumstances imaginable, we've witnessed breathtaking

innovation. We've seen how quickly we can change our behavior, as individuals and as societies, when circumstances require it. And today, we can also report that people in every part of the world have been stepping up to protect the development progress we've made over decades—when it comes to the SDGs, at least, the impact of the ongoing COVID-19 pandemic could have been far worse.

It has been a year that has reinforced our belief that progress is possible but not inevitable. The effort we put in matters a great deal. And, as impatient optimists, we believe we can begin to learn from the successes and failures of the pandemic so far. If we can expand upon the best of what we've seen these past 18 months, we can finally put the pandemic behind us and once again accelerate progress in addressing fundamental issues like health, hunger, and climate change.

The Data Tells a Surprising Story



Over the past year, it has been impossible to ignore stark disparities not only in who has gotten sick and who has died—but also in who had to go to work, who could work from home, and who lost their jobs entirely. Health inequities are as old as the health systems themselves, but it took a global pandemic to forcefully remind the world of their consequences.

Millions More in Extreme Poverty

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Nairobi, Kenya

For many, the economic impacts of the pandemic continue to be severe and enduring. We know we may seem like unlikely messengers on this topic—we're two of the most fortunate people on the planet. And the pandemic has made that even more clear. People like us have weathered the pandemic in good shape, while those who are most vulnerable have been hit the hardest and will likely be the slowest to recover. An additional 31 million people around the world have been

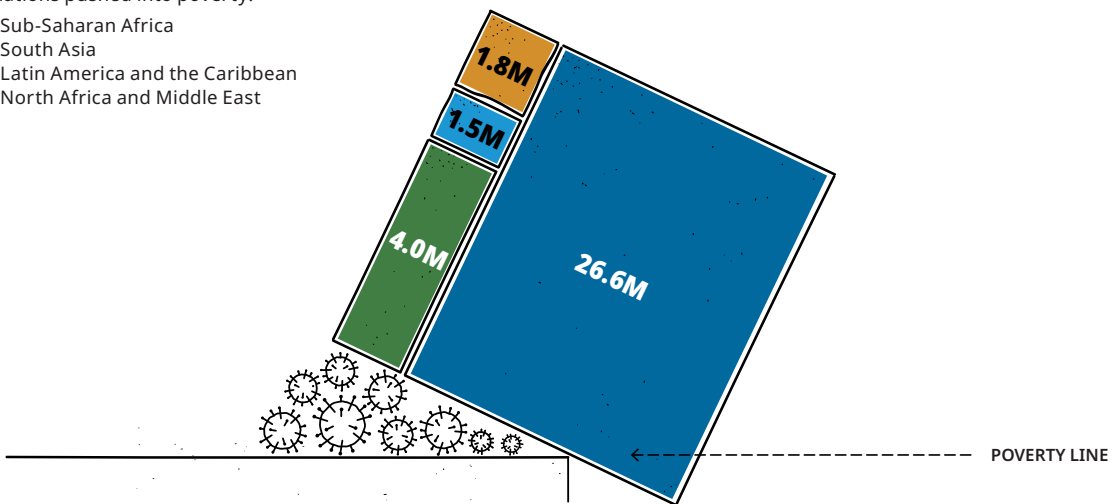
pushed into extreme poverty as a result of COVID-19. Although men are 70% more likely to die from COVID-19, women continue to be disproportionately affected by the economic and social impacts of the pandemic: This year, women's employment globally is expected to remain 13 million jobs below the 2019 level—while men's employment is largely expected to recover to pre-pandemic rates.

Although variants threaten to undermine the progress we've made, some economies are beginning to recover, bringing with them business reopenings and job creation. But recovery is uneven between—and even within—countries. By next year, for example, 90% of advanced economies are expected to regain pre-pandemic per capita income levels, while only a third of low- and middle-income economies are expected to do the same. Poverty reduction efforts are stagnating—and that means nearly 700 million people, the vast majority in low- and middle-income countries, are projected to remain mired in extreme poverty in 2030.

The Pandemic Has Pushed Millions of People into Extreme Poverty

Populations pushed into poverty:

- Sub-Saharan Africa
- South Asia
- Latin America and the Caribbean
- North Africa and Middle East



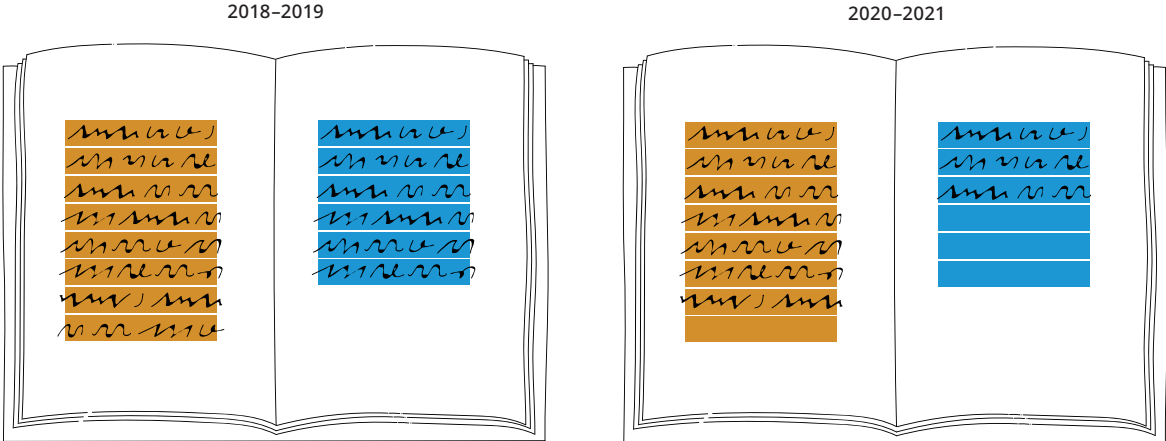
This graphic does not include regions that achieved a total net reduction of 2.6 million people in extreme poverty.

Growing Gaps in Education

We're seeing a similar story when it comes to education. Before the pandemic, nine out of 10 children in low-income countries were already unable to read and understand a basic text, compared to one in 10 children in high-income countries. Early evidence suggests that learning losses will be greatest among marginalized groups. Growing educational disparities were found in wealthy countries, too. In the United States, for example, learning loss among Black and Latino third grade students was, on average, double that of white and Asian American students. And learning loss among third graders from high-poverty schools was triple those of their peers in low-poverty schools.

Learning Loss among Third Graders from High-Poverty Schools Was Triple That in Low-Poverty Schools in the U.S., Widening Existing Disparities

- Low-poverty schools
- High-poverty schools

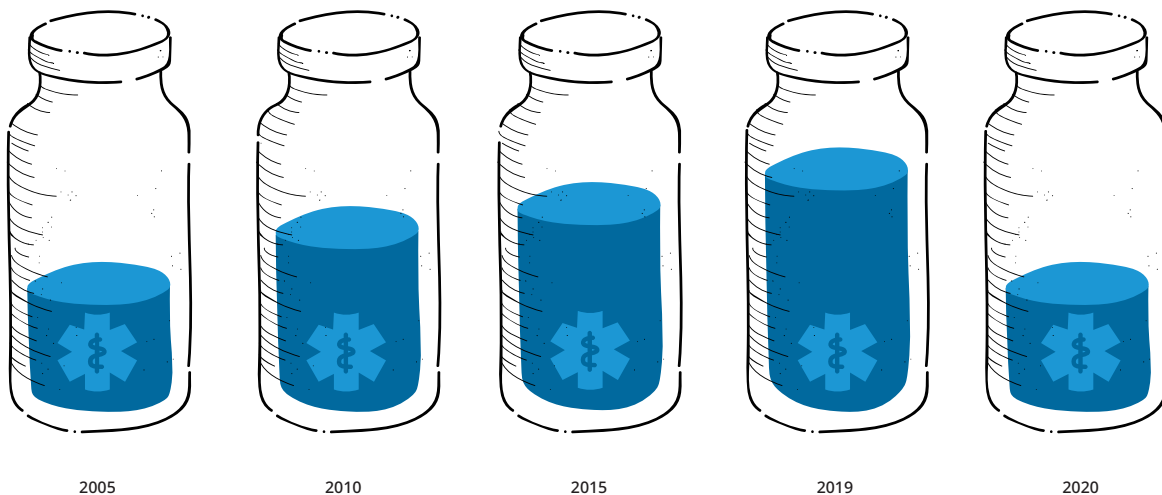


More Children Missing Vaccines

Meanwhile, global routine childhood vaccination rates fell to levels last seen in 2005. Between the start of the pandemic and when health services began to recover in the second half of 2020, more than 30 million children around the world missed their vaccinations—that's 10 million more because of the pandemic. It's possible that many of these children will never catch up on doses.

But here, the data surprised us: A year ago, we had reported that the Institute for Health Metrics and Evaluation was estimating that vaccine coverage would drop 14 percentage points globally in 2020, which would have amounted to 25 years of progress down the drain. But based on more recent data, it looks like the actual drop in vaccine coverage—devastating though it was—was only half that.

Global Routine Childhood Vaccination Rates in 2020 Fell to 2005 Levels



People Stepping Up

As we continued to sift through the data, it became evident that this was not a fluke: On many key development indicators, the world stepped up over the past year to avert some of the worst-case scenarios.

Take malaria, for example, which has long been one of the world's most deeply inequitable diseases: 90% of malaria cases are found in Africa. Last year, the World Health Organization forecasted severe disruptions to essential malaria prevention efforts that could have set progress back 10 years—and result in an additional 200,000 deaths from a preventable disease. That projection spurred many countries to action to ensure that bed nets were distributed and testing and antimalarial drugs remained available. Benin, where malaria is the leading cause of death, even found a way to innovate in the midst of the pandemic: They created a new, digitized distribution system for insecticide-treated bed nets, getting 7.6 million nets into homes across the country in just 20 days.

Of course, the full extent of the pandemic's impact on the SDGs will take years to fully understand, as more and better data becomes available. And this data doesn't diminish the very real suffering the pandemic has caused for people everywhere—far from it. But the fact that we can point to positive signs amid a once-in-a-generation global pandemic is extraordinary. With one hand tied behind their backs, countless individuals, organizations, and countries went above and beyond to innovate, adapt, and build resilient systems, and for that, they deserve the world's gratitude.

**They deserve
the world's
gratitude.**



Above
Cotonou, Benin

What the So-Called Miracle of Vaccines Shows Us



New vaccines usually take about 10 to 15 years to make. So, the development of multiple high-quality COVID-19 vaccines in less than a year is unprecedented.

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Pekanbaru, Indonesia

And it's easy to see why that might seem like a miracle. But in fact, the COVID-19 vaccines are the result of decades of careful investment, policies, and partnerships that established the infrastructure, talent, and enabling ecosystem needed to deploy them so quickly.

We have scientists around the world to thank for their years of foundational research. One researcher, Hungary's Dr. Katalin Karikó, dedicated her career to studying messenger RNA, also known as mRNA. For years, her unorthodox ideas failed to gain broad support and funding, and many dismissed the idea that

mRNA could be used to make vaccines and therapeutics. But Dr. Karikó persevered. Her story is emblematic of the many scientists whose discoveries—often years in the making—have made it possible for two highly effective mRNA vaccines to be developed in less than one year.

It's a gift that will keep on giving: There are already mRNA vaccine candidates in the development pipeline that could finally tackle some of the world's deadliest diseases, from malaria to cancer.

Of course, mRNA vaccines aren't the only R&D success story to come out of this approach.

The Long-Term Promise of Genomic Sequencing

By now, the whole world is keenly aware that SARS-CoV-2, the virus that causes COVID-19, has mutated into increasingly infectious and deadly variants, like delta, as it spreads around the world. Thanks to genomic sequencing—identifying the unique genetic makeup of a virus—scientists have been able to identify and track emerging variants.

Historically, the majority of the genomic sequencing in the world has taken place in the United States and Europe. Countries without sequencing technology would send viral samples to labs in places like New York and London for genetic analysis—and they'd only get results months later.

But for the past four years, organizations have been investing in building a genomic surveillance network in Africa, so countries on the continent could sequence viruses like Ebola and yellow fever. The Africa CDC established the Africa Pathogen Genomics Initiative, and when the pandemic hit, the nascent network turned its attention to SARS-CoV-2. The only reason the world knew that the more infectious and deadly beta variant had emerged in South Africa was because the country had invested heavily in R&D—in this case, pairing genomic sequencing capabilities with clinical trials and immunology studies. South Africa's own Dr. Penny Moore was one of the first scientists to discover that a coronavirus variant identified in South Africa could circumvent the immune system.

With this information, public health officials around the world could plan accordingly. And South Africa, which has also invested deeply in infrastructure to rapidly and effectively conduct clinical trials, could quickly adjust its vaccine trials. They began working to determine whether COVID-19 vaccines provided sufficient protection against the new variant that would soon spread everywhere.

It seems obvious that in a globalized world, where people and goods move constantly across borders, it's insufficient for rich countries to be the only ones with the equipment and resources to sequence viruses. But it took a pandemic to reinforce how important it is to support the ability of low- and middle-income countries to collect and analyze their own data—because it benefits everyone.

And what's particularly exciting about Africa's genomic sequencing network is that the technology works for any pathogen: If the continent is able to keep building the network, it will soon be doing its own disease tracking for long-standing viruses like flu, measles, and polio.

Scientific innovation, even at a record-breaking pace, isn't enough on its own. The COVID-19 vaccines are an amazing feat of R&D, but they are most effective when everyone has access to them. The inequities of the past year remind us that this is far easier said than done.

It's up to people—from the halls of power to grassroots organizations and neighborhood groups—to step up to fill the gaps. And this year, it was these dynamic human interventions, when met with previous investments in systems, in communities, and in people, that allowed the world to avoid some of those initial, worst-case predictions.

**It's
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for rich
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Investing in Systems

As we write this, more than 80% of all COVID-19 vaccines have been administered in high- and upper-middle-income countries.

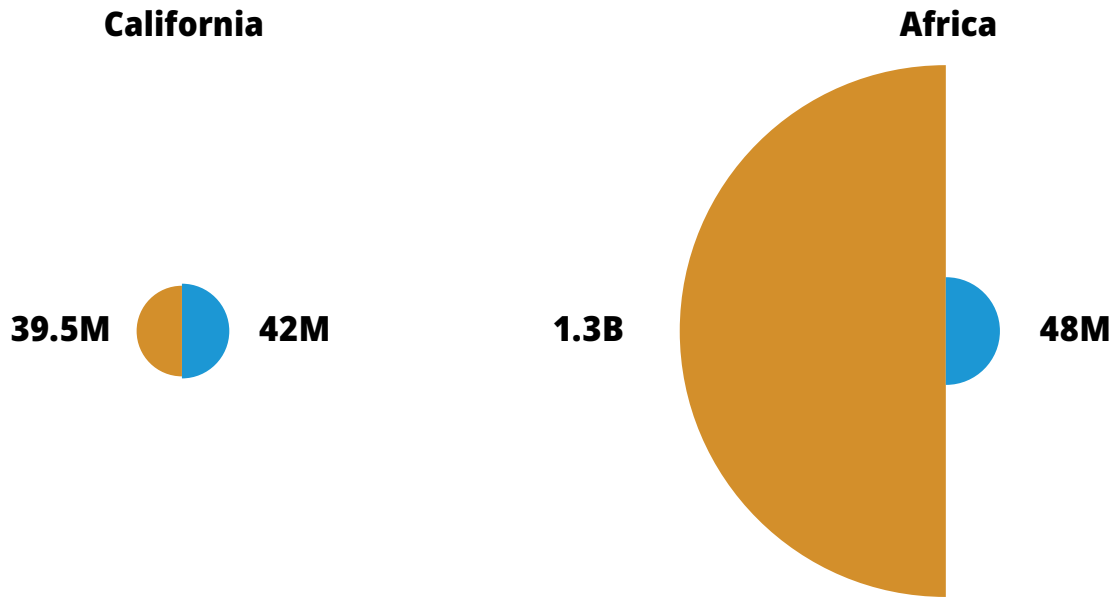
Some have secured two to three times the number of doses needed to cover their populations, in case boosters are needed for increasingly infectious variants. Meanwhile, less than 1% of doses have been administered in low-income countries. These inequities are a profound moral

outrage—and raise the very real risk that high-income countries and communities will begin to treat COVID-19 as another epidemic of poverty: *Not our problem.*

The Scale of COVID-19 Vaccine Inequity

The population of the entire continent of Africa is more than 30 times that of the state of California. But through the first half of 2021, they'd each administered roughly the same number of vaccines.

Population
Cumulative administered vaccines



The infrastructure needed to quickly manufacture an additional 15 billion vaccine doses cannot be set up overnight, or even in a year. But India provides an example of what happens when that infrastructure is built up over the long term.

India has been investing in its health care manufacturing infrastructure for decades—since the country’s independence. The Indian government helped Pune, a city near Mumbai, become a major global manufacturing hub by investing in R&D capacity and local infrastructure, like electricity, water, and transportation. They worked with the World Health Organization to build a regulatory system for vaccines that upheld the strictest international standards for quality, safety, and efficacy. And they partnered with vaccine manufacturers in Pune and other hubs like Hyderabad and our foundation to develop, produce,

and export vaccines that tackle the deadliest childhood illnesses, from meningitis to pneumonia to diarrheal diseases.

Of course, simply having manufacturing capacity wasn't sufficient to negate the crisis of COVID-19 in India—it's just one piece of the puzzle—but it is a remarkable feat of progress that today more than 60% of all vaccines sold globally are manufactured on the subcontinent.

We've also seen that countries that have strong government investment in health infrastructure are far better able to proactively track, and in many cases, contain the spread of COVID-19. Long-term investments in eradicating wild polio in lower-income countries have helped countries like Nigeria and Pakistan build one of the largest operational workforces in modern global health. Investing in polio eradication created infrastructure for outbreak response and vaccine administration—which made a critical difference in disease outbreaks from Ebola to COVID-19.

That's why long-term investments in health systems are so worthwhile: They are the foundation for emergency disease response. We might not have known which specific pathogen would lead to a once-in-a-generation global pandemic, but the tools to end the pandemic are largely the same as for polio or malaria or other infectious diseases: widespread testing and, when possible, fast and effective treatment and lifesaving immunization.

Investing in Communities

Some of the most effective interventions we've been tracking have happened at a hyperlocal level, headed by leaders who have worked long and hard to earn the trust of their communities—something that cannot be built overnight or in the midst of a crisis.

Women's "self-help groups" are common across India as well as other parts of South and South-East Asia. For years, the Indian government and global partners have been investing in these

small collectives of women who pool money and work to improve health, education, and other services in their villages.

Below

Vaishali, Bihar, India

When COVID-19 arrived in Bihar, India, home to more than 100 million people, one local self-help group established trust with their neighbors by delivering meals and home-based health care to those who had fallen ill from COVID-19. When vaccines were ready for distribution in their community, these women became a source of information and guidance for those same neighbors who had concerns about vaccine safety. The Bihar government took notice of the work being done at the community level and declared March 8—International Women’s Day—a day to vaccinate women across the state. Nearly 175,000 women took the first dose of the vaccine that week. Building on that success, the government of Bihar is replicating the program, guided by the women of the self-help group.

And in Senegal, community-based outreach has been key to delivering other vaccines, too.

Senegal has been one of the success stories of routine immunization coverage: Before the pandemic, children were immunized against diphtheria, tetanus, and pertussis at similar rates as children in the United States and other high-income countries. But when COVID-19



arrived, fear of infection and misinformation reduced the demand for these vaccines dramatically.

Social distancing and school closures forced health workers to adapt their outreach strategies. Senegal trained health workers on how to resume immunization safely, while letting local officials adapt outreach strategies to meet local needs. Clinic staff now use immunization records to identify children who are missing vaccinations and send text message reminders to their families. And they've made it easier for those families to respond: The country's extensive and trusted cadre of community health workers are going home to home to deliver vaccines, and reopened clinics are providing greater flexibility for the location and timing for scheduling catch-up doses.

In both these examples, solutions for the community came from within. The communities themselves led the way in developing innovative strategies to slow the spread of COVID-19 in ways that worked for their particular localities, and foundations and government partners lent their support. These investments in community building will be worth nurturing long after the pandemic is behind us.

Investing in Women and Girls



We're seeing new innovations when it comes to how governments address crises, too. Of course, major policies often take years, decades even, to take root and make an impact. But once enacted and implemented, those policies can have far-reaching and long-lasting effects. In many ways, effective policymaking is the ultimate long-term investment.

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Cape Town, South Africa

Consider the pandemic's economic gender divide: Even though each country has its own unique story to tell, we're seeing that in high- and low-income countries alike, women have been harder hit than men by the global recession that was triggered by the pandemic. But—importantly—data also show that the negative effect on women has been smaller in countries that had gender-intentional policies in place prior to the pandemic.

That's why we're so encouraged to see governments around the world putting women at the center of their economic recovery planning and policymaking.

Below
New Delhi, India

Pakistan expanded its Ehsaas Emergency Cash program to get money to poor households, with women making up two-thirds of the program's intended recipients. Ehsaas provided emergency cash assistance during the pandemic to nearly 15 million low-income households—42% of the country's population. And the effects will have a lasting impact: more than 10 million women being brought into the formal financial system for the first time.

Argentina recently published its first budget with a gender perspective, directing more than 15% of public spending toward programs that target gender inequality. With guidance from a newly appointed director of economy, equality, and gender in the Ministry of Economy, they've adopted policies that support women and families, such as establishing 300 new public childcare centers in the country's poorest neighborhoods.



And in the United States, the Hawaiian state government is putting women and girls—as well as Native Hawaiians, immigrants, transgender and nonbinary people, and people living in poverty—at the center of its economic recovery efforts. The first gender-oriented economic recovery plan in the United States includes proven policies that support women’s long-term economic empowerment, such as paid sick days and family leave, universal childcare, and raising the hourly minimum wage for single mothers.

We’re eager to see the long-term outcomes from these innovative approaches toward women’s economic empowerment. But even in this early phase, these are encouraging new models of policymaking. These policies won’t just make a difference in the short term; they’ll help ensure greater economic stability the next time a crisis comes around.

Even Further, Even Faster



If the past year has shown us anything, it's this: Simply addressing the crisis at hand means we'll always be playing catch-up. To make future "miracles" possible, we need to think in generations, not in news cycles.

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Beijing, China

Long-term investments are rarely the exciting, easy, or politically popular thing to do. But those who have made them have seen meaningful returns amid a crisis of historic proportions. So many of the groundbreaking innovations of the past year have one thing in common: They grew out of seeds that were planted years—or even decades—earlier.

So, it's clearer than ever that we need more governments, multilateral organizations, and foundations like ours to make forward-thinking investments, knowing that the returns might be many years down the road. We must work with others to support talented researchers

around the globe to identify new tools and technologies that could be building blocks for solving a multitude of challenges. And we must strengthen collaboration across countries and sectors to work together toward common goals.

But it's not enough for high-income countries to simply keep investing money and resources internally and hoping their game-changing innovations make their way to the rest of the world. We also need to invest in R&D, infrastructure, and innovation of all kinds closer to the people who most stand to benefit.

New Sources of Innovation

We've seen that COVID-19 vaccine access is strongly correlated with the locations where there is vaccine R&D and manufacturing capability. Latin America, Asia, and Africa are being hit particularly hard by the delta variant right now because so much of their population remains unvaccinated. Africa, in particular, has had difficulty getting access to the doses they need. The continent—home to 17% of the world's population—has less than 1% of the world's vaccine manufacturing capabilities. If African leaders, with donor support, invest in and build a sustainable regional vaccine development and manufacturing ecosystem, the continent would be far less likely to be last in line in a future pandemic.

That's why we're supporting the Africa CDC and African Union's vision to do just that by 2040. It's not only Africa that would benefit from improved health security and pandemic preparedness; the entire world would benefit from new sources of R&D and scientific innovation.

Africa is committed to establishing mRNA manufacturing on the continent, and already, mRNA companies are stepping up to make that a reality. This will allow Africa to create vaccines not just for COVID-19, but potentially also for malaria, tuberculosis, and HIV—diseases that disproportionately affect the most vulnerable.

Below

Gurmia, Bihar, India



Our call to invest closer to the source is a reflection of our belief in the ability of people all over the world to innovate and solve tough problems. The next big idea or lifesaving breakthrough can be sparked anywhere in the world, at any time. Whether the world will benefit is up to all of us.

It's not difficult to imagine a world in which Dr. Karikó's revolutionary ideas about mRNA never got the funding they needed. Or a world in which Africa didn't have its own genomic sequencing capacity—and the beta variant couldn't get sequenced in time to act quickly.

The pandemic has taught the world an important lesson: Responding to crises starts years before they happen. And if we want to be better, faster, and more equitable in our approach to realizing the Global Goals by 2030, we need to start laying the foundation. Now.

**Responding to crises starts
years before they happen.**

The Call to Adapt: Innovators for Impact

Just as countries, communities, and organizations have been innovating during COVID, millions of individuals around the world have shown us that each of us—all of us—can also make a mark.

These are three such thinkers and makers. They help birth ideas, designs, and babies. They are doers, driven by passion, knowledge, and the unstoppable will to solve problems, and are undeterred by challenging times. When COVID-19 battered the world, it only fortified their spirit. With renewed resilience

and determination, they shifted what they did and how they worked. For them, the pandemic became a call to adapt. And to do better. Introducing you to them is just the beginning. We will continue looking to tell the stories of the many more who are blazing trails for a better world.

Innovating for Vaccines: Strive Masiyiwa

In May 2020, when the world was scrambling for PPE, testing kits, and ventilators, Zimbabwean mobile telecommunications mogul Strive Masiyiwa accepted a gargantuan challenge. Newly appointed as one of the African Union's special envoys for COVID response, he embarked on a high-speed chase to help get Africa's 1.3 billion residents much-needed medical supplies.

“The global supply was so limited, and it became a battle. Africa was edged out,” he said at the time. Reporting to seven African presidents who, along with Africa's CDC, made up the continent's joint COVID-19 Task Force, the challenge was clear: “My job is to fix the problem in front of me. How do I ensure those critically required supplies are moving?” he says.

Strive has made a career of trying to fix the problems in front of him. In 1991, the young entrepreneur was asked by a multinational corporation to help bring satellite phones to Africa. If he raised US\$40 million, he'd get 5% of the company and a cut of each phone eventually sold on the continent. But after two years of trying, he did not succeed. Discouraged, Strive went back to his construction business, until the lessons



This Page

Strive Masiyiwa, New York City,
New York

coalesced. Using a Global System for Mobiles (also known as GSM and 3G) seemed like a big opportunity to bring phones to the continent himself. “Suddenly, all the things I had learned... became a massive windfall. It was like I had advanced 25 years as an entrepreneur!” he says.

Fast-forward to COVID-19. Just 28 days after his appointment, Strive assembled a technical team to develop and launch the African Medical Supplies Platform (AMSP), a user-friendly online marketplace for Africa’s 55 governments to access COVID-related medical supplies, streamline logistics, and consolidate buying power for things like Lumira test kits and treatments like dexamethasone. Strive and his team also created a pipeline for high-tech ventilators to be manufactured in South Africa, reducing the cost tenfold. And

later, when COVAX vaccine deliveries to the continent were delayed, Strive not only worked to secure contracts independently through the African Vaccine Acquisition Task Team (AVATT), but also helped ensure that vaccine manufacturing would take place in Africa. The World Bank and African Union estimate that by January 2022, African manufacturers will have participated in the production of up to 400 million doses for local distribution.

A fierce critic of highly resourced nations “pushing their way to the front of the queue to secure production assets,” Strive rejects vaccine nationalism, a stance that has—in many ways—defined his work. “We didn’t ask anyone to give us anything for free,” he insists. “Equitable access meant buying vaccines

the same day and time they became available.”

Largely pausing his day job during the pandemic, Strive has spent the last year negotiating to help reduce vaccine inequities between rich nations and African ones and has become part of the brain, engine, and heart of Africa’s massive homegrown COVID-19 response. “When we talk about philanthropy, we often talk about money. But this is a once-in-a-lifetime crisis, and the scale of it, both in terms of human cost and human life, as well as economic cost, is pretty profound. You just have to drop what you are doing and tackle it,” he said.

Innovating for Birth: Efe Osaren

Efe had just arrived at the hospital when everything changed. Minutes before, when New York City announced its COVID-19 lockdown, she was barreling underground in the subway, mentally reviewing her client's case: older woman, bed rest, likely preterm C-section, baby that would be delivered straight to the NICU. For first-time mothers, especially those in high-risk pregnancies, birth can be a traumatic experience. For Efe, her job as a doula meant holding their hand through the uncharted journey, ensuring

that stress didn't harm mom and baby alike. Except that on this most anticipated of March dates, an invisible virus barricaded her from the delivery room.

Efe Osaren was 15 when she became enthralled by a unique ritual in which her newborn niece was stretched and massaged with palm oil and hot rags. It was a traditional Yoruba bath, and her mom told Efe she'd been bathed that way too, so she'd grow up with strong bones. The bath didn't make Efe unbreakable, but it did mold her.

Below

Efe Osaren, El Paso, Texas



The Nigerian American student living in Texas knew then she wanted to use tradition and science to help babies come into the world in health. Especially babies born to women of color.

In the United States, new Black moms die at higher rates than white ones—irrespective of age, education, rural or urban residence, or socioeconomic status. Black mothers are three times more likely to die in childbirth than white ones. “It makes me feel rageful for my clients,” says Efe. It’s why she also works as a reproductive birth justice advocate. “Pregnancy requires you to feel safe. When you don’t have comfort, you have fear... that can lead to medical emergencies.”

Back in a NYC hospital, she encountered her own worst fear—she would not be able to be there with her client. With no time to lose, she summoned her client’s partner and gave him a crash course in the lobby: how

to help mom breathe, how to keep her calm with eye contact, how to press on her hips and back, how to instill confidence in her, how to ensure that if she’s wheeled into the OR, she will be safe.

The flash training became the blueprint for Efe’s pivot during COVID. She began teaching virtual birthing classes, empowering her clients through knowledge, and even helping them get tripods and Bluetooth speakers for their phones so they could video chat during labor.

An advocate for women of color her whole career, Efe now equips them to do the job themselves. It is not an easy task, because she has become bodyguard, concierge, therapist, and mediator. But she knows her work is important.

Note: While research shows that specific interventions can improve the birth experience for moms, more research and funding are needed to identify interventions that reduce racial inequity in maternal outcomes. Accordingly, obstetric quality improvement programs that represent current best practices should be expanded and standardized.

Innovating for PPE: Kuldeep Aryal

On April 25, 2015, Kuldeep Aryal was in his room studying for his college civil engineering exams when a massive earthquake ripped Nepal open. After spending interminable minutes hiding under his home's structural beams and clinging onto life with nothing but a prayer, Kuldeep went outside and found his neighbor's home on the ground. It was one of 700,000 houses that had crumbled in the quake.

As he began lifting bricks and tiles, a question arose from

under the rubble. "How much do I want my engagement with the world to have impact?" he asked himself. And a humanitarian was born. "I never looked back." What he did not know then was how his work in Nepal's response and recovery effort would end up informing how he's done everything since.

When COVID-19 hit South Asia, Kuldeep was living in Dhaka. Like all other nations on the planet, Bangladesh was also struggling to source PPE, to create systems for contact

Below

Kuldeep Aryal, Cox's Bazar, Bangladesh



tracing, and to get clarity about what it meant to be locked down at home indefinitely. But hope, it turns out, was abundant. “This was a triggering event. I went onto chat groups, we open-sourced medical supplies, and we started sharing ideas about how to make things ourselves,” he said. He connected with universities who could help him with 3D printers. He mobilized resources. And within weeks, he was producing face shields for his community.

“At first, it was slow. We could only make 40 to 50 per day. The university didn’t allow us to come and go from the lab, so while some spent the night there, others went out looking for raw materials,” he said, describing how there was no down time. While printers slowly churned out face shields, he and his fellow makers formulated hand sanitizer using chemicals they spotted around. “Anything. We had an environment of crisis,

with resource constraints,” he said. “We had to figure out how to use what we had, to make whatever we could. And then make it faster.”

Months into the pandemic, Kuldeep was making goggles, handwashing stations, and oxygen concentrators, sophisticated machines that are saving lives in hospitals today. His formula is simple: Use open source to design; localize for your market; and then scale. “The hardest thing is not the inventing. It’s figuring out the challenge of production and where the supply chain lives,” he said, matter-of-fact and without fanfare. Invention comes first. Adaptation to local markets next. And adoption—or taking things mainstream—is the ultimate prize. “That initial spark of innovation, we try to build on it and expand, so we can make our

innovations common,” he said. “So everyone can benefit.”

Kuldeep disavows the notion that catastrophe freezes anyone into a state of victimhood. Instead, he insists, the most challenged people on earth are usually the most resilient. “People with inequities have suffered a lot. But we’ve always suffered. It’s not a new thing. COVID has just been another challenge,” he said, and continued his march forward.

Explore the Data

Each year the Goalkeepers Report publishes the most recent data on the 18 global indicators most closely related to the foundation's work.

Interact with the Data

Visit our site to view an interactive version of these charts and access the raw data, in English.

↔ <https://gates.ly/GK21Data>

These indicators provide a roadmap for measuring progress toward the Global Goals. Throughout the pandemic, there have been some marked setbacks as well as some remarkable

bright spots. But to stay the course, it is important to remember that progress is possible, but it is not inevitable.

A Malaria-Free China Paying It Forward

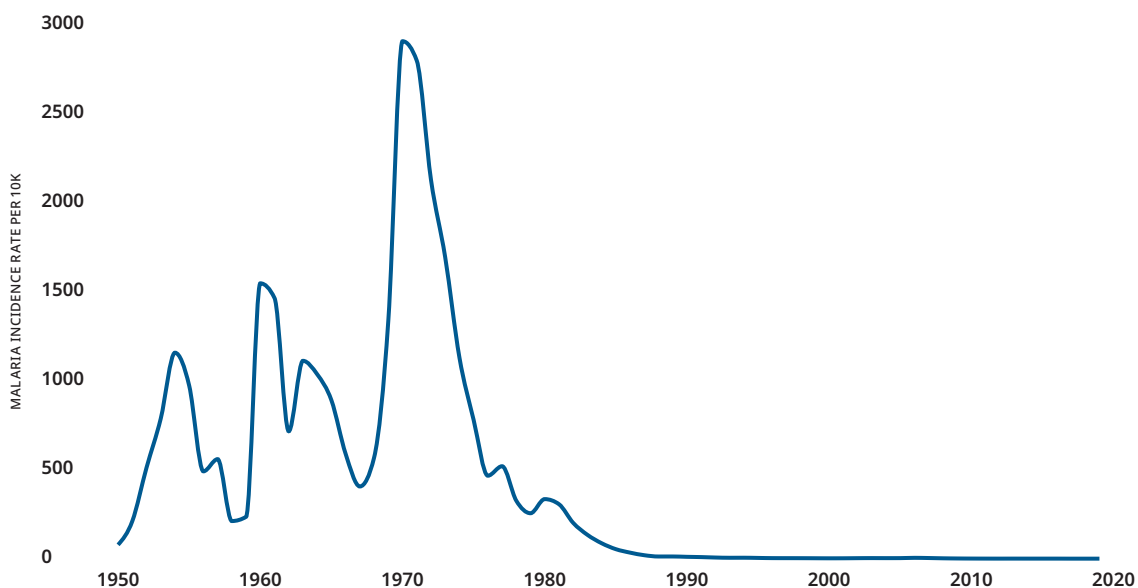
In June of this year, China celebrated a significant victory: It was declared malaria-free in the People's Republic of China by the World Health Organization (WHO). In just seven decades, China went from 30 million cases a year to zero. The certification of malaria elimination in a country that is home to more than 1 billion people is credited to innovation, perseverance, and collaboration.

To achieve this milestone, China made a long-term investment in research and development, beginning with the grit and determination of a group of scientists led by Professor Tu Youyou. In 1972, Nobel Laureate Professor Tu and her team discovered a compound for malaria treatment called artemisinin. This drug was developed from the ether extractions of a herb common in Chinese traditional



Above
Tu Youyou in Beijing, China

From 30 Million to Zero: China's 70-Year Journey to Eliminate Malaria



medicine. Professor Tu’s groundbreaking innovation started a ripple effect of scientific discovery for the treatment and cure of malaria—not just in China but around the world. Today, artemisinin-based combination therapies (also known as ACTs) are the worldwide standard malaria treatments under the WHO’s recommendation.

But ACTs are just one part of China’s celebrated achievement. Many factors underpin this achievement, especially the country’s pursuit of locally tailored solutions, improved disease surveillance and response systems, and regional and international collaborations. What’s more, China took its accomplishment one step further through global citizenship. Today, while Africa bears most of the world’s malaria burden with more than 90% of malaria cases and deaths globally, China is on a mission to help end this. To help achieve malaria elimination for other countries, Chinese researchers and health professionals have been working with a number of international partners on several key elements that will ensure their success. These include adapting and sharing lessons learned, supplying antimalarial drugs and products, supporting Africa CDC in establishing robust public health systems across the continent, and mobilizing funding that will afford raw materials and technical support.

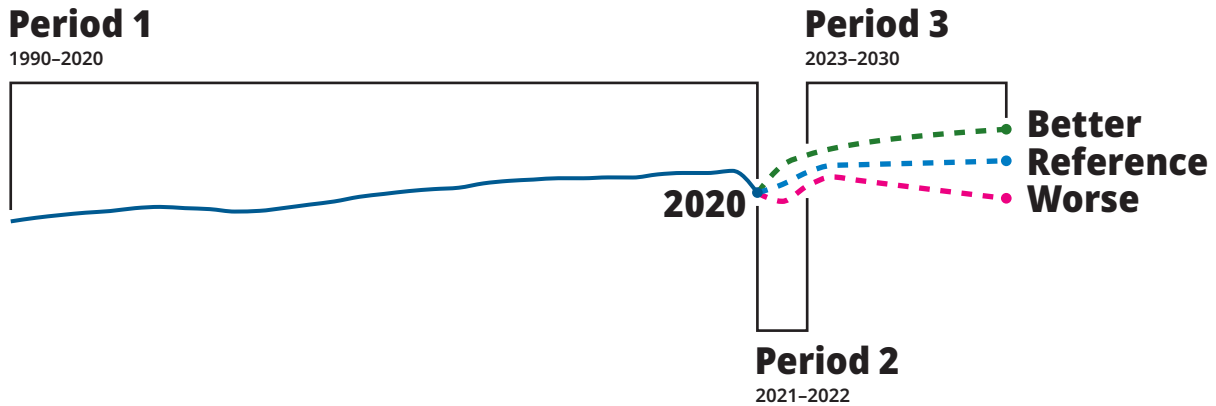
Methodology

Our primary data partner, the Institute for Health Metrics and Evaluation (IHME), worked together with many partners and used novel methods to generate a set of contemporary estimates for how the pandemic has affected global progress on the SDGs.

Methodology

Read the full methodology description from IHME in the Data Sources section of the online version of the 2021 Goalkeepers Report

↪ <https://gates.ly/GK21DataSources>



This diagram provides a snapshot of IHME’s three-part process and the data and methods used in each.

Period 1, 1990–2020

This is historical data drawn from thousands of sources around the world, backed by published evidence that has been checked and re-checked by global health researchers.

Period 2, 2021–2022

This is the period disrupted by the pandemic, and the most challenging period to assess given the uncertainty and immediacy of the data. Here IHME is using contemporary data gathered from surveys, mobility data of populations, administrative data from governments and the WHO, and COVID-19 case data in order to assess how the disruptions from the pandemic have affected progress on the Global Goals from 2020 to 2022.

Period 3, 2023–2030

This is trying to predict the future, using the past as a guide. IHME looked at how economic growth and progress has affected these indicators in the past and then projected possible trends for the future. So, if all countries make progress as well as the best historical performers (top 15%), the indicators will follow the green line. But if the economic trends are in line with the worst performers, the indicators will follow the red line.

Poverty



SDG Target 1.1

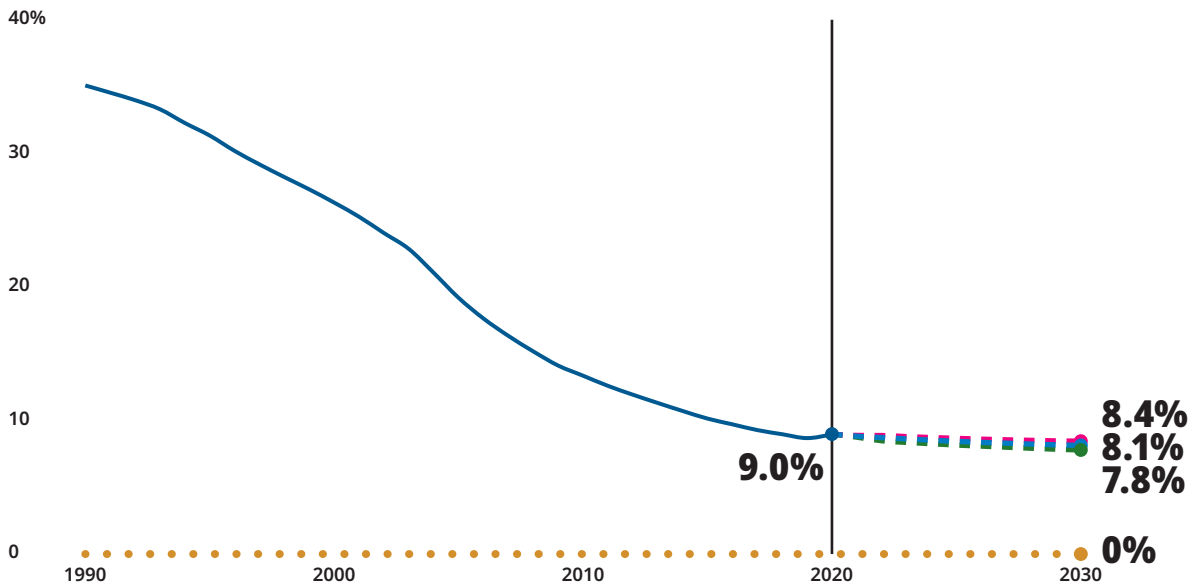
Eradicate extreme poverty for all people everywhere.

The pandemic and resulting economic crises have reversed progress on eliminating poverty by four years. In places where extreme poverty, epidemic waves, economic challenges, and demographic

factors continue to persist, we expect poverty reduction to stall at near current levels in the years ahead.

Percentage of Population below the International Poverty Line (US\$1.90/Day)

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Stunting



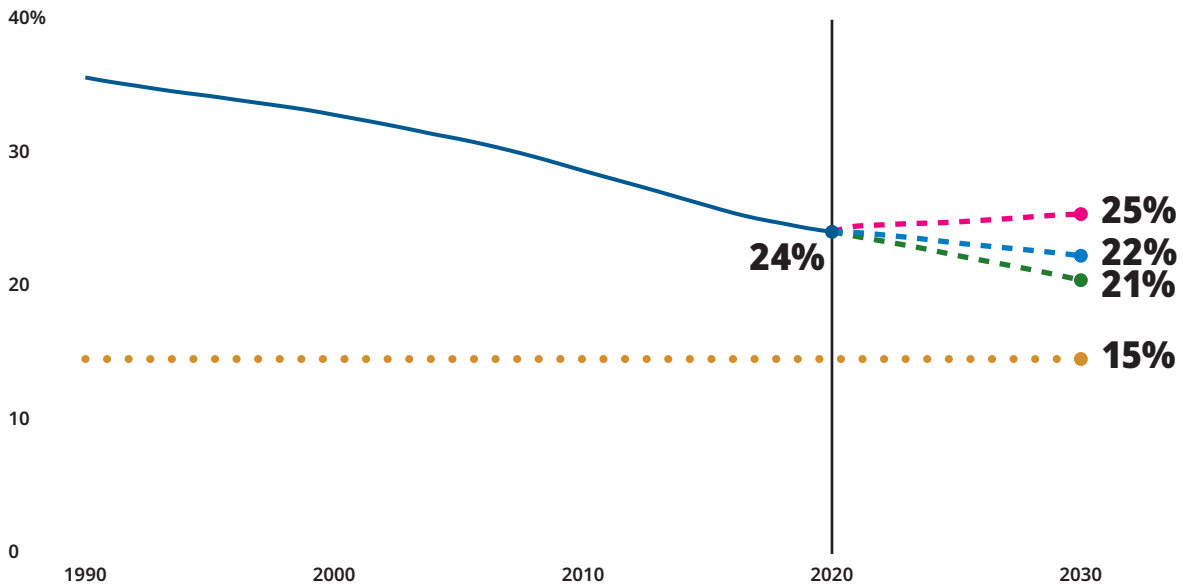
SDG Target 2.2

End all forms of malnutrition, including achieving, by 2025, the internationally agreed-upon targets on stunting and wasting in children under five. Target shown on chart is provisional and has been extrapolated based on existing 2025 target.

In the global data for 2020, 24% of children under age 5 were stunted. The 2030 projection suggests 22% of children under age 5 will be stunted.

Prevalence of Stunting among Children under Age 5

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Agriculture



SDG Target 2.3

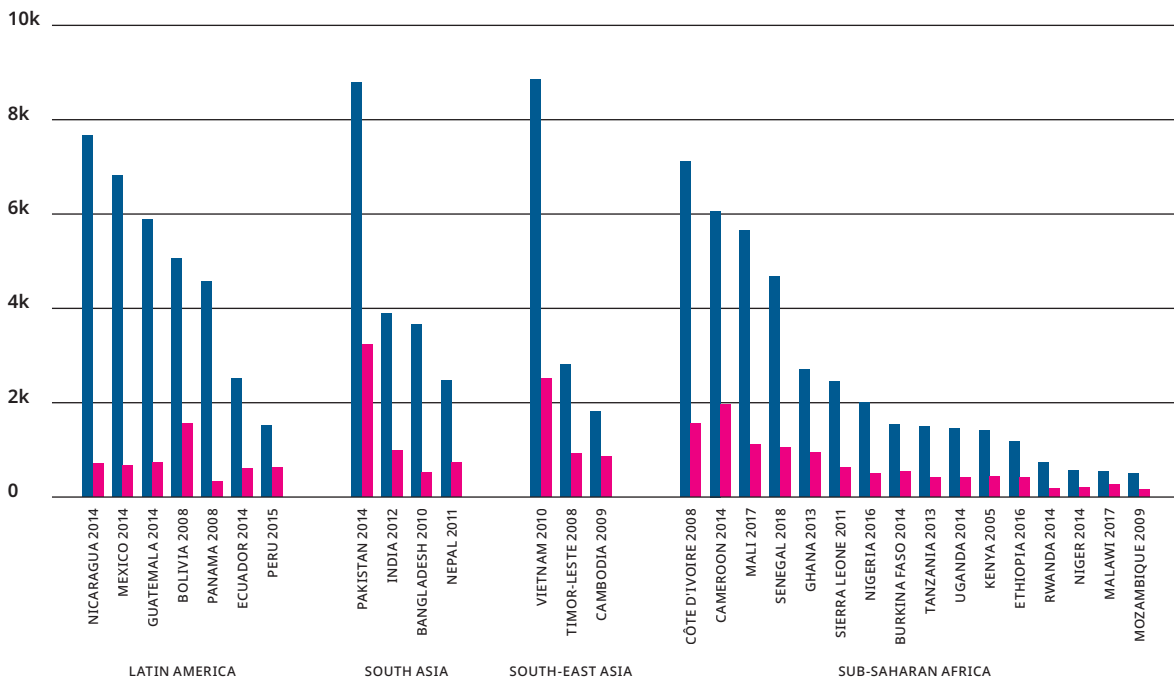
Double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers.

Hunger has increased this year due to conflict, extreme weather events, and the economic slowdown from the pandemic. Smallholder farmers are facing challenges in accessing crop inputs and coping with severely reduced incomes. The

pandemic has shown the importance of providing markets and decision-makers with information to tackle hunger and poverty and to adapt to the impacts of climate change.

Average Annual Income from Agriculture, PPP (Constant 2011 International \$)

- Non-small-scale producers
- Small-scale producers



Maternal Mortality



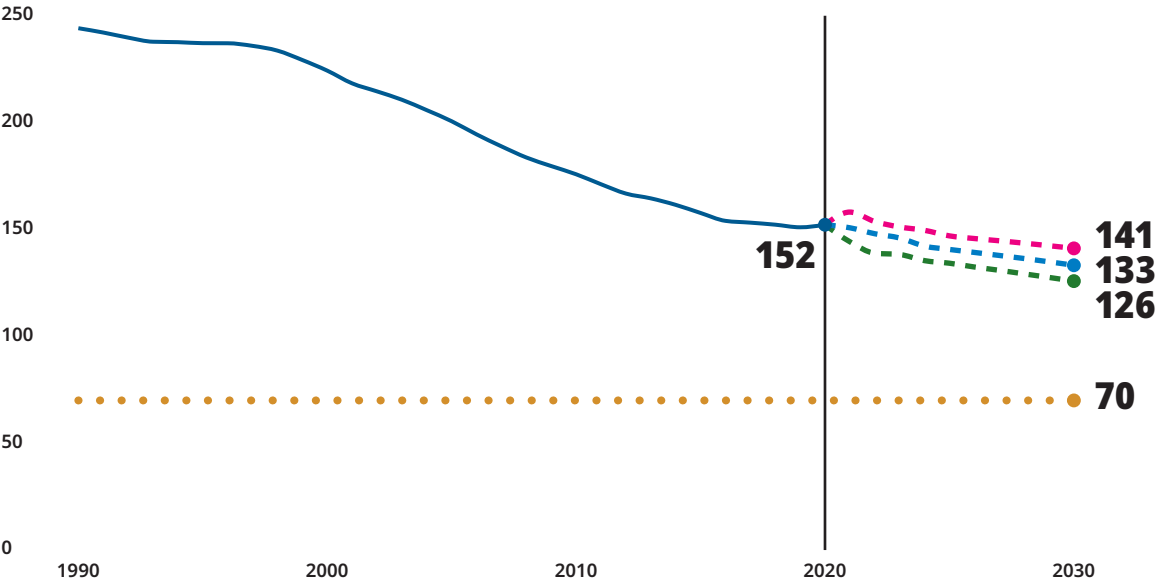
SDG Target 3.1
Reduce the global maternal mortality ratio to less than 70 per 100,000 live births.

COVID-19 and its impacts are taking a toll on the health of women and newborns, as mothers continue to face disruptions in prenatal care and delivery. In 2020, the global maternal mortality

ratio was 152 deaths per 100,000 live births, up from 151 deaths per 100,000 live births in 2019. This trajectory projects 133 deaths per 100,000 live births in 2030, nearly double the SDG target.

Maternal Deaths per 100,000 Live Births

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Under-5 Mortality



SDG Target 3.2

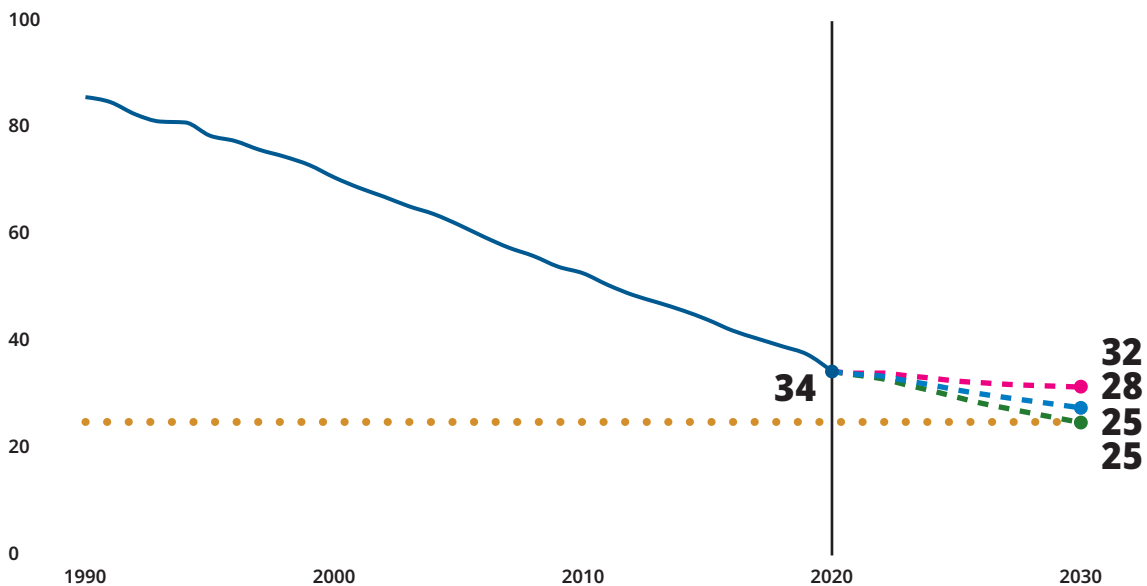
End preventable deaths of newborns and children under age five, with all countries aiming to reduce under-five mortality to at least as low as 25 per 1,000 live births.

Under-5 mortality is lower than ever before, but the COVID-19 pandemic has resulted in major disruptions to health services that threaten to undo decades of hard-won progress. Increasing access to

childhood vaccinations, postnatal care, adequate nutrition, and other basic lifesaving interventions is critical to end preventable child deaths.

Under-5 Deaths per 1,000 Live Births

- 2030 target
- Global average
- Better scenario
- Reference scenario
- Worse scenario



Neonatal Mortality



SDG Target 3.2

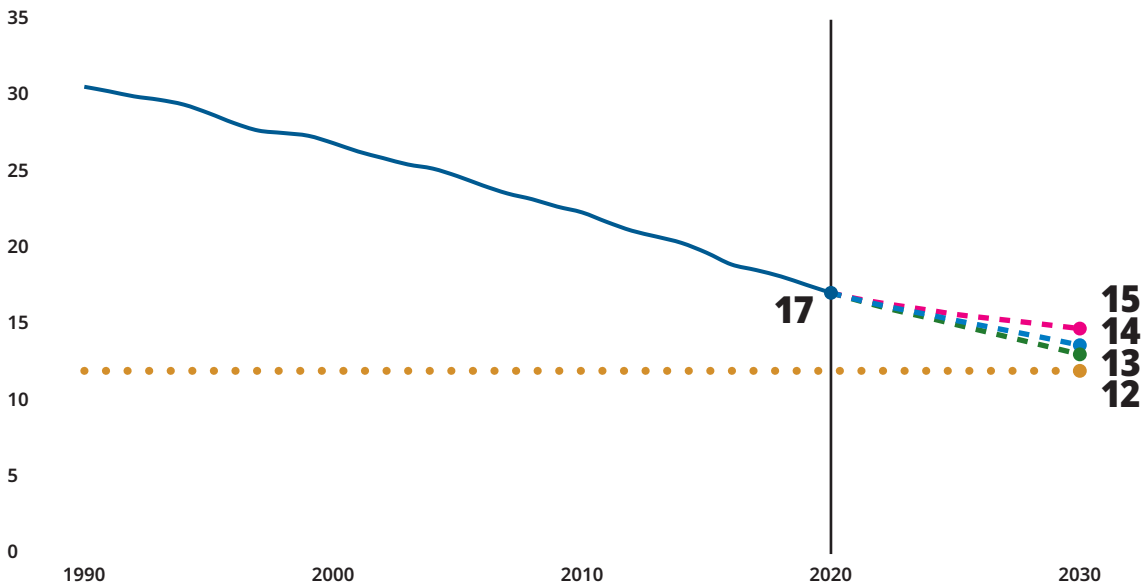
End preventable deaths of newborns and children under age five, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births.

Babies are particularly vulnerable to shocks to health systems, including disruptions in ante- and postnatal care. The global data for neonatal mortality in 2020 was 17.1 deaths per 1,000 live

births, similar to the 2019 estimate of 17.6 deaths per 1,000 live births. This trajectory projects 13.7 deaths per 1,000 live births in 2030, exceeding the SDG target.

Neonatal Deaths per 1,000 Live Births

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



HIV



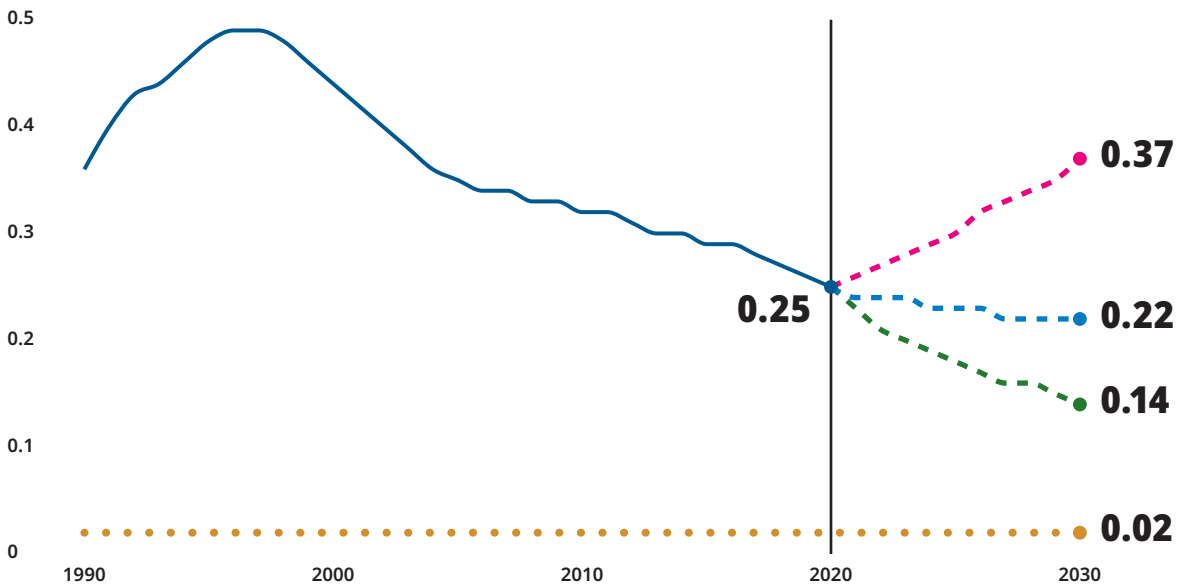
SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases.

To make sustainable progress in the fight against HIV/AIDS, we must continue the delivery of effective HIV treatment along with expanded access to lifesaving prevention options.

New Cases of HIV per 1,000 People

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Tuberculosis



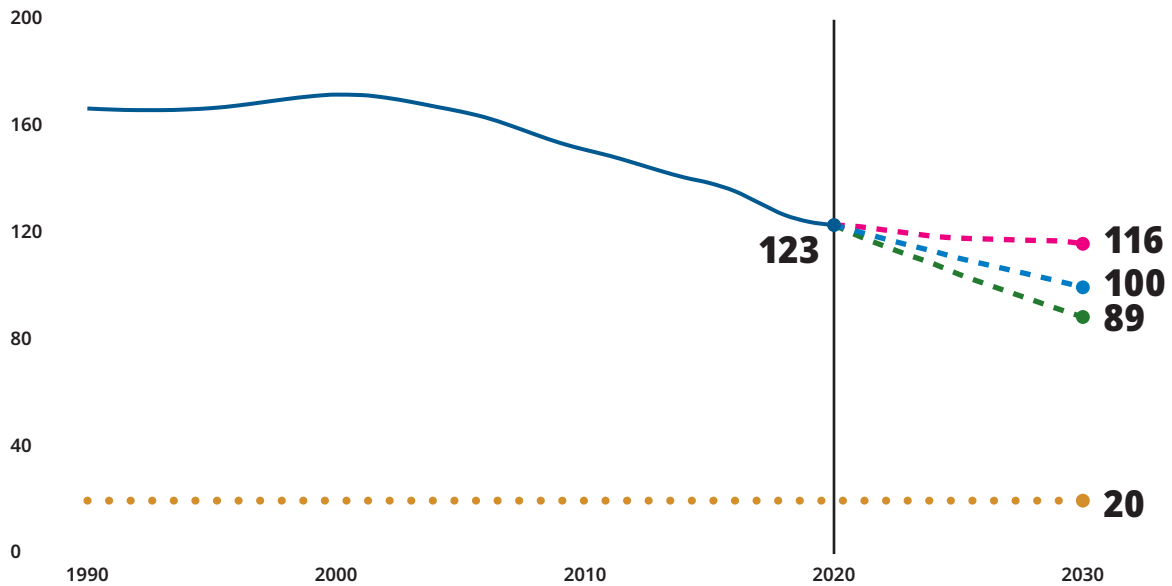
SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases.

The current data suggests we are not on track to end tuberculosis by 2030. In order to make significant progress, more people need access to effective treatment and we need to identify new TB infections that may have been missed during the pandemic.

New Cases of Tuberculosis per 100,000 People

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Malaria



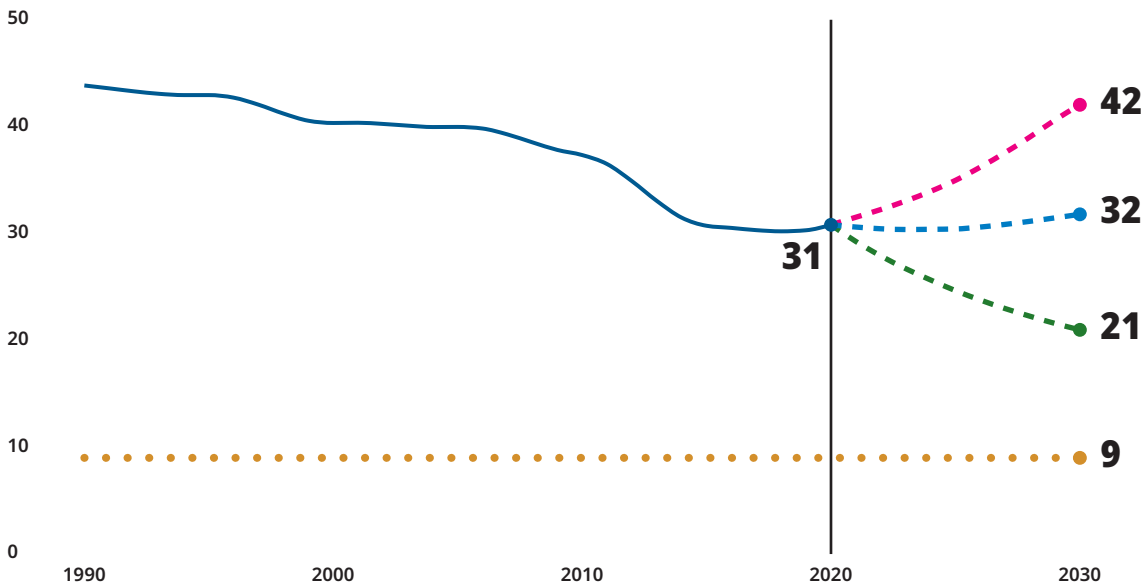
SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases.

The global data for 2020 was 31 new cases of malaria per 1,000 people, with a 2030 projection of 32 new cases per 1,000 people.

New Cases of Malaria per 1,000 People

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Neglected Tropical Diseases

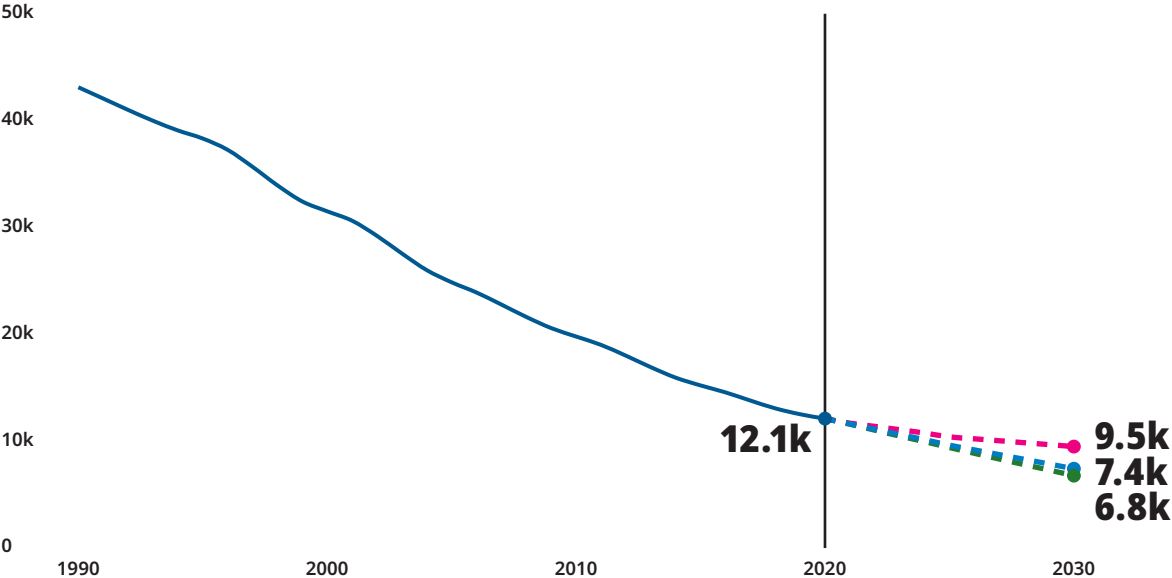


SDG Target 3.3
End the epidemics of AIDS, tuberculosis, malaria,
and neglected tropical diseases.

The global data for 2020 was 12,114 cases of 15 neglected tropical diseases (NTDs) per 100,000 people, with a 2030 projection of 7,417 cases of 15 NTDs per 100,000 people.

Prevalence of 15 NTDs per 100,000 People

- Global average
- - Better scenario
- - Reference scenario
- - Worse scenario



Family Planning



SDG Target 3.7

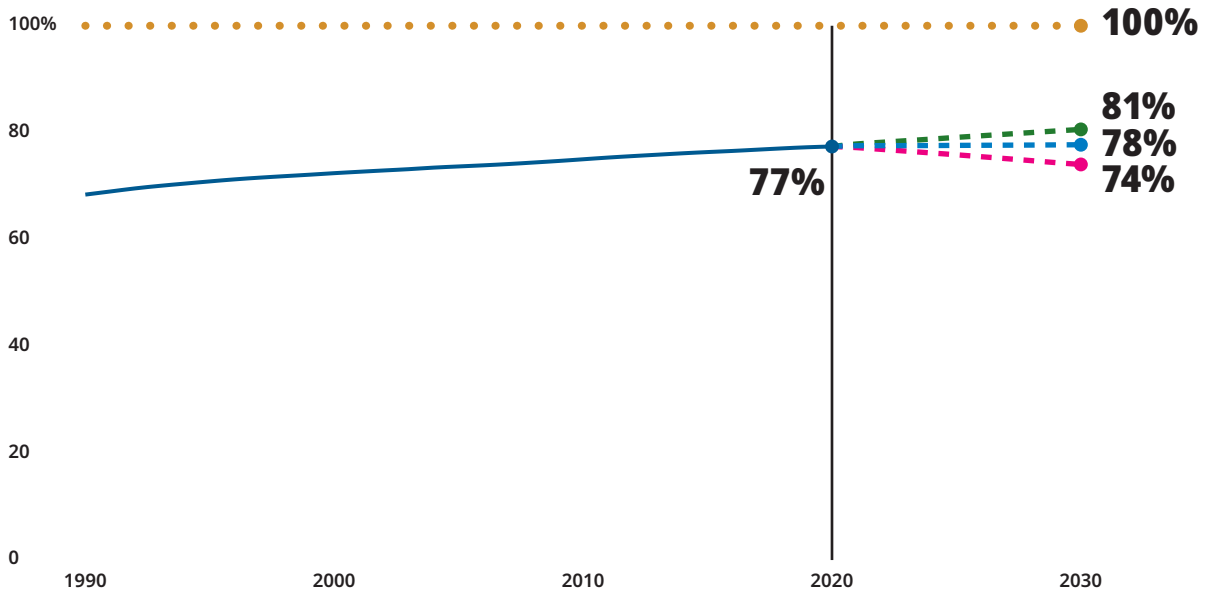
Ensure universal access to sexual and reproductive health care services, including those for family planning.

The global data for 2020 showed that 77% of women ages 15–49 had their family planning needs met with modern methods. The 2030 projection suggests

that 78% of women ages 15–49 will have their family planning needs met with modern methods.

Percentage of Women of Reproductive Age (15–49) Who Have Their Need for Family Planning Satisfied with Modern Methods

- 2030 target
- Global average
- Better scenario
- Reference scenario
- Worse scenario



Universal Health Coverage

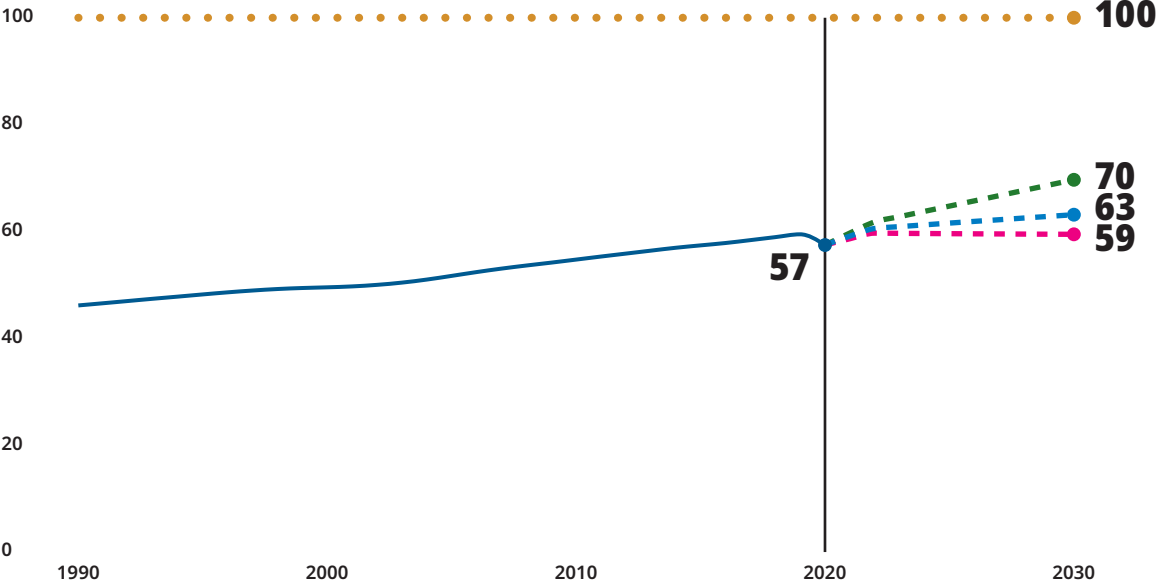


SDG Target 3.8
Achieve universal health coverage for all.

The global data for 2020 was a 57 score for coverage of essential health services and a 2030 projected 63 score for coverage of essential health services.

Performance Score of the UHC Effective Coverage Index

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Smoking



SDG Target 3.A

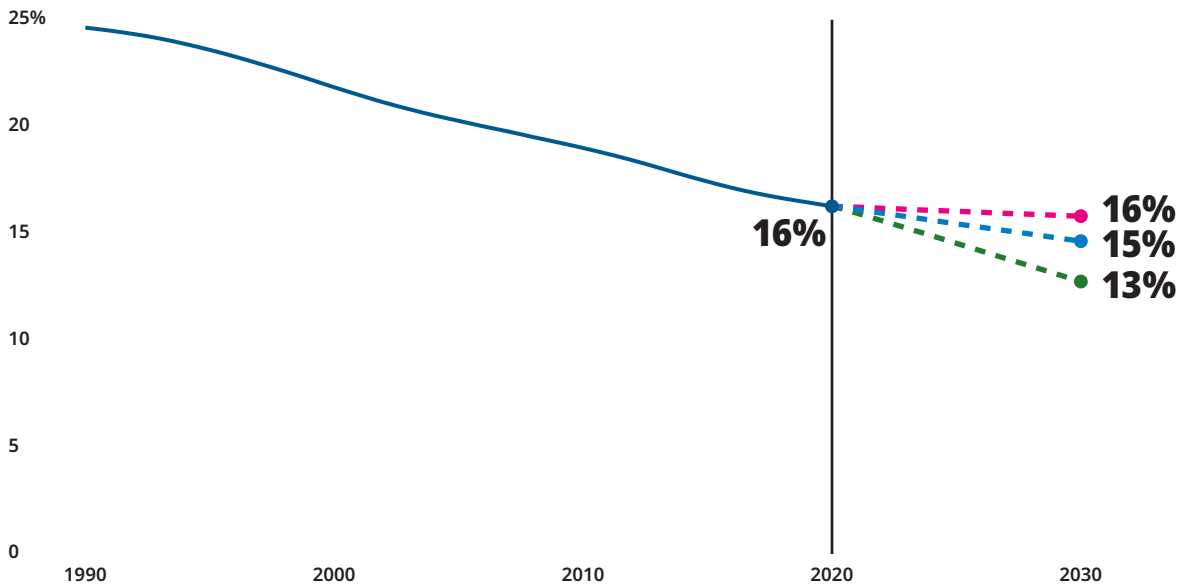
Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries.

Projections suggest that smoking prevalence could continue to decline from a 2020 level of 16% to 13% in 2030—meaning 112 million fewer smokers, if current progress accelerates. Countries can

accelerate progress by enacting and enforcing strong policies in line with the WHO Framework Convention on Tobacco Control.

Age-Standardized Smoking Prevalence among People Ages 15 and Older

- Global average
- - Better scenario
- - Reference scenario
- - Worse scenario



Vaccines



SDG Target 3.B

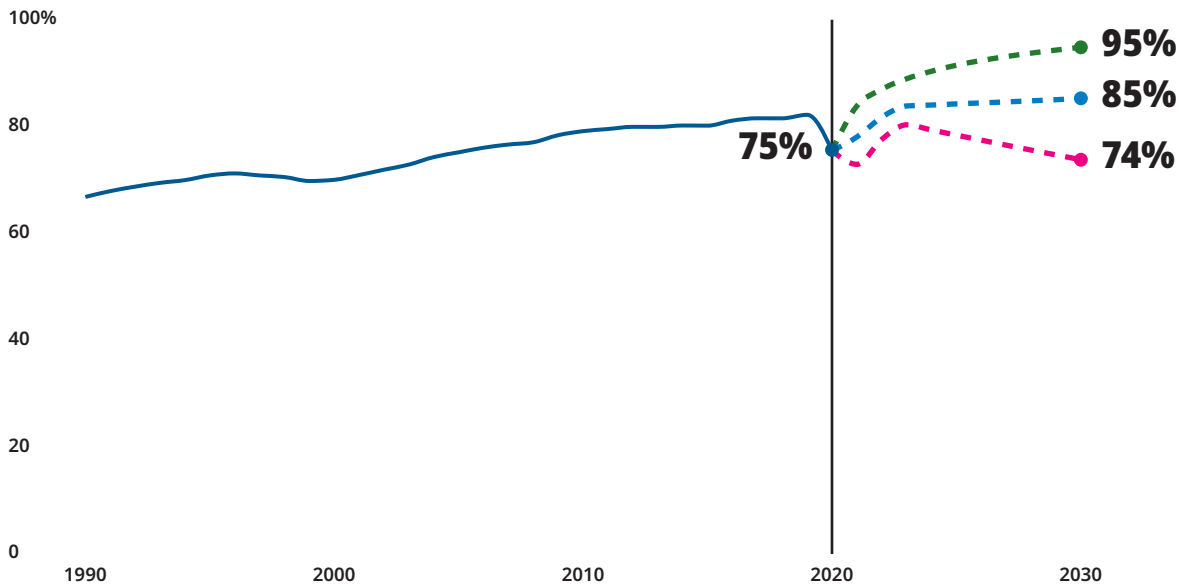
Support the research and development of vaccines and medicines for the communicable and noncommunicable diseases that primarily affect developing countries; provide access to affordable essential medicines and vaccines.

COVID-19 has led to major disruptions for vaccines and other lifesaving health services. Many immunization programs face the challenge of catching up on missed child vaccinations while also rolling out

COVID-19 vaccines. The pandemic has underscored the importance of ensuring global, equitable access to all vaccines. The health and well-being of millions of people across the globe depends on it.

Coverage of DTP (Third Dose)

- Global average
- Better scenario
- Reference scenario
- Worse scenario



Education



SDG Target 4.1

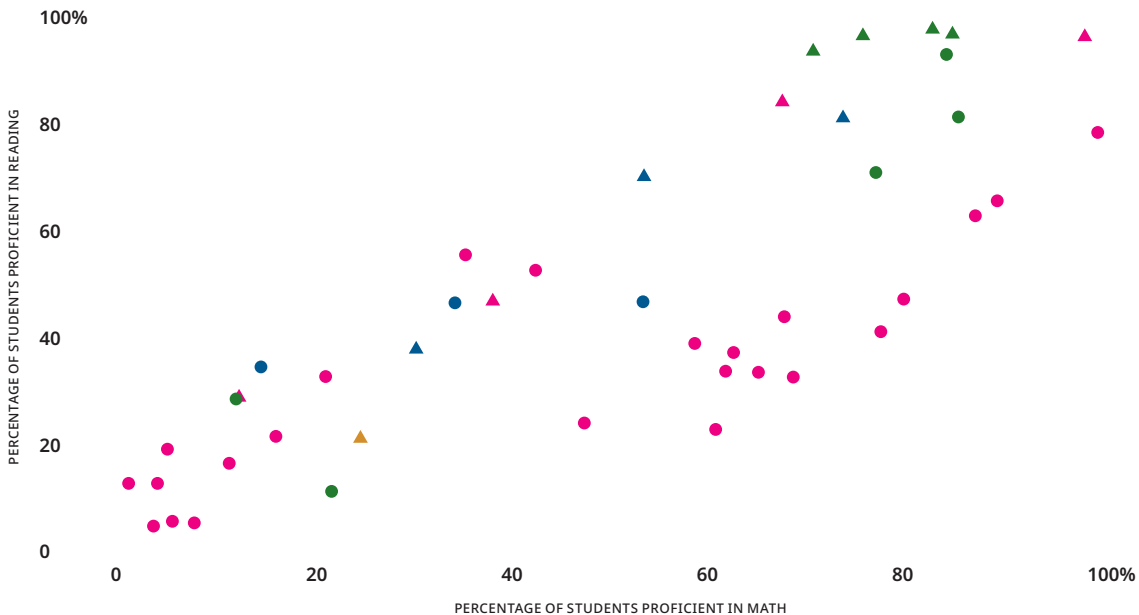
By 2030, ensure that all girls and boys complete free, equitable, and quality primary and secondary education leading to relevant and effective learning outcomes.

In countries where data has been collected, math and reading proficiency for girls and boys falls short of the levels needed to meet the global targets for 2030, which represent a minimum level of

mastery of foundational skills. Measures of learning proficiency remain scarce, particularly in low- and middle-income countries, and their reliability is often questionable.

Percentage of Students in Grade 2 or 3 Achieving at Least Minimum Proficiency Level in Math or Reading, Both Sexes

- ▲ Central Europe, Eastern Europe, and Central Asia
- ▲ High-income
- ▲ Latin America and Caribbean
- ▲ North Africa and Middle East
- South Asia
- South-East Asia, East Asia, and Oceania
- Sub-Saharan Africa



Gender Equality



SDG Target 5.4

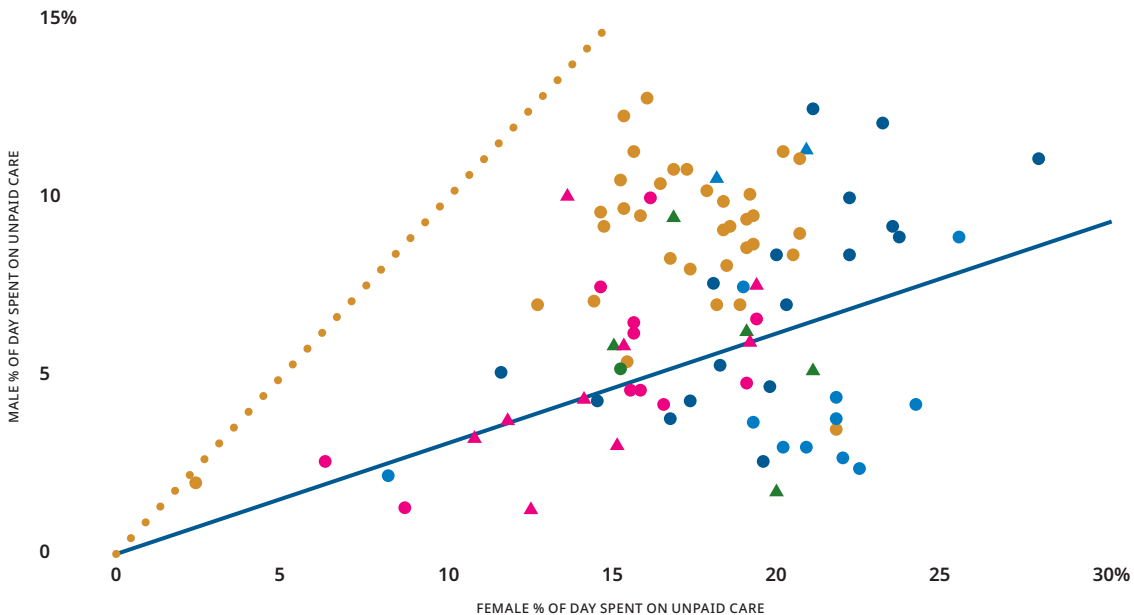
Recognize and value unpaid care and domestic work through the provision of public services, infrastructure, and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.

In countries where data has been collected, women spend 3.1 more time in unpaid care and domestic work than men. The largest gap between men and women on average is in the North African and

Central Asian groups of countries, but the gap exists in every region.

Unpaid Domestic and Care Work by Sex and Region

- Equal amount of work
- Global average
- ▲ Australia and New Zealand
- ▲ Central Asia and South Asia
- ▲ East Asia and South-East Asia
- Europe and North America
- Latin America and Caribbean
- North Africa and West Asia
- Oceania (excluding Australia and New Zealand)
- Sub-Saharan Africa



Sanitation



SDG Target 6.2

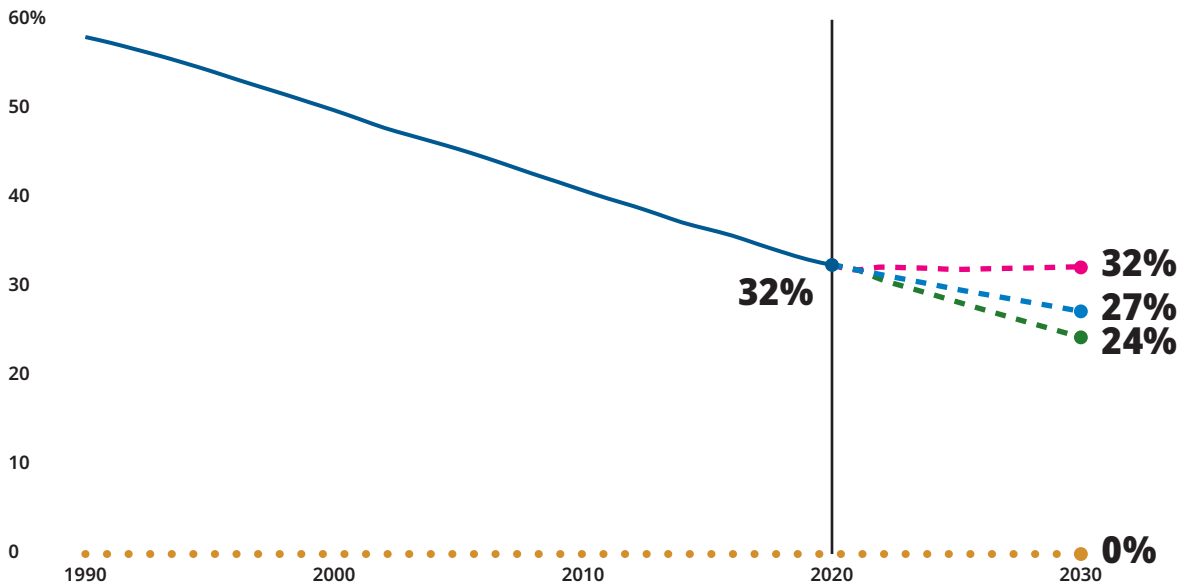
Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

The SDGs rightly established a new, “safely managed” sanitation indicator, but data to track progress on this new measure has lagged. The data presented here measures access to sewerage toilets, but other, lower-cost technologies exist to safely

manage waste. Each year the available data has increased, and the UN recently estimated that 3.6 billion people lacked safely managed services in 2020.

Prevalence of Populations Using Unsafe or Unimproved Sanitation

- 2030 target
- Global average
- - - Better scenario
- - - Reference scenario
- - - Worse scenario



Financial Services for the Poor



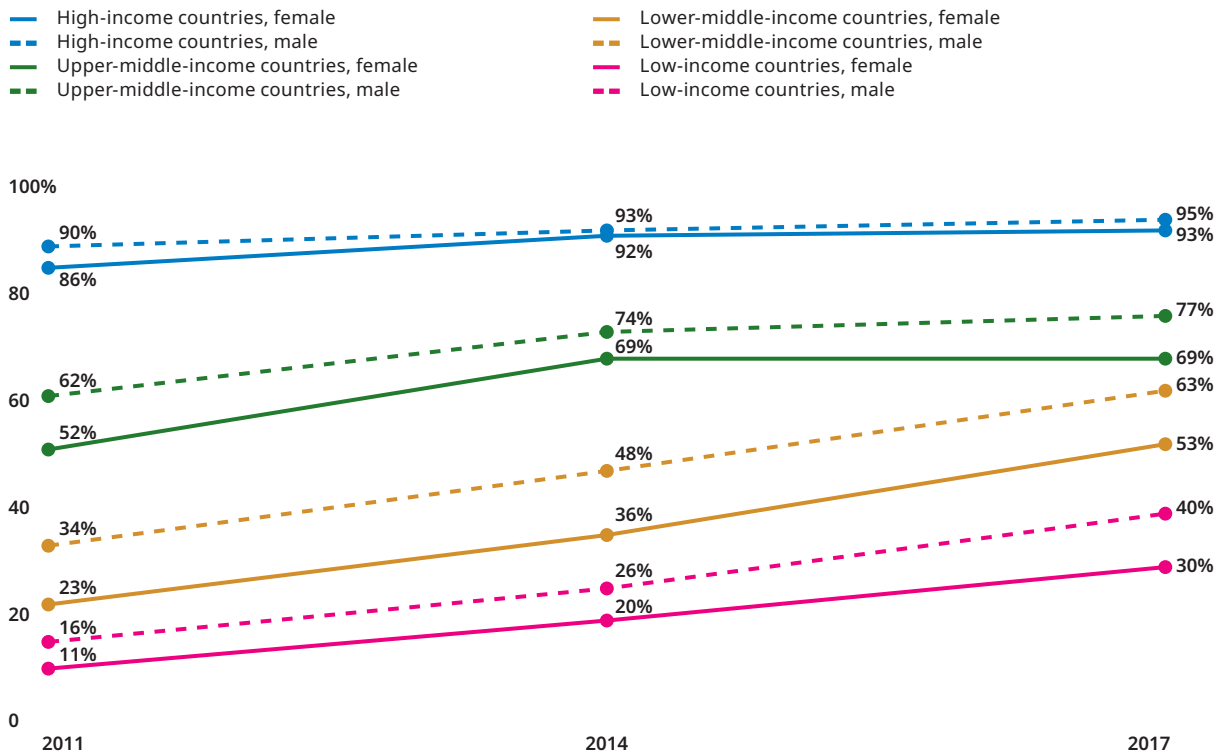
SDG Target 8.10

Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance, and financial services for all.

There is strong evidence that the pandemic has accelerated digital adoption and use: Financial service providers saw digital payments increase during the pandemic. Since the start of the

pandemic, nearly 60 low- and middle-income countries have used digital payments to deliver emergency relief, more than half making payments into full-fledged financial accounts.

Percentage of Adults (Ages 15 and Older) With an Account at a Bank or Other Financial Institution or with a Mobile-Money Service Provider



Sources and Notes

The data sources for facts and figures featured in the 2021 Goalkeepers Report are listed here by section. Brief methodological notes are included for unpublished analyses. Full citations, links to source materials, and additional references can be found on the Goalkeepers website at <https://gates.ly/GK21DataSources>

Introduction

See last year's initial projections of the impacts of the pandemic on the Sustainable Development Goals in the 2020 Goalkeepers Report, *COVID-19: A Global Perspective*.

The Data Tells a Surprising Story

Millions More in Extreme Poverty

World Bank Group. *Global Economic Prospects*. June 2021. <https://openknowledge.worldbank.org/bitstream/handle/10986/35647/9781464816659.pdf>

International Monetary Fund. *World Economic Outlook Database*, April 2021. Accessed August 2021. <https://www.imf.org/en/Publications/WEO/weo-database/2021/April>

Ratio of COVID-19 deaths by sex from IHME analysis, 2021. Controlling for the age distribution of the global population, the ratio of male:female deaths is 1.72. IHME's latest COVID-19 projections can be accessed at <https://covid19.healthdata.org> and related publications at <https://healthdata.org/covid/publications>.

International Labour Organization. *Building Forward Fairer: Women's rights to work and at work at the core of the COVID-19 recovery*. July 2021. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---gender/documents/publication/wcms_814499.pdf

For more information about poverty estimates by the Institute for Health Metrics and Evaluation (IHME), see the Explore the Data section in this report.

Growing Gaps in Education

Learning poverty is defined as being unable to read and understand a simple text by age 10.

World Bank Group. *Ending Learning Poverty: What Will It Take?* Washington, DC: World Bank Group, 2019. <https://openknowledge.worldbank.org/handle/10986/32553>

World Bank Group. *Realizing the Future of Learning: From Learning Poverty to Learning for Everyone, Everywhere*. December 2020. World Bank, Washington, DC. <https://documents1.worldbank.org/curated/en/250981606928190510/pdf/Realizing-the-Future-of-Learning-From-Learning->

Poverty-to-Learning-for-Everyone-Everywhere.pdf

Lewis, Karyn, Megan Kuhfeld, Erik Ruzek, and Andrew McEachin. *Learning during COVID-19: Reading and math achievement in the 2020–21 school year*. NWEA research brief. Center for School and Student Progress. July 2021. <https://www.nwea.org/content/uploads/2021/07/Learning-during-COVID-19-Reading-and-math-achievement-in-the-2020-2021-school-year-research-brief-1.pdf>

More Children Missing Vaccines

For more information about vaccine coverage estimates by the Institute for Health Metrics and Evaluation (IHME), see the Explore the Data section in this report.

People Stepping Up

World Health Organization. *World Malaria Report 2020: 20 years of global progress and challenges*. Geneva: World Health Organization, 2020. <https://apps.who.int/iris/rest/bitstreams/1321872/retrieve>

World Health Organization. *The potential impact of health service disruptions on the burden of malaria. A modelling analysis for countries in*

sub-Saharan Africa. Geneva: World Health Organization, April 23, 2020. <https://www.who.int/publications/item/9789240004641>

Sherrard-Smith, et al. "The potential public health consequences of COVID-19 on malaria in Africa," *Nature Medicine* 26 (September 2020): 1411–1416. <https://www.nature.com/articles/s41591-020-1025-y.pdf>

Investing in Systems

Our World in Data compiles and publishes updated information on vaccine doses administered by geography: <https://ourworldindata.org/covid-vaccinations> (accessed August 2021).

The COVID-19 Vaccine Market Dashboard tracks information on the world's COVID-19 vaccine market, including vaccine agreements, doses secured, and deliveries by country. Accessed August 2021. <https://www.unicef.org/supply/covid-19-vaccine-market-dashboard>

Investing in Communities

Sarr, Moussa. “How Did Senegal Mitigate the Impact of COVID-19 on Routine Childhood Immunizations?” *Exemplars in Global Health – Perspectives* (blog). Accessed August 2021. <https://www.exemplars.health/emerging-topics/epidemic-preparedness-and-response/covid-19/appendix/perspectives/thread?forumId=9&threadId=43>

Dixit, Sameer M. et al. “Addressing disruptions in childhood routine immunization services during the COVID-19 pandemic: perspectives and lessons learned from Liberia, Nepal and Senegal,” medRxiv March 18, 2021. Preprint. <https://doi.org/10.1101/2021.03.18.21252686>

Investing in Women and Girls

The Ehsaas Emergency Cash program in Pakistan has a public dashboard that tracks total beneficiaries served and total amounts disbursed. Accessed August 2021. https://www.pass.gov.pk/ecs/uct_all.html

Additional gender analysis was conducted by Elizabeth Katz, Safa Abdalla, and Judy Rein with research assistance from Katelyn Roett and Lauren Lamson at the Global Center for Gender Equality at Stanford University.

Even Further, Even Faster

New Sources of Innovation

Africa Vaccine Manufacturing Initiative. *Vaccine Manufacturing and Procurement in Africa*.

Study. 2017. <https://www.avmi-africa.org/wp-content/uploads/2017/09/VMPA-Study-e-book.pdf>

Africa Centres for Disease Control and Prevention. *Africa’s Vaccine Manufacturing for Health Security*. Discussion paper. Presented at the Conference on Expanding African’s Vaccine Manufacturing, April 2021.

Explore the Data

A Malaria-Free China Paying It Forward

Ding, Cheng, Chenyang Huang, Yuqing Zhou, Xiaofang Fu, Xiaoxiao Liu, Jie Wu, Min Deng, Lanjuan Li, Shigui Yang. “Malaria in China: a longitudinal population-based surveillance study.” *Epidemiology and Infection* 148, E37 (2020): 1–8. <https://doi.org/10.1017/S0950268820000333>

World Health Organization. Malaria incidence estimates for 2017–2020 from “Global Health Observatory data repository.” WHO (website). Accessed August 2021. <https://apps.who.int/gho/data/view.main.MALARIAINCIDENCE?v2lang=en>

INDICATORS ESTIMATED BY IHME

A general description of the methodology used by IHME to estimate the effects of the COVID-19 pandemic on the 14 SDG indicators and their accompanying projections to 2030 is provided in a separate explainer section in the report. A more detailed description is available on the website. What follows are methodological notes specific to each indicator.

For the health and poverty indicators, IHME generates

three future scenarios. The “reference” scenario represents the mean scenario. The “better” scenario applies the 85th percentile of the Socio-demographic Index (SDI)—which incorporates income, fertility, and education—and the 85th percentile of the observed annualized rate of change (AROC) of the indicator or its drivers across country-years for the period 1990 through 2020. The “worse” scenario applies the 15th percentile of the SDI combined with the 15th percentile of the AROC of the indicator.

Poverty

The extreme poverty rate measures the fraction of a country’s population that is estimated to live on less than US\$1.90 per day, measured in 2011 purchasing power parity (PPP) adjusted dollars. To estimate a complete time series of extreme poverty for all countries, all available data was first extracted from the World Bank and supplemented with data extracted from the United Nations’ World Institute for Development Economics Research and country-specific surveys. Second, IHME modeled this extracted data using an approach that builds from available data and borrows strength across time, geography, and predictive covariates (GDP per capita, female education, kilocalorie consumption, natural resource exports, and government expenditure).

IHME models the mean consumption rate for each country and year and the consumption distribution (the Lorenz curve) for each country in order to estimate the value of consumption for each percentile of the population of each country and year through 2020. While no survey

data was available beyond 2019, IHME used this model to estimate poverty rates for 2020 because it is more sensitive to economic shocks, like those currently being experienced in most countries. IHME forecasted extreme poverty rates (\$1.90) for 2021 to 2030 by estimating the year-over-year change in the poverty rate using an ensemble model. This model is based on GDP per capita, fertility, government expenditure, and education forecasts; it only indirectly captures the other impacts of the global economic recession.

Updated estimates include new survey data for Nigeria, Pakistan, and Zimbabwe; improved PPP exchange rates; and better methods for estimating the consumption distribution.

Stunting

IHME measures stunting prevalence as height-for-age more than two standard deviations below the reference median on the height-age growth curve based on WHO 2006 growth standards for children 0–59 months. Projections to 2030 were modeled using an ensemble approach to predict stunting exposure, with SDI as a key driver, in order to capture the effects of the COVID-19 pandemic on income per capita; stunting exposure was then translated to the indicator (stunting prevalence) using a cascading spline model.

The results presented here represent several improvements incorporated into the Global Burden of Disease (GBD) 2020 study, leading to improved estimates in a number of countries, notably including South Africa, DRC, India, and Pakistan.

Murray, Christopher J.L., Alexandr Aravkin, Peng Zheng, Cristiana Abbafati, Kaja M. Abbas, Mohsen Abbasi-Kangevari, Foad Abd-Allah, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *Lancet* 396, no. 10258: 1223–49 (October 17, 2020). [https://doi.org/10.1016/S0140-6736\(20\)30752-2](https://doi.org/10.1016/S0140-6736(20)30752-2)

Maternal Mortality Ratio

The maternal mortality ratio (MMR) is defined as the number of maternal deaths among women ages 15–49 years during a given time period per 100,000 live births during the same time period. MMR depicts the risk of maternal death relative to the number of live births and essentially captures the risk of death in a single pregnancy or a single live birth. Projections to 2030 used SDI as a key driver, which incorporates projections of income per capita and the effects of the COVID-19 pandemic.

IHME analysis of direct and indirect maternal mortality in selected countries showed no significant relationship between direct mortality and indicators of the COVID-19 pandemic (e.g., COVID-19 deaths, mobility). However, the COVID-19 pandemic had a significant effect on indirect maternal mortality, which IHME incorporated.

Under-5 Mortality Rate

IHME defines the under-5 mortality rate (U5MR) as the probability of death between birth and age 5. U5MR is expressed as number of deaths per 1,000 live births.

Projections were based on a combination of key drivers, including Global Burden of Disease (GBD) risk factors, selected interventions (e.g., vaccines), and SDI. Additional short-term disruptions (2020–2021) from the COVID-19 pandemic incorporated the reductions seen in child deaths from infectious diseases (flu, respiratory syncytial virus, measles, pertussis) observed during the pandemic, driven primarily by social distancing and mask use. Most of the changes in U5MR estimates in the 2021 Goalkeepers Report results arise from new and additional input mortality data that IHME has incorporated since GBD2019. The addition of such new data primarily affects U5MR in the most recent time period.

Neonatal Mortality Rate

IHME defines the neonatal mortality rate as the probability of death in the first 28 completed days of life. It is expressed as the number of deaths per 1,000 live births. Projections were based on a combination of key drivers, including GBD risk factors, selected interventions (e.g., vaccines), and SDI. Short-term effects (2020–2021) incorporated the reductions seen in child deaths from infectious diseases (flu, respiratory syncytial virus, measles, pertussis) observed during the pandemic, driven primarily by social distancing and mask use. Most of the changes in neonatal mortality estimates in this year's Goalkeepers Report are the result of new data.

HIV

IHME estimates the HIV rate as new HIV infections per 1,000 population. Forecasts

of HIV incidence were based on forecasted antiretroviral therapy (ART), prevention of maternal-to-child transmission (PMTCT) coverage, and current infection incidence as inputs into a modified version of Avenir Health's Spectrum software. Adult ART is forecasted using the expected spending on HIV curative care—which in turn was forecasted based on income per capita, including the effect of the COVID-19 pandemic—and ART prices.

Changes to estimates are the result of additional data compiled by UNAIDS from 115 countries, including new ART coverage, PMTCT coverage, and incidence estimates. Additionally, IHME updated ART coverage data for South Africa using Thembisa's ART coverage estimates. Other modeling improvements are described in GBD 2020.

Tuberculosis

IHME estimates new and relapse tuberculosis cases diagnosed within a given calendar year (incidence) using data from prevalence surveys, case notifications, and cause-specific mortality estimates as inputs to a statistical model that enforces internal consistency among the estimates.

The changes in GBD 2020 TB incidence estimates were mainly driven by the inclusion of new data sources.

In addition to historical trends, projections to 2030 used SDI as a key driver, which incorporates projections of income per capita and the effects of the COVID-19 pandemic.

Malaria

IHME estimates the malaria rate as the number of new cases per 1,000 population. Projections to 2030 were derived using a two-stage model. First, coverage of the two key antimalarial interventions artemisinin-based combination therapy (ACT) and insecticide-treated bed nets (ITNs) were forecast as a function of SDI. IHME then used the residuals from the first stage to fit a country-specific model based on calendar year. For countries outside of sub-Saharan Africa, where there is no available data on intervention coverage, SDI was used in the first stage, and calendar year in the second stage. 2020 data on ITN distribution suggested minimal disruptions to ITN distribution due to the pandemic. Reports on ITN distribution were incorporated into the model, but no additional short-term effects of the pandemic were applied to malaria incidence.

Neglected Tropical Diseases

IHME measures the sum of the prevalence of 15 NTDs per 100,000 that are currently measured in the annual Global Burden of Disease study: human African trypanosomiasis, Chagas disease, cystic echinococcosis, cysticercosis, dengue, food-borne trematodiasis, Guinea worm, soil-transmitted helminths (STH: comprising hookworm, trichuriasis, and ascariasis), leishmaniasis, leprosy, lymphatic filariasis, onchocerciasis, rabies, schistosomiasis, and trachoma. Since the 2020 Goalkeepers Report, changes in historical trends in this indicator reflect updates to the estimated prevalence of each NTD made

for GBD 2020. Specifically, changes in the summary NTD prevalence indicator between the 2020 Goalkeepers Report and these estimates largely reflect the addition of new data to STH models, especially in Latin American and South Asia.

Modeling studies examining various disruption scenarios suggest that the impact of the COVID-19 pandemic on NTD prevalence and control is likely to vary broadly by disease and context. Given the limitations of available surveillance and control program data in 2020 and 2021—and uncertainty regarding the impact of any potential disruptions—IHME did not adjust for short-term effects of the COVID-19 pandemic in 2020–2021 for this report. As additional data becomes available, further work will be required to better understand whether and how the pandemic has affected NTD control programs and NTD prevalence. However, projections to 2030 did use SDI as a key driver, which incorporates projections of income per capita and the effects of the COVID-19 pandemic.

Hollingsworth, T. Déirdre, Pauline Mwinzi, Andreia Vasconcelos, and Sake J. de Vlas. “Evaluating the potential impact of interruptions to neglected tropical disease programmes due to COVID-19.” *Transactions of the Royal Society of Tropical Medicine & Hygiene* 115, no. 3 (Mar 6, 2021): 201–204. <https://doi.org/10.1093/trstmh/tra023>

Family Planning

IHME estimates the proportion of women of reproductive age (15–49 years) who have their need for family planning satisfied with modern

contraceptive methods. Modern contraceptive methods include the current use of male or female sterilization, male or female condoms, diaphragms, cervical caps, sponges, spermicidal agents, oral hormonal pills, patches, rings, implants, injections, intrauterine devices (IUDs), and emergency contraceptives. Projections to 2030 used SDI as a key driver, which incorporates projections of income per capita and the effects of the COVID-19 pandemic.

IHME’s analysis of PMA surveys and the smartphone-based follow-up surveys referenced in the full IHME methodology on the Data Sources page of the 2021 Report does not show a consistent, significant reduction in contraception use due to the pandemic. As a result, IHME has not incorporated a short-term effect on the family planning indicator. Changes to the historical estimates can be attributed to the inclusion of 66 new data sources for GBD 2020. The new data sources were primarily post-2000 and located in sub-Saharan Africa, South-East Asia, East Asia, and Oceania.

Universal Health Coverage

The universal health coverage (UHC) effective coverage index is composed of 23 effective coverage indicators that cover population-age groups across the entire life course (maternal and newborn age groups, children under age 5, youths ages 5–19 years, adults ages 20–64, and adults ages 65 years old or older). These indicators fall within several health service domains: promotion, prevention, treatment, rehabilitation, and palliation.

Health system **promotion** indicators include met need for family planning with modern contraception.

Health system **prevention** indicators include the proportion of children receiving the third dose of the diphtheria-tetanus-pertussis vaccine and children receiving the first dose of measles-containing vaccine. Antenatal care for mothers and antenatal care for newborns are considered indicators of health system prevention and treatment of diseases affecting maternal and child health.

Indicators of **treatment** of communicable diseases are the mortality-to-incidence (MI) ratios for lower respiratory infections, diarrhea, and tuberculosis, as well as coverage of antiretroviral therapy among those with HIV/AIDS. Indicators of treatment of non-communicable diseases include MI ratios for acute lymphoid leukemia, appendicitis, paralytic ileus and intestinal obstruction, cervical cancer, breast cancer, uterine cancer, and colorectal cancer. Indicators of treatment of non-communicable diseases also include mortality-to-prevalence (MP) ratios for stroke, chronic kidney disease, epilepsy, asthma, chronic obstructive pulmonary disease, diabetes, and the risk-standardized death rate due to ischemic heart disease.

To produce forecasts of the UHC index from 2021 to 2030, a model for UHC was fit using total health spending per capita projections as the independent variable. Country- and year-specific inefficiencies were then extracted from the model and forecasted to 2030. These forecasted inefficiencies, along with forecasted total health

spending per capita estimates, were substituted into the previously fit UHC model for all countries for 2021–2030.

Short-term effects due to the pandemic were included in the final 2021 Goalkeepers results with some exceptions. Maternal met demand for family planning was not adjusted, nor were antiretroviral therapy (ART) coverage scores, as described on the Data Sources page of the 2021 Report in the relevant sections. Adjustments for vaccine delivery are described in the Vaccines subsection. For other indicators (19 out of 23), in the absence of data to inform the correspondence between reductions in utilization and reductions in coverage, IHME applied 25% of the reduction in monthly missed medical visits (excluding routine services).

Smoking

IHME measures the age-standardized prevalence of the daily use of smoked tobacco among people ages 15 and older. IHME collated information from all available surveys that include questions about daily use of tobacco, either currently or within the last 30 days, and information on the type of tobacco product smoked (including cigarettes, cigars, pipes, hookahs, as well as local products). IHME then converted all data to its standard definition so that meaningful comparisons could be made across locations and over time. Projections to 2030 used SDI as a key driver, which incorporates projections of income per capita and the effects of the COVID-19 pandemic.

Vaccines

IHME's measurement of immunization coverage reports on the coverage of the following vaccines separately: three-dose diphtheria-tetanus-pertussis (DTP3), measles second dose (MCV2), and three-dose pneumococcal conjugate vaccine (PCV3). IHME measured the short-term (2020–2022) effects via administrative data on vaccine doses. In collaboration with WHO, IHME was able to synthesize data on the number of vaccine doses delivered by month in 2019 and 2020 from 94 countries. To estimate the change in vaccine coverage since the onset of the pandemic for each country, the number of doses delivered in each month of 2020 was compared to those delivered in the same month in 2019, adjusting for pre-pandemic year-to-year changes observed in January and February 2020. Administrative data was triangulated with qualitative information on the level of vaccine system disruption compiled by the WHO, including two recent WHO pulse polls, WHO Essential Health Services polls, and reports from WHO regional offices. Data sources that were implausible based on the reported level of disruption within a country were excluded. Projections to 2030 used SDI as a key driver, which incorporates projections of income per capita and the effects of the COVID-19 pandemic.

Evidence in the second half of 2020 suggested resumption of routine immunization services and/or catch-up vaccination in many countries and regions. At the time of the 2020 Goalkeepers Report, evidence suggested very large disruptions, which IHME

projected through the rest of the year. Since that report, new data suggests that—in many locations—resumption of services and catch-up vaccination have been faster than originally predicted based on mobility alone. To better allow the model to account for this observation, a second step was added to the modeling framework initially developed for the 2020 Goalkeepers Report. This second step models changes in the residual variation in the relationship between vaccine delivery and mobility over time, allowing for catch-up vaccination and for resumption of vaccine delivery to occur at a different pace than suggested based on mobility trends alone. As a result of this new data and adjustments to the modeling framework, therefore, estimates of annual disruption in vaccine coverage in this report are smaller than in the 2020 Goalkeepers Report.

Causey, Kate, Nancy Fullman, Reed J. D. Sorensen, Natalie C. Galles, Peng Zheng, and Alexandr Aravkin. “Estimating global and regional disruptions to routine childhood vaccine coverage during the COVID-19 pandemic in 2020: a modelling study.” *Lancet* 398, no. 10299: P522–534 (August 7, 2021). [https://doi.org/10.1016/S0140-6736\(21\)01337-4](https://doi.org/10.1016/S0140-6736(21)01337-4)

Sanitation

IHME measured households with piped sanitation (with a sewer connection or septic tank); households with improved sanitation but without a sewer connection (pit latrine, ventilated improved latrine, pit latrine with slab, composting toilet); and households without improved sanitation (flush toilet that is not piped to sewer or septic tank, pit latrine without a slab

or open pit, bucket, hanging toilet or hanging latrine, no facilities), as defined by the Joint Monitoring Programme for Water Supply and Sanitation. Projections to 2030 were modeled using an ensemble approach with SDI as a key driver in order to capture the effects of the COVID-19 pandemic and projections of income per capita. Past changes are primarily due to new data and changes in data processing.

World Health Organization (WHO) and the United Nations Children's Fund (UNICEF). Progress on household drinking water, sanitation and hygiene 2000–2020: five years into the SDGs. Geneva: WHO and UNICEF, 2021. License: CC BY-NC-SA 3.0 IGO. <https://washdata.org/sites/default/files/2021-07/jmp-2021-wash-households.pdf>

INDICATORS ESTIMATED FROM OTHER SOURCES

Agriculture

RuLIS - Rural Livelihoods Information System “Data by Indicator.” RuLIS (website), Food and Agriculture Organization of the United Nations (FAO). Most recent year available was used for select countries, ranging from 2005–2017. Accessed August 2020. www.fao.org/in-action/rural-livelihoods-dataset-rulis/data/by-indicator/en/

Food and Agriculture Organization of the United Nations (FAO). Use of *AGRISurvey data for computing SDG's and national indicators Experience in three countries*. Country brief. Rome: FAO, 2021. License: CC BY-NC-SA 3.0 IGO. www.fao.org/3/cb4762en/cb4762en.pdf

For methodology, see:

Food and Agriculture Organization of the United Nations. *Rural Livelihoods Information System (RuLIS): Technical Notes on Concepts and Definitions Used for the Indicators Derived from Household Surveys*. Report. Rome: FAO, 2018. www.fao.org/3/ca2813en/CA2813EN.pdf

Education

UNESCO Institute for Statistics. “Sustainable Development Goal 4.” UIS (website). Data accessed August 2021. <http://data.uis.unesco.org/>

Data that was included last year for several (largely high-income) countries was moved out of this grade 2/3 data set because the TIMSS and PIRLS assessments on which the data is based were judged to be better aligned to the end-of-primary assessment point.

Gender Equality

The chart is based on data from the United Nations Global SDG Database and the World Bank's World Development Indicators database.

The data is the most recent available for 90 countries and territories (2001–2019). The age group is 15 or older where available (18 or older in Ghana). In a number of cases, data is for those ages 10 or older or 12 or older. In the case of Thailand (2015), they are for those ages 6 or older, and in the United Republic of Tanzania (2014) for those ages 5 or older. Data for Bulgaria, Denmark, Latvia, the Netherlands, Slovenia, and Spain corresponds to time spent on unpaid care among those ages 20 to 74 only. Differences across countries should be interpreted with

caution, given heterogeneity across surveys and countries in definitions, methodology, and sample coverage. Time-diary data often excludes supervisory responsibilities, leading to underestimation of the time constraints of care.

The regional average ratios are the averages of the ratios of the component countries, and the global average ratio is the average of the ratios of all countries included. The global average ratio is different from that reported in the SDGs section of the United Nations Statistical Division report because the latter used the ratio of the average amount of time spent by women on unpaid work to the average amount of time spent by men.

For further information on the country-level data, see:

UN Statistics Division. “SDG Indicators: United Nations Global SDG Database.” UNSD (website). Updated July 2021. <https://unstats.un.org/sdgs/indicators/database/>

The World Bank. “World Development Indicators: World Bank Database.” Updated July 2021. <https://databank.worldbank.org/source/world-development-indicators>

Financial Services for the Poor

Demirgüç, Asli, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess. *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, DC: World Bank, 2018. <https://globalfindex.worldbank.org/>

The “Richest/Poorest” comparison refers to what the World Bank calculates as account ownership of the richest 60% of households and poorest 40% of households, respectively.

Apedo-Amah, Marie Christine, Besart Avdiu, Xavier Cirera, Marcio Cruz, Elwyn Davies, Arti Grover, Leonardo Iacovone, Umut Kilinc, Denis Medvedev, Franklin Okechukwu Maduko, Stavros Poupakis, Jesica Torres, Trang Thu Tran. *Unmasking the Impact of COVID-19 on Businesses: Firm Level Evidence from Across the World*. Policy research working paper no. 9434. Washington, DC: World Bank, 2020. License: CC BY 3.0 IGO. <http://hdl.handle.net/10986/34626>

Gentilini, Ugo, et al. *Social Protection and Jobs Responses to COVID-19: A Real-Time Review of Country Measures*. Living Paper version 15. Washington, DC: World Bank, 2021. License: CC BY 3.0 IGO. <http://hdl.handle.net/10986/33635>

Photography

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