The Race to Nourish a Warming World

BILL & MELINDA GATES *foundation*

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 those goals, with a focus on Goals 1–6.

Nine years in, the world is off track. But failure is not inevitable—if we collectively challenge our assumptions about how global progress is achieved.

Contents

Key Takeaways

The world's worst child health crisis is malnutrition. No country, however rich, is immune.

More than 400 million children aren't getting the nutrients they need to grow and thrive.

Climate change is making it even harder to solve.

We have new tools and promising research to ensure kids get healthier even as the world gets hotter.

The Race to Nourish a Warming World

The world's worst child health crisis is malnutrition. Climate change is making it even harder to solve. To protect the world's children from hunger's worst effects, we must invest in global health.

by Bill Gates
Co-chair, Bill & Melinda Gates Foundation

When historians write about the first quarter of the 21st century, I think they may sum it up this way: Twenty years of unprecedented progress followed by five years of stagnation.

This is true for nearly every issue the Bill & Melinda Gates Foundation works on, from poverty reduction to primary school enrollment. But nowhere is the contrast more stark or tragic than in health.

© Bill & Melinda Gates Foundation / Patrick Meinhardt, Kenya

Between 2000 and 2020, the world witnessed a "global health boom." Child mortality fell by 50%. In 2000, more than 10 million children died every year, and now that number is down to fewer than five million children. The prevalence of the world's deadliest infectious diseases fell by half, too. Best of all, the progress was happening in regions where the disease burden had been the highest. Sub-Saharan Africa and South Asia saw the most improvement.

This health boom had many causes. A new generation of political leaders embraced humanitarianism. Hundreds of thousands of health workers fanned out across the globe, bringing the latest medicine to places that doctors had rarely visited. But one often overlooked factor was a small—yet crucial—increase in funding.

Starting in 2000, the world's wealthiest countries began steadily increasing their funding to supplement low-income countries as they increased their own investments in health. This funding fueled the work of organizations like Gavi, the Vaccine Alliance, and the Global Fund to Fight AIDS, Tuberculosis, and Malaria, which gave poorer nations access to life-saving vaccines, drugs, and other medical breakthroughs.

Aid is relatively small. By 2020, wealthy countries were spending less than one quarter of 1% of their budgets on aid. That's an average of $10.47 on health per person in the poorest countries. But that $10.47 made a remarkable difference.

Then COVID-19 hit, and progress came to a screeching halt.
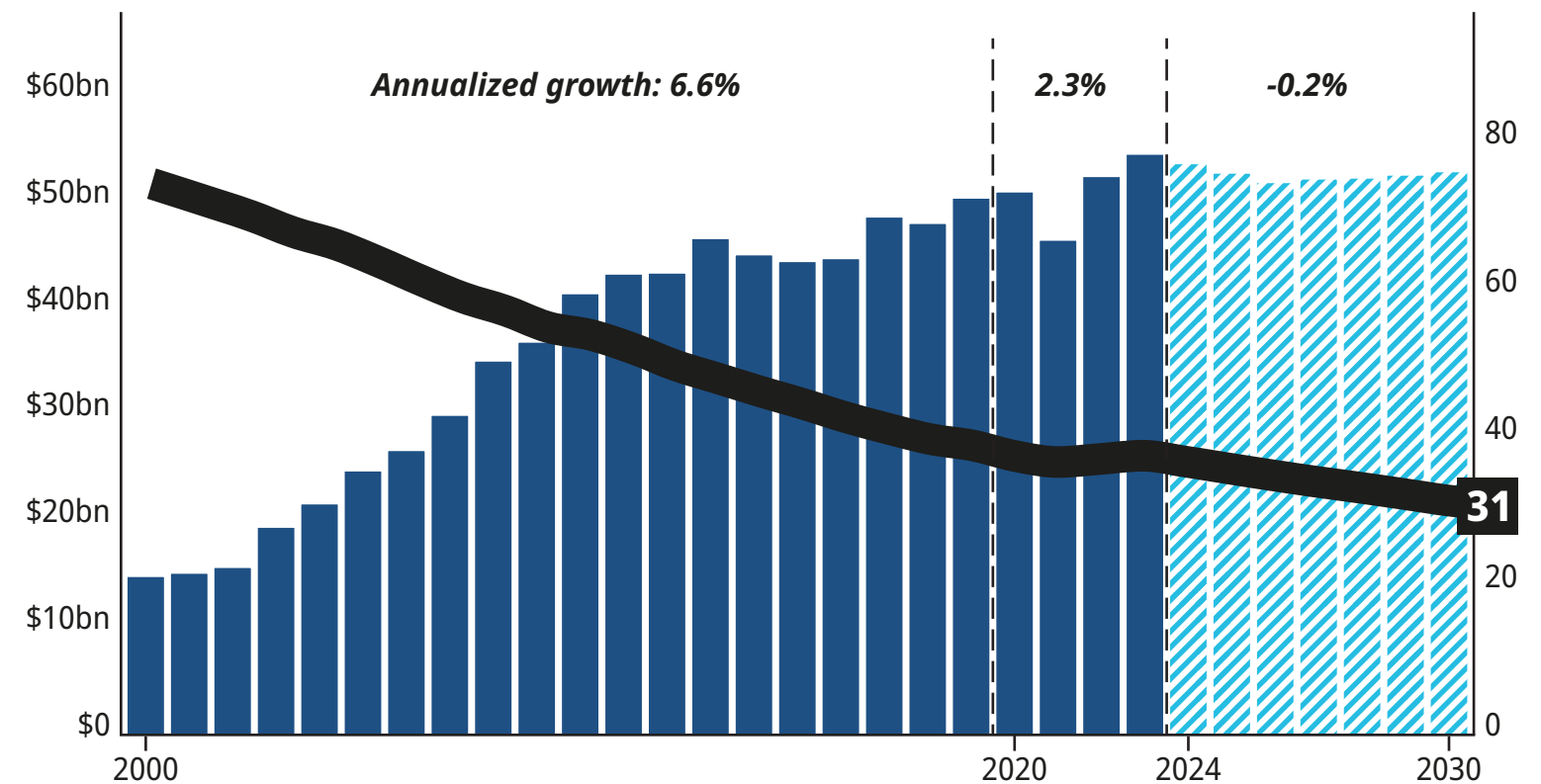
Stalled financing threatens decades of health progress

Legend

DAH, excluding COVID-19 funding   **Funding Projection**   **Child Mortality**

Development assistance for health (DAH)
(2022 $USD)

Under-5 deaths per
1,000 live births

Development assistance for health is provided by governments and private organizations in high-income countries to low- and middle-income countries.

Today, the world is contending with more challenges than at any point in my adult life: inflation, debt, new wars. Unfortunately, aid isn't keeping pace with these needs, particularly in the places that need it the most.

For instance, more than half of all child deaths still occur in sub-Saharan Africa. Since 2010, the percentage of the world's poor living in the region has also increased by more than 20 percentage points. Despite this, during the same period, the share of total foreign aid to Africa has dropped from nearly 40% to only 25%—the lowest percentage in 20 years. Fewer resources mean more children will die of preventable causes.

The global health boom is over. *But for how long?*

That's the question I have been wrestling with for the past five years: *Will we look back on this period as the end of a golden era? Or is it just a brief intermission before another global health boom begins?*

I'm still an optimist. I think we can give global health a second act—even in a world where competing challenges require governments to stretch their budgets.

To do this, we'll need a two-pronged approach. First, the world has to recommit to the work that drove the progress in the early 2000s, especially investments in crucial vaccines and medicines. They're still saving millions of lives each year, and we can't afford to backslide.

But we also need to look forward. The R&D pipeline

© UNICEF/UN0856865/Abdou, Niger

© Getty Images, Bali

is brimming with powerful—and surprisingly cost-effective—new breakthroughs. Now we just need to put them to work fighting the world's most pervasive health crises. And it starts with good nutrition.

Every now and then, somebody will ask me what I would do if I had a magic wand. For years, I've given the same answer: I would solve malnutrition.

This summer, UNICEF released its first report on child food poverty. The findings were stark. Two-thirds of the world's children—more than 400 million kids—are not getting enough nutrients to grow and thrive, putting them at higher risk for malnutrition. In 2023, the WHO estimated that 148 million children experienced stunting, and 45 million children experienced wasting—the most severe forms of chronic and acute malnutrition. It prevents them from growing to their full potential—and, in the worst cases, from growing up *at all*.

When a child dies, half the time the underlying cause is malnutrition.

And now a significant headwind is making malnutrition harder to solve: climate change. We worked with our partners at the Institute for Health Metrics and Evaluation to better understand how difficult the headwind is:

> **Between 2024 and 2050, climate change will mean 40 million additional children will be stunted, and 28 million additional children will be wasted.**

It's an important projection, and it should inform

where country leaders devote their aid money to reverse the current trends and the growing burden of malnutrition.

Obviously, fighting climate change is crucial. But what these data show is that the health crisis and the climate crisis are the same thing in the poorest countries near the equator. In fact, the best way to fight the impacts of climate change is by investing in nutrition.

Nations can't grow if their people can't

Most people associate malnutrition with hunger. We've all seen the awful photos of starving children. That's the most visible kind of malnutrition—but it's not the only kind.

Malnutrition also includes what doctors call "hidden hunger." Kids can be eating enough calories and still not getting the right nutrients. When this happens to very young children, it interrupts the development of their bodies and brains. The effects are irreversible.

With most serious childhood diseases, the kids who survive eventually grow up fine. But the kids who survive malnutrition never truly escape it. It follows them to school. A child who has a severe brush with malnutrition before the age of three will complete five fewer years of schooling than well-nourished kids. And the malnourished kids who do remain in school tend to do poorly and take longer to complete each grade than their peers.

As these kids become adults, it continues to haunt them. Studies show that people who went hungry as

© Gates Archive / Mansi Midha, India

© Gates Archive/ Mansi Midha, India

© Gates Archive / Gordwin Odhiambo, Kenya

kids earn 10% less over their lifetimes and are 33% less likely to escape poverty.

Nations can't grow if their people can't. The economic costs of undernutrition are significant: It is estimated that every year, the cost of undernutrition is US$3 trillion in productivity loss because malnutrition has stunted people's physical and cognitive abilities. In low-income countries, that loss ranges from 3 to 16 percent (or more) of GDP. It's the equivalent of a permanent 2008-level global recession.

Today, one in every five of the world's children suffers from stunting, and climate change threatens to increase that number. We should ask: *What will that mean for the global economy in 20 years when these children are in the prime of their working lives?*

Few economists think of the malnutrition rate as a critical economic data point—but they should start. Nutritional deficits quickly translate into financial deficits.

We have new tools to help solve malnutrition

By now, it's clear: Malnutrition makes every forward step our species wants to take heavier and harder.

But the inverse is also true. If we solve malnutrition, we make it easier to solve every other problem. We solve extreme poverty. Vaccines are more effective. And deadly diseases like malaria and pneumonia become far less fatal.

That's why I believe we can jumpstart a second global health boom by getting kids the right nutrients.

This is especially true now, because we have more tools to ensure kids gets healthier even as the world gets hotter.

The science of nutrition has experienced a renaissance over the past decade. Animal scientists have discovered how to breed more productive livestock, while food scientists have found new ways to fortify more nutrients into the staples of people's diets—like salt, flour, and bouillon cubes. Doctors are even beginning to unlock the mysteries of the microbiome, the teeming universe of bacteria that lives inside our digestive tracts.

As you read on, you'll hear from people on the front line of nourishing people around the world. Together, they're showing us how we can jumpstart another golden age for health: with a lot of grit, creativity, and enormous generosity toward their fellow human beings.

We have new tools to solve malnutrition—and make people healthier and more climate-resilient.

A Recipe for Progress: 4 Solutions to Nourish Our Planet

No other global health problem requires a larger-scale solution than malnutrition. These proven solutions can make a difference now.

© Gates Archive/ Mansi Midha, India

One of the hardest things to do in global health is scaling a solution.

No global health problem requires a larger-scale solution than malnutrition. Every single person on the planet needs to eat a healthy, nutritious diet every day.

Brazil, India, Kenya, Rwanda, and dozens of other emerging nations have leaned into this challenge. They've found gaps in their food systems and are repairing them to deliver the right macro- and micronutrients to as much of the population as possible.

For these countries, building a more nutritious food system produces a double benefit. It lowers the malnutrition rate, improving health outcomes. It also can lead to a remarkable amount of economic growth.

6x more

Milk produced by cows

New agricultural technologies are being developed to increase the amount of milk that cows produce in Kenya.

109 million

Stunting cases prevented

Improving dairy productivity and supply in just five countries—Ethiopia, India, Kenya, Nigeria, and Tanzania—could prevent millions of cases of childhood stunting between 2020 and 2050.

16.6 million

Anemia cases prevented per year

In Nigeria, fortifying bouillon cubes wouldn't just prevent anemia, it would also avert more than 11,000 deaths from neural tube defects.

5,000

Lives saved each year

Ethiopia is exploring adding folic acid to iodized salt. This "double-fortified" salt could eliminate nearly 75% of all deaths and stillbirths due to neural tube defects each year.

500,000

Lives saved

If low- and middle-income countries adopted Multiple Micronutrient Supplements, the world's most complete prenatal vitamins, almost half a million lives could be saved by 2040.

$2.60

For an entire pregnancy

Now, throughout the world, it costs only a few dollars to take MMS, which contains 15 vitamins and minerals proven to significantly reduce the risk of adverse birth outcomes.

© Gates Archive / Ryan Lobo, India

Ensuring more productive cows and safer milk

For people around the world, "drink your milk" has long been wise advice—it makes them healthier and even more climate-resilient over the long term. Milk is a nutrient-rich food that addresses many of the nutritional deficits children face, including calcium, vitamins (including A and B12), protein, and healthy fats. But producing enough of it, ensuring it is affordable, and preventing it from spoiling remains a challenge in low-income regions.

After all, the big, highly productive cows you'll find in the American Midwest or the British countryside are not the same cows you'll find in most other parts of the world. Roughly 80 percent of the dairy cows in Kenya produce a mere 2 liters of milk per day.

But that's changing. New agricultural technologies are being developed to increase the amount of milk these cows produce. Some technologies use DNA and data to help farmers select cows that give birth to more productive offspring, including more female calves. Others help farmers produce more high-quality forage or repurpose crop waste—both of which can be used as nutritious cow feed. As a result, an increasing number of Kenyan cows are now producing 6 to 10 times more milk than before. That's more milk to drink at home and more income for dairy farmers and vendors, most of whom are women.

It's also better health for children: New analysis from the International Food Policy Research Institute shows that improving dairy productivity and consumption in just five countries—Ethiopia, India, Kenya, Nigeria, and Tanzania—could prevent as many as 109 million cases of childhood stunting by 2050.

And training is an essential part. Programs like Livestock Enhancement and Advancement Programme (LEAP) and MoreMilk are helping dairy farmers and market sellers learn and follow best practices for safe storage and handling, so their customers have access to milk that's not only full of nutrients but also free of pathogens.

© Gates Archive / Ryan Lobo, India

Sushama Das, a dairy farmer in Astaranga, in the Indian state of Odisha, shared how easier access to government subsidies, training, and services has helped her family expand their farm and earn more money:

I was married at a very young age. My new husband was a farmer; he grew crops. After we had our three children, we realized that it would be better to have both of us working on the farm. I had always had affection for cows, so I took up dairy farming. I have never seen this as a business. Rather, it's a way of sustaining my family. I do my work for them.

After about a decade of working with just two cows, my son-in-law helped me apply for a government subsidy online, which allowed me to purchase more cows. And over the years, I have been able to participate in several training schemes targeted toward dairy farmers like me, which have helped me improve the health of the cows and the productivity of my farm.

Once I expanded my herd using the government subsidy, I participated in a program called LEAP. Local livestock inspectors taught me how to keep our cow shed clean and how to properly sterilize the drum where we collect our milk. Veterinarians with a mobile clinic have stopped by our shed and given my cows free vaccinations; they have not fallen sick ever since. And now I can go online to book artificial insemination services for the cows, which is helping me expand my herd.

Today, we have eight cows, and they are producing 60 liters of milk every day. I am able to employ someone who helps me with the milking; we do one milking in the morning and one in the evening. And then workers from a local milk processing company come directly to our shed to pick up the milk drum and sell it to the community.

The subsidies and training schemes have helped our family earn more money—our monthly income is now five times as much as it used to be. Before, I felt a sense of emptiness whenever I wanted to spend any money. Now, there is a sense of fullness. I can spend money on things that give me happiness.

© Bill & Melinda Gates Foundation / Bryan Jaybee, Kenya

Coletta Kemboi, a dairy farmer in Maili Nne, Kenya, leveraged new skills to care for her cows, expand her business, and provide for her family.

My husband, Daniel, and I started dairy farming 15 years ago, with just two cows. When we started our business, it was hard to find customers. Sometimes our milk spoiled, and the customers we did have would complain.

When I took a training with MoreMilk, I learned about how to improve hygiene across the dairy farm. I learned where to keep your cows, how to clean them, and how to prevent transferring bacteria from the cows to the milk. And I learned that the containers used to collect the milk should be very clean, not reused from cooking—something I have taught our customers as well.

Since then, we have not had any complaints about spoilage. The milk we produce, about 110 liters per day, is high quality. And that has helped us recruit new customers because once one of them buys our milk, he goes and tells others. We've gotten at least 20 new customers since I did the training, including people who work in hotels.

When the inspectors from the dairy board visit our shop in Maili Nne, they take tests of our milk. Before, there were some traces of unclean milk, but since I went through the training, they have come to our shop around three times. And their tests are proof that our milk is good.

Our cows have also been more productive because I now know how to feed them better and make sure they have water. And I learned that when there is excess milk, there is added value. I started making mala, a malted milk, with the excess. No milk is wasted. And I can sell mala in the shop for 100 shillings per liter, while fresh milk sells for 70 shillings per liter.

The extra money we are earning goes to the farm—we are planting beans—and to our house. And we are able to pay my three children's school fees, including for my daughter, who will join university this year.

So I am proud and happy, and I thank God for the training I received.

© Gates Archive / Nyancho NwaNri, Nigeria

Fortifying the global pantry against micronutrient deficiencies

Another promising innovation is found in pantries all over the world.

Large-scale food fortification is an old technology—but we're unlocking new ways of using it to increase micronutrients in the food staples of low-income countries to create resilience for vulnerable families.

After all, micronutrient deficiencies have an outsized impact on health. For example, vitamin A deficiencies are the leading cause of childhood blindness, while folate deficiencies are the leading cause of neural tube defects.

In the United States and Switzerland, iodized salt has been sold in supermarkets since the 1920s. It has been a critical and highly affordable intervention against iodine deficiency disorders, which has led to the virtual elimination of iodine deficiency and the improvement of IQ scores in countries throughout the world. Over the past 20 years, the percentage of households using iodized salt has increased from less than 20% to nearly 90%.

Leveraging that success, Ethiopia is now exploring adding another critical nutrient, folic acid, to iodized salt. They are testing a way to produce this "double-fortified" salt nearly as cheaply as iodized salt—without having to build new factories. This pioneering approach holds the potential to dramatically reduce devastating birth outcomes, including nearly

eliminating three-quarters of all deaths and stillbirths due to neural tube defects, up to 5,000 per year in Ethiopia, and helping to reduce anemia up to 4% across the country.

© Federal Ministry of Health and Social Welfare Nigeria

And in West Africa, leaders like **Ladidi Bako-Aiyegbusi**,mni, director of nutrition at the Nigerian Ministry of Health and Social Welfare, are spearheading a large-scale effort towards the first guided voluntary fortification of condiment, bouillon cubes, a staple of local cuisine in Nigeria. It is estimated that fortified bouillon cubes could halve deaths and stillbirths from neural tube defects—up to 11,000 per year—and avert up to 16.6 million cases of anemia each year in Nigeria.

What you might not know is that simple bouillon seasoning cubes, made up of dehydrated broth and filled with salt and spices, are one of the ingredients found in most kitchens across my country of Nigeria, irrespective of the geographical location, economy, or educational status of the family.

As the director of nutrition at the Ministry of Health, my job is to monitor and improve the nutritional status of the Nigerian people. Without access to the essential nutrients the children under 5 years need to grow, thrive, and lead healthy lives, they are being robbed of their future.

Available evidence shows that although we have made some progress over the past few decades, malnutrition is still an underlying cause of nearly half of the deaths of children under 5 years old. According to the 2018 Nigeria Demographic Health Survey, Nigeria has the second-highest burden of stunted children in the world, with 37%—or 6 million children—that are stunted annually, and 7% of children diagnosed with wasting each year. Moreover, the prevalence of folate deficiency remains alarmingly high, contributing to serious health outcomes such as still births due to neural tube defects and anemia.

That is the reason our government is investing in comprehensive nutrition services throughout the country—efforts that we believe will prevent more than 11 million children, or one in every three children under 5 years of age, from experiencing severe child food poverty.

Hence, as part of our nutrition program, we are working in collaboration with the Nigeria Country Working Group on Bouillon Fortification, which includes public and private partners, the National Agency for Food and Drug Administration and Control, Standard Organisation of Nigeria, Federal Competition and Consumer Protection Commission, Dangote, Promasidor, and Sweet Nutrition. This group is exploring the feasibility of fortifying the bouillon cubes to include the nutrients that individuals, especially vulnerable children and women, need most—such as iron, folic acid, zinc, and vitamin B12.

Given the high prevalence of folate deficiency in Nigeria, fortifying staple foods like rice, wheat and bouillon cubes represents a critical opportunity to address this public health challenge. Leaning heavily on what has made iodized salt programs successful, we believe that these bouillon cubes can help to reduce devastating ailments caused by micronutrient deficiencies and needs to be aligned with our Ministry's efforts to reduce salt and sodium intake.

Fortifying bouillon cubes would support ongoing strategies to combat micronutrient deficiencies "hidden hunger" here. While we all value a more nutritious diet filled with fresh fruits and vegetables, and rich-in-protein animal products, fortified bouillon can contribute to meeting the micronutrients needs of families as we continue to strengthen our overall food system for the future.

If we're successful, that would mean that the fortified bouillon seasoning cubes in so many Nigerian dishes would also contribute to improving the micronutrient content of the dishes in my country. The project impact is improvement of the nutritional status of all Nigerians, with particular emphasis on the vulnerable groups—namely children, women, and the elderly.

Expanding access to better prenatal vitamins

© UNICEF/UNI528406/Cisse, Burkina Faso

Healthy diets are crucial for good nutrition. But in different stages of life with different needs, they're not always sufficient. Doctors know that mothers need extra nourishment during pregnancy and the critical days that follow to stay healthy and give their children the best start in life.

These increased needs make it difficult for pregnant women all over the world to consume the full range of necessary nutrients, especially in countries where healthy foods are out of budget or out of reach.

One solution is the United Nations International Multiple Micronutrient Antenatal Preparation Multiple Micronutrient Supplements—the world's most complete prenatal vitamin. It contains 15 vitamins and minerals proven to significantly reduce the risk of adverse birth outcomes. It is more effective and powerful than the iron and folic acid supplements that many women typically receive in low- and middle-income countries. If all low- and middle-income countries switched to MMS, which costs only $2.60 for an entire pregnancy, almost half a million lives would be saved and 25 million babies would have improved birth outcomes by 2040.

© UNICEF/UNI504353/Iyakaremye, Rwanda

Dr. Sabin Nsanzimana, the minister of health in Rwanda, is leading the effort to ensure pregnant women in his country have access to these supplements:

Prenatal vitamins save lives. That's why you can find them on grocery store shelves in wealthy nations. But for women in low- and middle-income countries, like Rwanda, they are at once more essential and harder to find.

That's because the nutrients that build a baby's brain— folic acid, iron, zinc, and iodine, as well as protein and fatty acids—are often limited in our local food supply. And when pregnant women do get nutrition supplementation, it's likely just folic acid and iron.

The consequences are real and tragic. Here in Rwanda, nearly a quarter of pregnant women are anemic— which can lead to deadly complications for both mother and baby. Neonatal mortality is common. And for the babies who survive, around one-third will experience stunting. That means too many children don't get the chance to grow up and realize their potential—and Rwanda doesn't get to benefit from the full expression of their talents.

In partnership with UNICEF, my colleagues at the Ministry of Health and the Rwanda Biomedical Centre set out to do something about it. In the seven districts with the highest rates of stunted growth, we have started giving expectant mothers [multiple] micronutrient supplementation (MMS) with 15 essential micronutrients proven to reduce low birthweight, anemia, infant mortality, and stillbirths. Health care workers are providing women with the one pill that can help them stay healthy during pregnancy and give their children a better start in life. Since we started distributing MMS in January, we've already reached over 50,000 women.

Down the line, MMS+, which adds in two other nutrients that promote fetal growth, has the potential to accelerate our progress even further.

When we set a child on a trajectory for healthy growth, we do the same for our whole country. MMS, and soon MMS+, help us all thrive.

© Getty Images, Bangladesh

Financing progress through the Child Nutrition Fund

Although all the interventions we've covered have life-saving potential on a global scale, without resources and extensible plans for implementation behind them, they would be little more than good ideas.

That's why the Bill & Melinda Gates Foundation worked with UNICEF and other partners to launch the Child Nutrition Fund—a new financing mechanism designed to bring these innovative solutions to life and transform the way the world addresses child malnutrition.

Before the Child Nutrition Fund, there was no dedicated platform to coordinate efforts to address child malnutrition, to encourage domestic funding, or to support local production of the nutrient-rich foods and food supplements children need most.

The Child Nutrition Fund provides solutions to all three of these problems, in one place. And we know it will be effective, because we've already seen these financing mechanisms in action—the Global Fund to Fight AIDS, Tuberculosis, and Malaria is a great example. It is one of the fastest-scaling, most effective institutions ever created. The interventions it has funded and deployed have saved nearly 60 million lives.

Now, the Child Nutrition Fund is using a similar approach to attack child malnutrition, head-on, in partnership with countries around the world.

© UNICEF

Dr. Víctor Aguayo, director of child nutrition and development, UNICEF, leads that organization's nutrition efforts to ensure children not only survive, but thrive:

The Child Nutrition Fund could be a game changer. It holds the potential to address the child malnutrition crisis and transform philanthropy for maternal and child nutrition.

Historically, the world of maternal and child nutrition has been overly reliant on the generosity of global donors. This strategy has created a boom to address some nutrition challenges but has also left critical areas of work inevitably neglected, particularly those related to the early prevention of malnutrition among the most vulnerable children: the youngest, the poorest, and those left behind by socio-economic inequities.

Public and private donors have their hearts in the right place, but that doesn't mean they always know how to put their resources in the right place. Some nutrition programs receive most of the global funding, while other nutrition interventions can't get off the ground in key geographic areas or for critical population groups where the early prevention, detection, and treatment of child malnutrition is urgent.

Simply put, we have long needed a different approach to accelerate our response to the global child malnutrition crisis and a way to fund global maternal and child nutrition efforts sustainably at scale.

The Child Nutrition Fund is that new approach. It's targeted, it's sustainable—and most importantly, it works. Since launching last year, we've already seen it drive remarkable progress.

For example, in Mauritania, it was able to support and complement national efforts and resources to cover 100% of the financial needs for ready-to-use therapeutic foods for the treatment of severe wasting in young children.

And in Bangladesh and Indonesia, it will allow national programs to progressively reach universal coverage of all pregnant women with multiple micronutrient supplements—in what would become two of the largest maternal nutrition programs for the prevention of maternal anemia and low birthweight in the world.

That early success is truly incredible—as is the immediate buy-in by the host governments we work with. It's why I've never been more hopeful about our chances of solving child malnutrition around the world for good, thanks to the Child Nutrition Fund.

In rich countries and poor ones, the future of human progress depends on what's happening in our guts.

The Microbiome: The Next Nutrition Frontier

A final word from Bill Gates

"A pregnant woman eats for two" is a common saying. But doctors have realized it needs updating.

A pregnant woman is actually eating for three … trillion: herself, her child, and the vast network of microorganisms that lives inside her digestive tract.

Around 15 years ago, researchers began to suspect that the bacteria that live in your gut—your microbiome—may play a crucial role in health after noticing that oral childhood vaccines like polio weren't as effective in places with high rates of malnutrition.

A series of succeeding studies revealed the fundamental problem: When undernourished children are exposed to too many pathogens in their environment, they can get what we call "environmental enteric dysfunction."

© Getty Images, Zambia

To oversimplify a very complex set of processes: Their guts become inflamed, their intestines get blunted, and they struggle to absorb nutrients. In other words, a child with an unhealthy microbiome can eat a full and healthy diet—but still be undernourished.

This discovery has changed the way the Bill & Melinda Gates Foundation thinks about nutrition. We still support work in agricultural development and a diversity of nutritious, affordable food for a healthy diet because making sure there is enough food to eat has to be the starting point. But it's no longer the end point. Today, we are also thinking about how to improve gut health to make sure children can absorb nutrients, develop strong immune systems, and grow as they should to thrive.

Just a few years ago, researchers hoped to identify a gold-standard microbiome: the precise contents of a healthy gut that applied to everyone, everywhere. We know now that what we really need to understand is how these metabolic networks function and design diets to complement and feed our gut bacteria. For example, we know that certain locally appropriate therapeutic foods, like specific sugars in green bananas in Bangladesh, appear to work especially well because they feed not only the child, but also the bacteria in their gut.

There is still so much we don't know about these networks, but the good news is that they might be relatively easy to understand in children relative to adults.

Compared to the adult microbiome, which contains 100 trillion cells, the infant microbiome starts out simple. We now know that early-in-life microbes need to colonize the gut in a very specific sequence to pave the way for healthy growth, development, and immune function. During this early life stage, the infant microbiome is more easily molded. And once it sets, it impacts us for the rest of our lives.

This research isn't just useful for addressing malnutrition in low-income nations. It has huge implications for the overnutrition problem in wealthy countries. In the United States, an estimated 60% of the population is overweight or obese, often because of high-fat, high-sugar diets. These diets alter the biology of the gut and lead to inflammation.

In rich countries and poor ones, we're realizing that the future of human progress depends on what's happening in our guts.

It's a thrilling time to be standing at the frontier of nutrition. We're on the cusp of unlocking not only a deeper understanding of the microbiome—but with it, solutions that could forever change how the world treats malnutrition, our most pervasive health crisis. But this will only be possible if the world commits to funding the progress of the future today.

That starts with a commitment that no child should die before their fifth birthday. That's a commitment the world has made before. Halving the rate of under-5 child mortality was perhaps humanity's most important achievement—and we can do it again, if countries around the world do three things.

© Gates Archive / Ryan Lobo, India

First, they must maintain their global health funding.

Second, they must commit to fully replenishing Gavi, the Vaccine Alliance, and the Global Fund to Fight AIDS, Tuberculosis, and Malaria— organizations that have the hard-earned know-how to distribute vaccines, drugs, and other medical breakthroughs to the people who need them most.

And third, they must immediately address the growing threat of child malnutrition. We have a new funding mechanism, the Child Nutrition Fund, that has great potential to focus resources where they are needed most.

If we do these three things, we won't just usher in a new global health boom and save millions of lives— we'll also prove that humanity can still rise to meet our greatest challenges.

© Bill & Melinda Gates Foundation / Patrick Meinhardt, Kenya

© Gates Archive / Diana Zeyneb Alhindawi, Rwanda

Explore the data

Each year, Goalkeepers share the latest estimates on 18 indicators, ranging from poverty to education. These indicators help us understand the progress toward the Sustainable Development Goals—where innovation and investment are creating bright spots, and where we're collectively falling short. These data remind us that progress is possible but not inevitable.

But with just six years remaining, the world is off track. Urgent action is needed to meet the SDG targets and create a more equitable and safe future for all by 2030.

1 NO POVERTY — Poverty

2 ZERO HUNGER — Stunting, Agriculture

3 GOOD HEALTH AND WELL-BEING — Maternal Mortality, Under-5 Mortality, Neonatal Mortality, HIV, Tuberculosis, Malaria, Neglected Tropical Diseases, Family Planning, Universal Health Coverage, Smoking, Vaccines
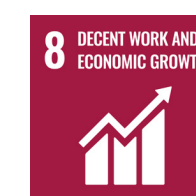
4 QUALITY EDUCATION — Education

5 GENDER EQUALITY — Gender Equality

6 CLEAN WATER AND SANITATION — Sanitation

8 DECENT WORK AND ECONOMIC GROWTH — Inclusive Financial Systems

Interact with the data
Visit our website to view an interactive version of these charts and access the raw data.
gates.ly/2024GKReportExploreData

Poverty

SDG Target 1.1

Eradicate extreme poverty for all people everywhere.

Nine percent of the global population, or 712 million people, struggled on less than the $2.15 per day poverty line in 2022. At the current pace, nearly 7% of the world's population will remain in extreme poverty by 2030—that's 574 million people in extreme poverty.

Percentage of population below the international poverty line (US$2.15/day)

8.95%

1981

2022
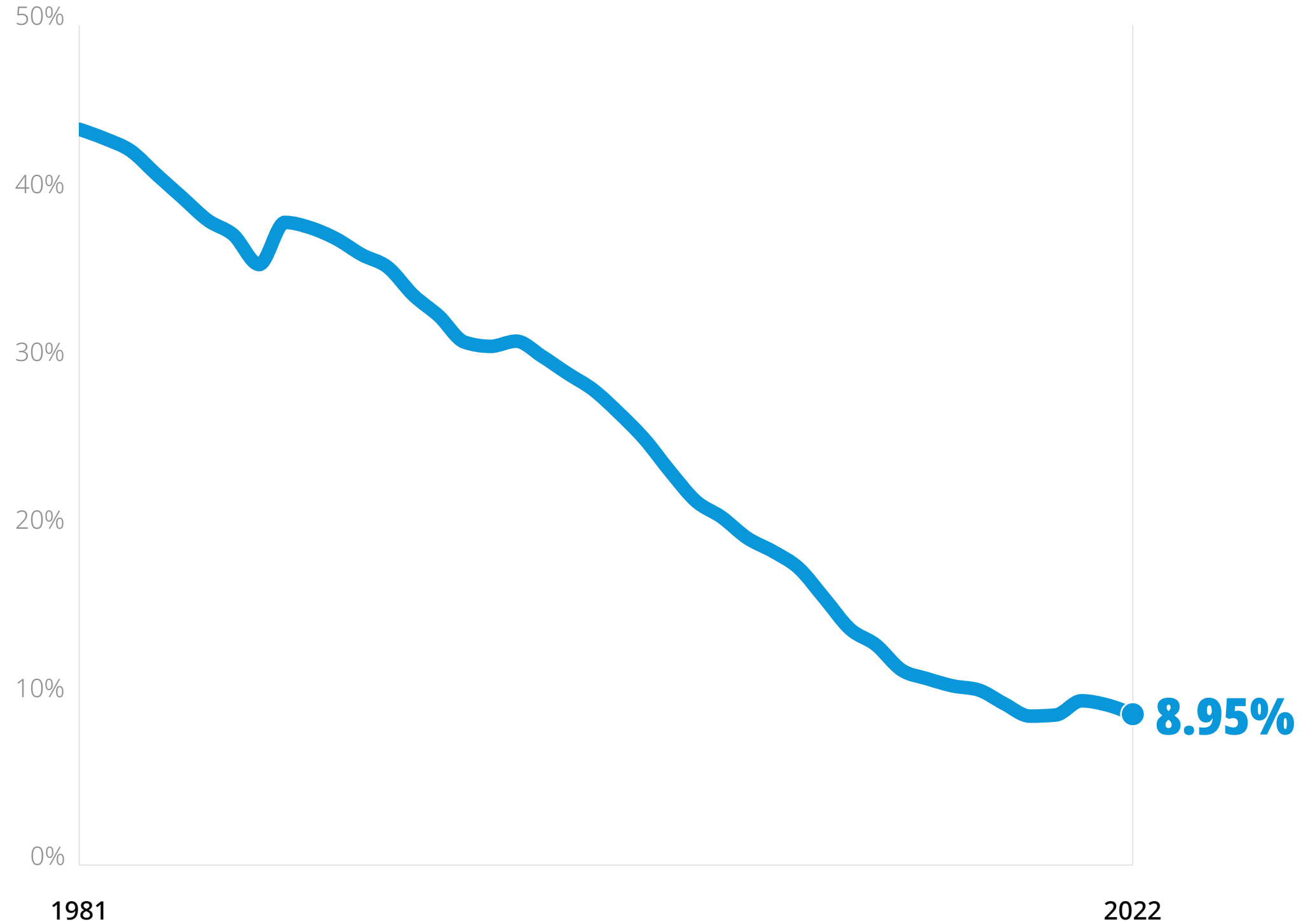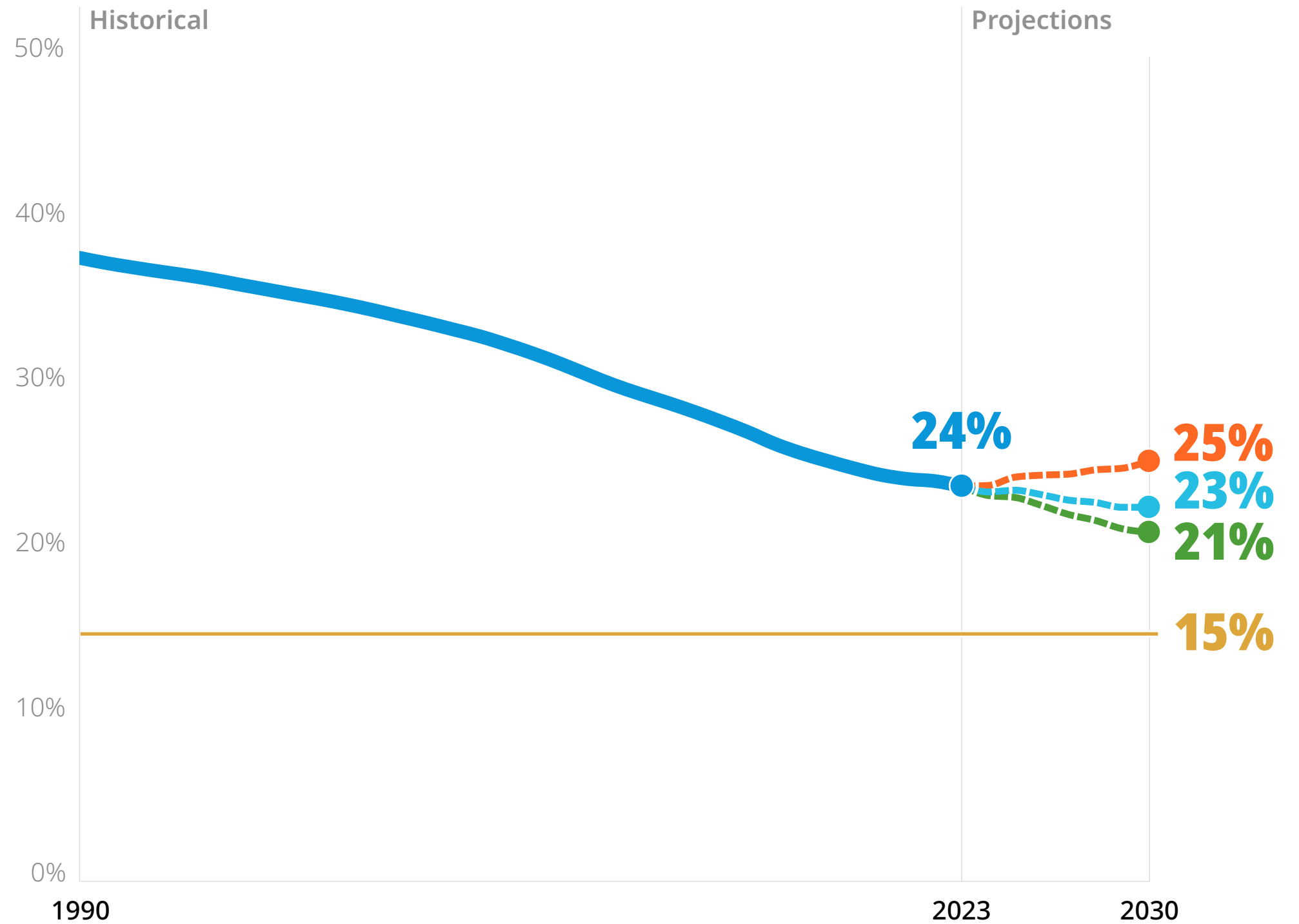
Legend

Historical average

Stunting

2 ZERO HUNGER

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 5.

Stunting among children has stalled at 24% in 2023. The 2030 projection estimates that 23% of children under age 5 will be stunted—missing the 2025 stunting target of 15%.

Prevalence of stunting among children under age 5

Historical   Projections

24%

25%
23%
21%

15%

1990   2023   2030

Legend

2030 target   Historical average   Worse   Reference   Better
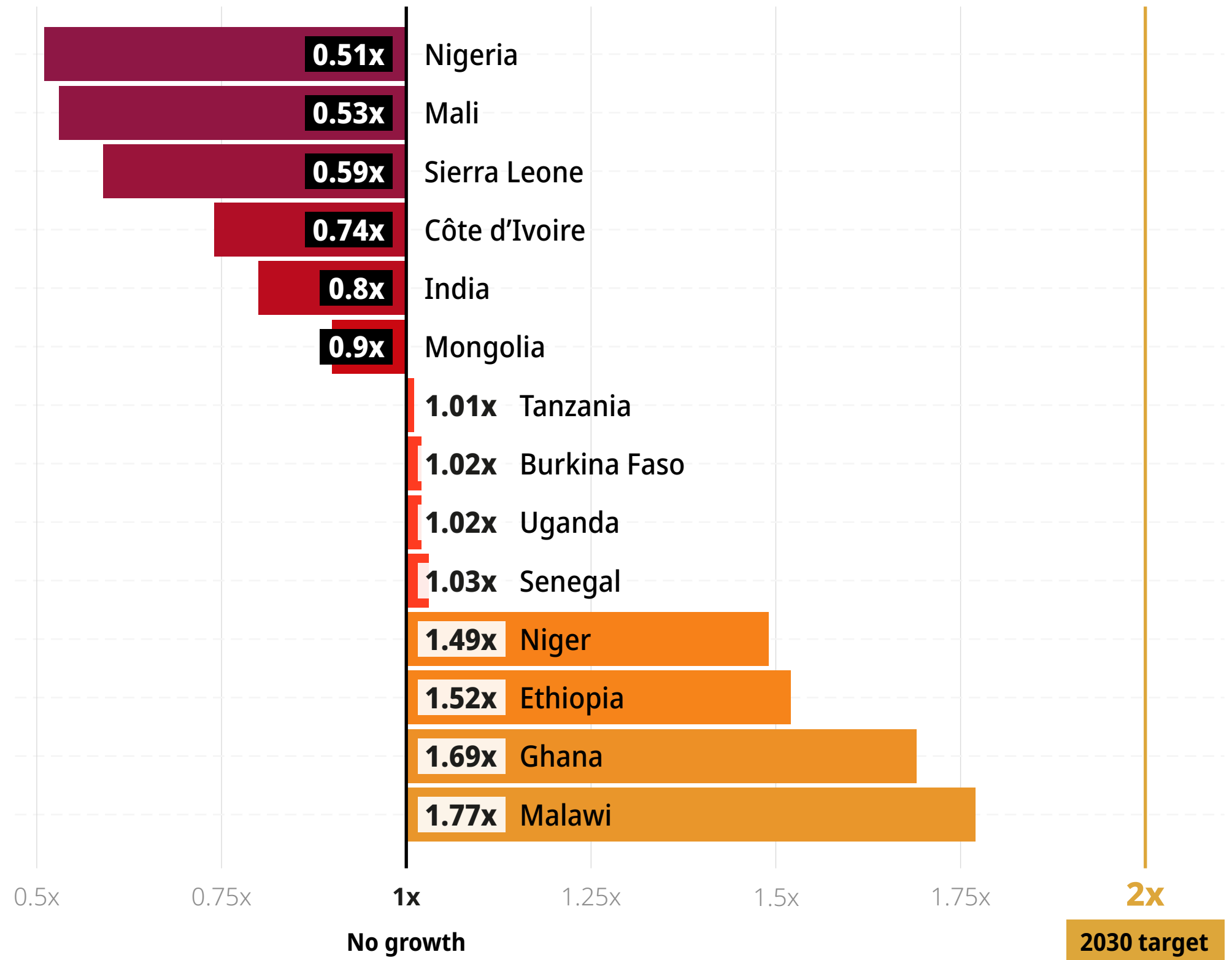
Agriculture

2 ZERO HUNGER

SDG Target 2.3

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

Over the past several years global food security has been under pressure due to climate change and other challenges, including the conflict in Ukraine, which has added significantly more pressure to production. We continue to see that smallholder producers lag large-scale producers and face an even bigger income and productivity crisis.

Note: Country growth rates are not comparable since they are calculated over different year ranges. All date ranges can be found in data sources.

Rate of average annual income growth from agriculture for smallholder food producers, PPP (constant 2011 international $)

0.51x	Nigeria
0.53x	Mali
0.59x	Sierra Leone
0.74x	Côte d'Ivoire
0.8x	India
0.9x	Mongolia
1.01x	Tanzania
1.02x	Burkina Faso
1.02x	Uganda
1.03x	Senegal
1.49x	Niger
1.52x	Ethiopia
1.69x	Ghana
1.77x	Malawi

0.5x　　0.75x　　1x　　1.25x　　1.5x　　1.75x　　2x

No growth

2030 target

Maternal Mortality
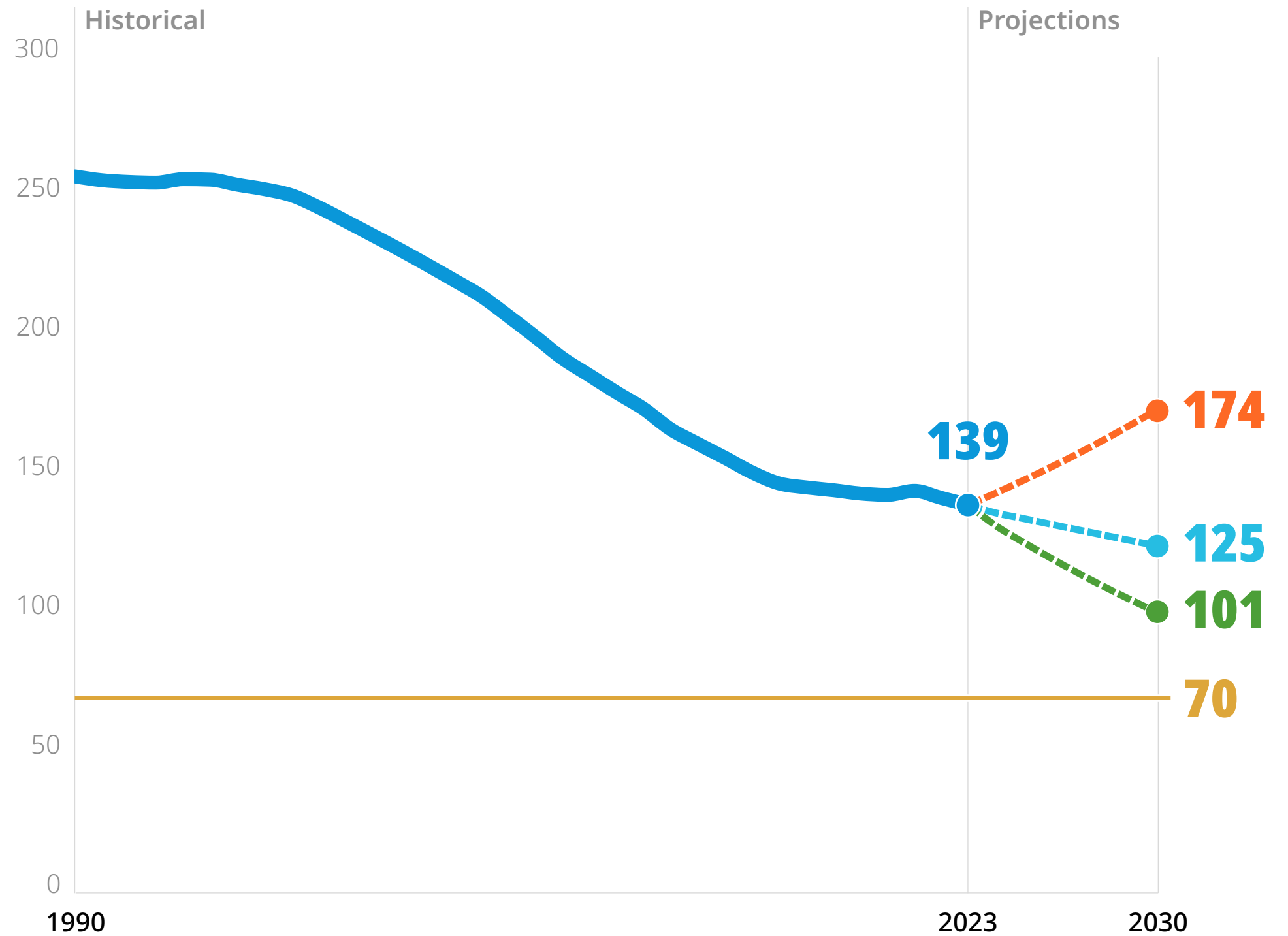
3 GOOD HEALTH AND WELL-BEING

SDG Target 3.1

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

Progress on the global maternal mortality ratio has stalled since 2016 and was 139 per 100,000 live births in 2023. The 2030 projection estimates 125 maternal deaths per 100,000 live births— almost double the target. Achieving the target by 2030 will require an annual rate of reduction of 12%, a rate that has rarely been achieved at the national level.

Maternal deaths per 100,000 live births

Historical   Projections

300

250

200

150   **139**

100

50

0

1990   2023   2030

174
125
101
70

Legend

| 2030 target | Historical average | Worse | Reference | Better |

Under-5 Mortality

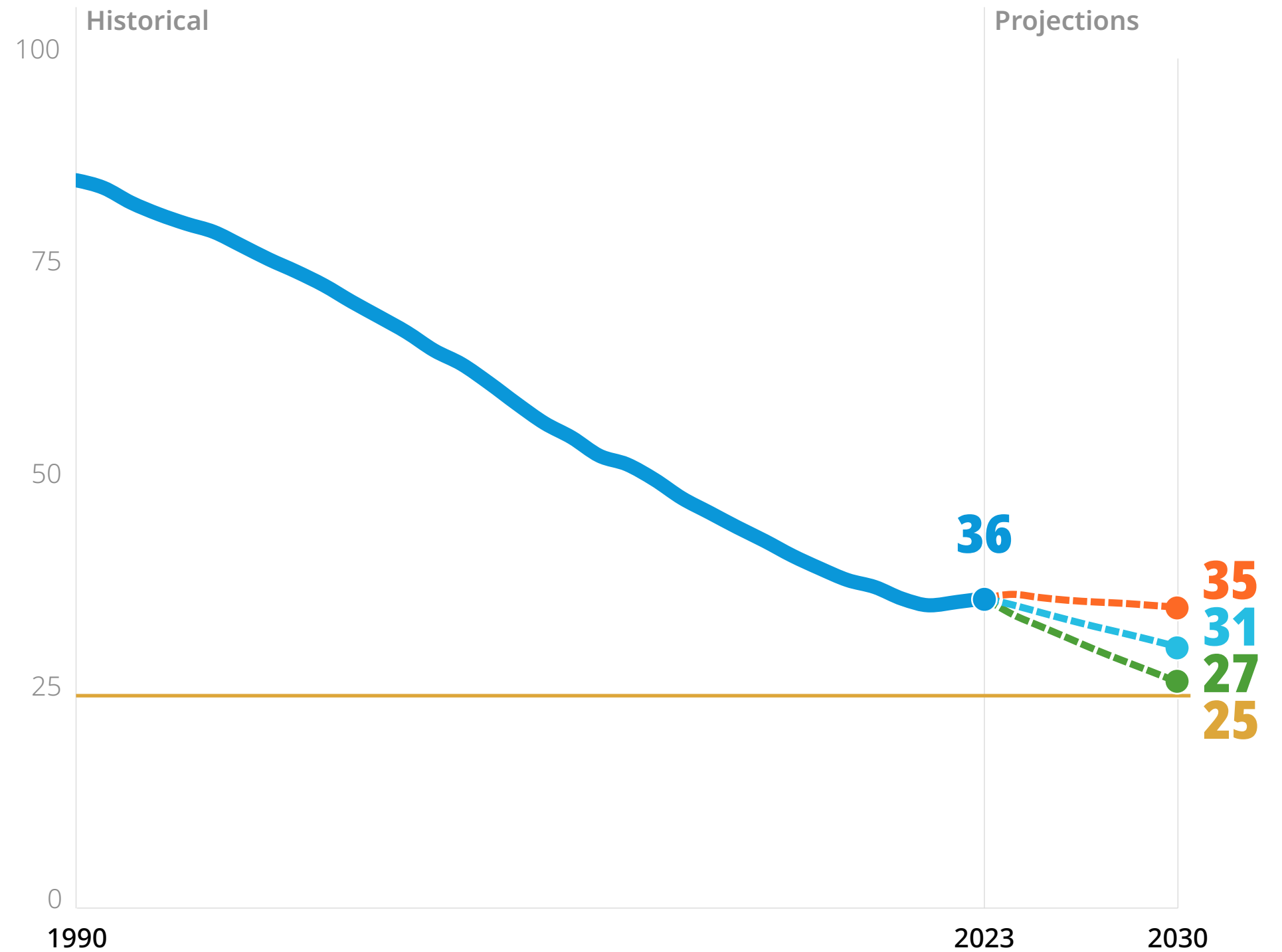**3 GOOD HEALTH AND WELL-BEING**

SDG Target 3.2

End preventable deaths of children under 5 years of age, with all countries aiming to reduce under-5 mortality to at least as low as 25 per 1,000 live births.

Since 2021, the child mortality rate has stalled at 36 deaths per 1,000 live births. By 2030, the projected child mortality rate will be 31 per 1,000 live births—missing the target of 25 child deaths per 1,000 live births. If progress accelerates, the 2030 target is within reach.

Under-5 deaths per 1,000 live births

Historical   Projections

100

75

50

36

35

31

27

25

25

0

1990   2023   2030

Legend

2030 target   Historical average   Worse   Reference   Better

Neonatal Mortality
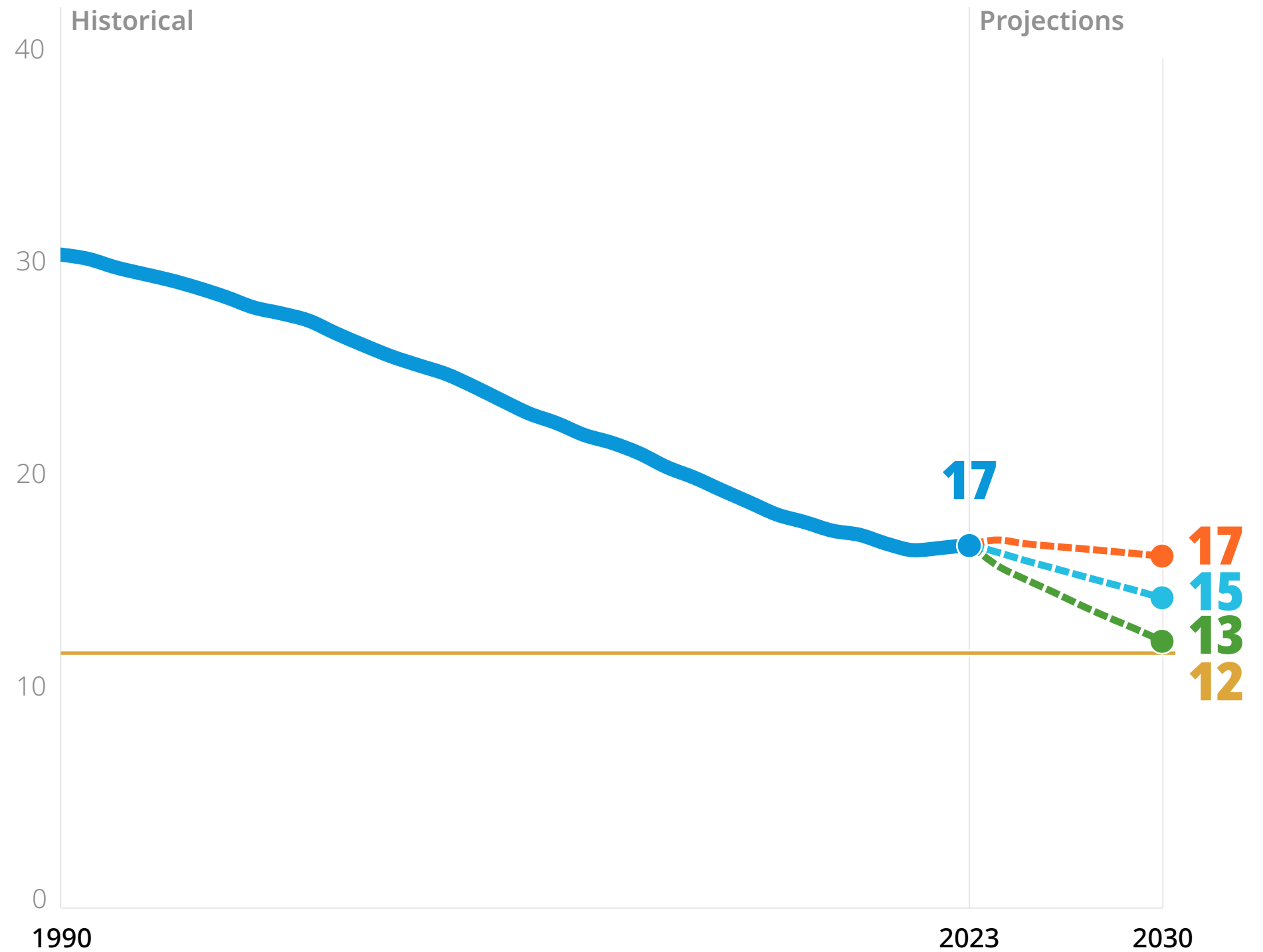
3 GOOD HEALTH AND WELL-BEING

SDG Target 3.2

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

Since 2021, the neonatal mortality rate has stalled at 17 neonatal deaths per 1,000 live births. By 2030, the projected rate will be 15 neonatal deaths per 1,000—missing the target of 12 neonatal deaths per 1,000 live births.

Neonatal deaths per 1,000 live births

Historical | Projections

40
30
20
17
17
15
13
12
10
0

1990   2023   2030

Legend

2030 target   **Historical average**   **Worse**   **Reference**   **Better**
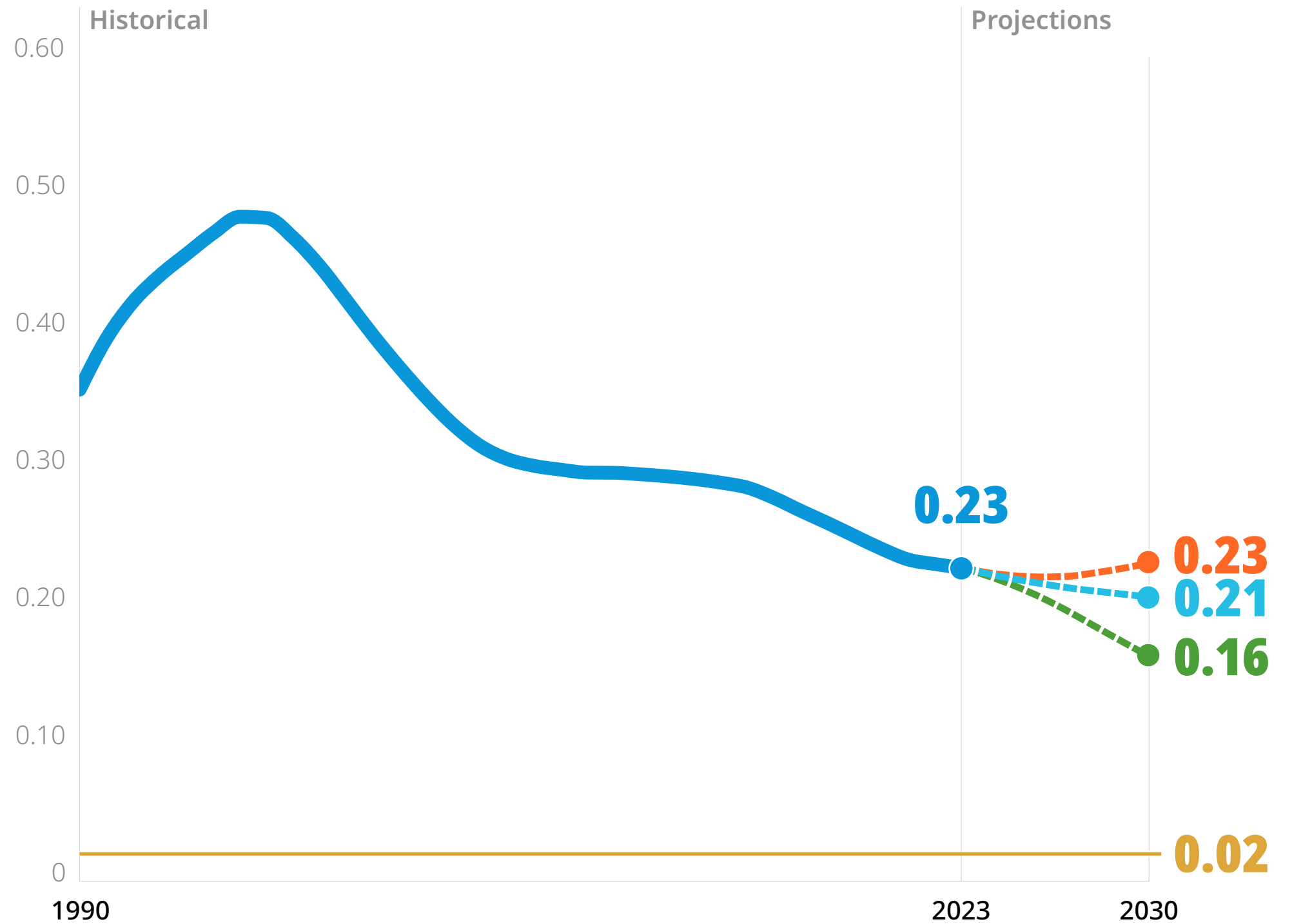
HIV

3 GOOD HEALTH AND WELL-BEING

SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

Globally, progress on reducing new cases of HIV has slowed—reaching 0.23 new cases of HIV per 1,000 people in 2023. The 2030 projection estimates that the new cases of HIV will be 0.21 per 1,000 people—almost 10 times the target of 0.02 new cases per 1,000 people.

New cases of HIV per 1,000 people

Historical   Projections

0.60

0.50

0.40

0.30   0.23

0.20   0.23
              0.21
0.10   0.16

0
              0.02

1990   2023   2030

Legend

2030 target   Historical average   Worse   Reference   Better

Tuberculosis
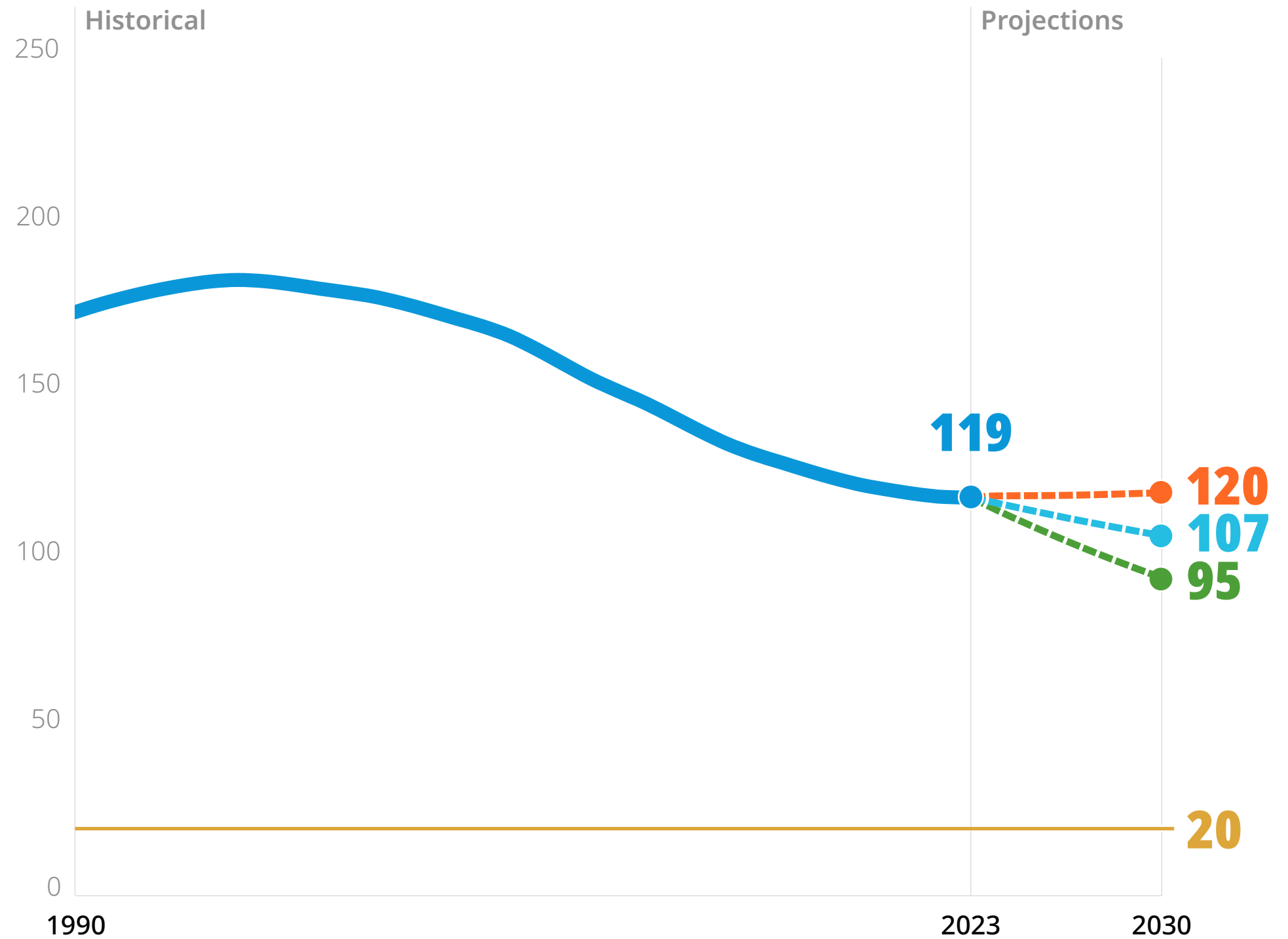
3 GOOD HEALTH AND WELL-BEING

SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

Globally, new cases of tuberculosis have stalled at 119 per 100,000 people since 2022. The projection suggests some progress from 2024, with new cases of tuberculosis reaching 107 per 100,000 people in 2030—that's more than five times the target of 20 new cases per 100,000 people.

New cases of tuberculosis per 100,000 people

Historical   Projections

119
120
107
95
20

1990   2023   2030

Legend

| 2030 target | Historical average | Worse | Reference | Better |

Malaria
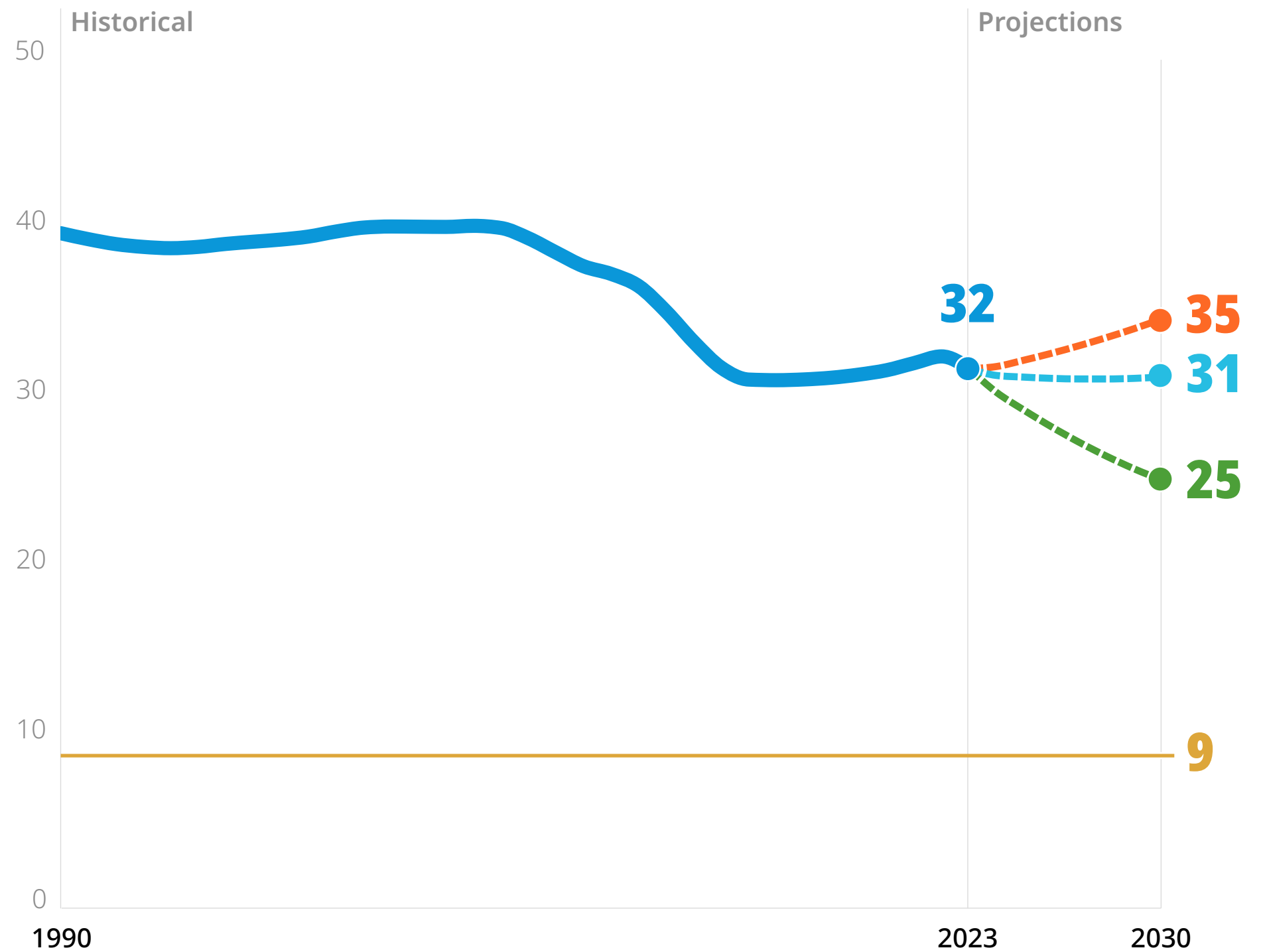
3 GOOD HEALTH AND WELL-BEING

SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

New cases of malaria have stalled, reaching 32 per 1,000 people in 2023. The 2030 projection estimates continued stalling, with new cases remaining the same by 2030—three times more than the SDG target.

New cases of malaria per 1,000 people

Historical   Projections

50

40

32

35

31

30

25

20

10

9

0

1990   2023   2030

Legend

2030 target   Historical average   Worse   Reference   Better

Neglected Tropical Diseases

3 GOOD HEALTH AND WELL-BEING

SDG Target 3.3

End the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases (NTDs) and combat hepatitis, water-borne diseases and other communicable diseases.

For 15 NTDs, it is estimated that cases have declined globally in 2023 to 13,277 cases per 100,000 people from 13,554 per 100,000 people in 2022. Cases of these 15 NTDs are projected to continue to decline to 10,604 per 100,000 by 2030.

Prevalence of 15 NTDs per 100,000 people

Historical | Projections

50k
40k
30k
20k
13.3k
10k
13.4k
10.6k
9.2k
0

1990　　　2023　　　2030
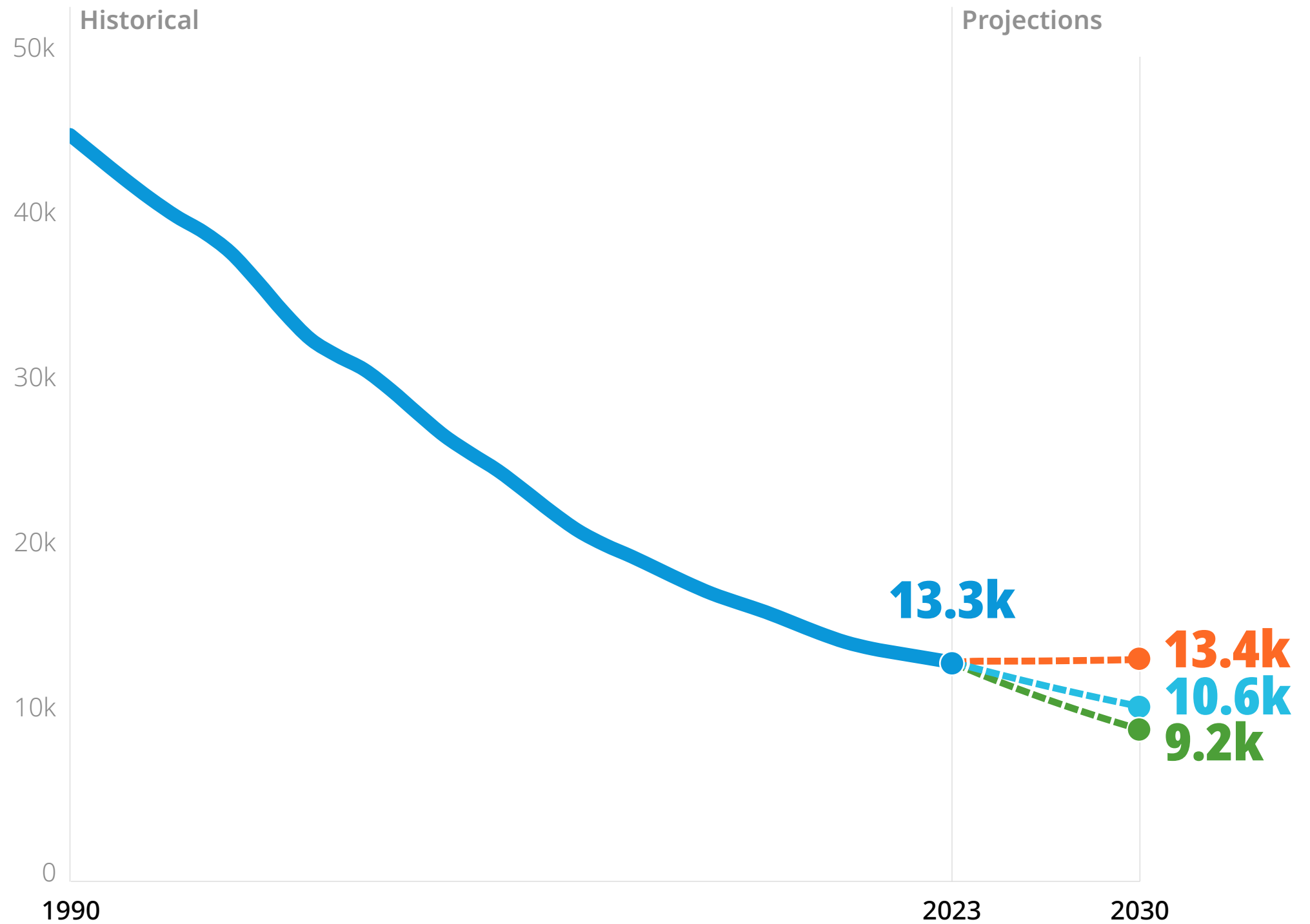
Legend

Historical average　**Worse**　**Reference**　**Better**

Family Planning

**3 GOOD HEALTH AND WELL-BEING**

SDG Target 3.7

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

Globally, it is estimated that 8 out of 10 women identified as having a need for contraception are using a modern method to achieve their reproductive goals. Projections suggest progress will stall through 2030—missing the universal access target of 100%.

Percentage of women of reproductive age (15–49) who have their need for family planning satisfied with modern methods

Historical | Projections

100% — 100%

78%

81%
79%
76%

75%

50%

25%

0%

1990   2023   2030
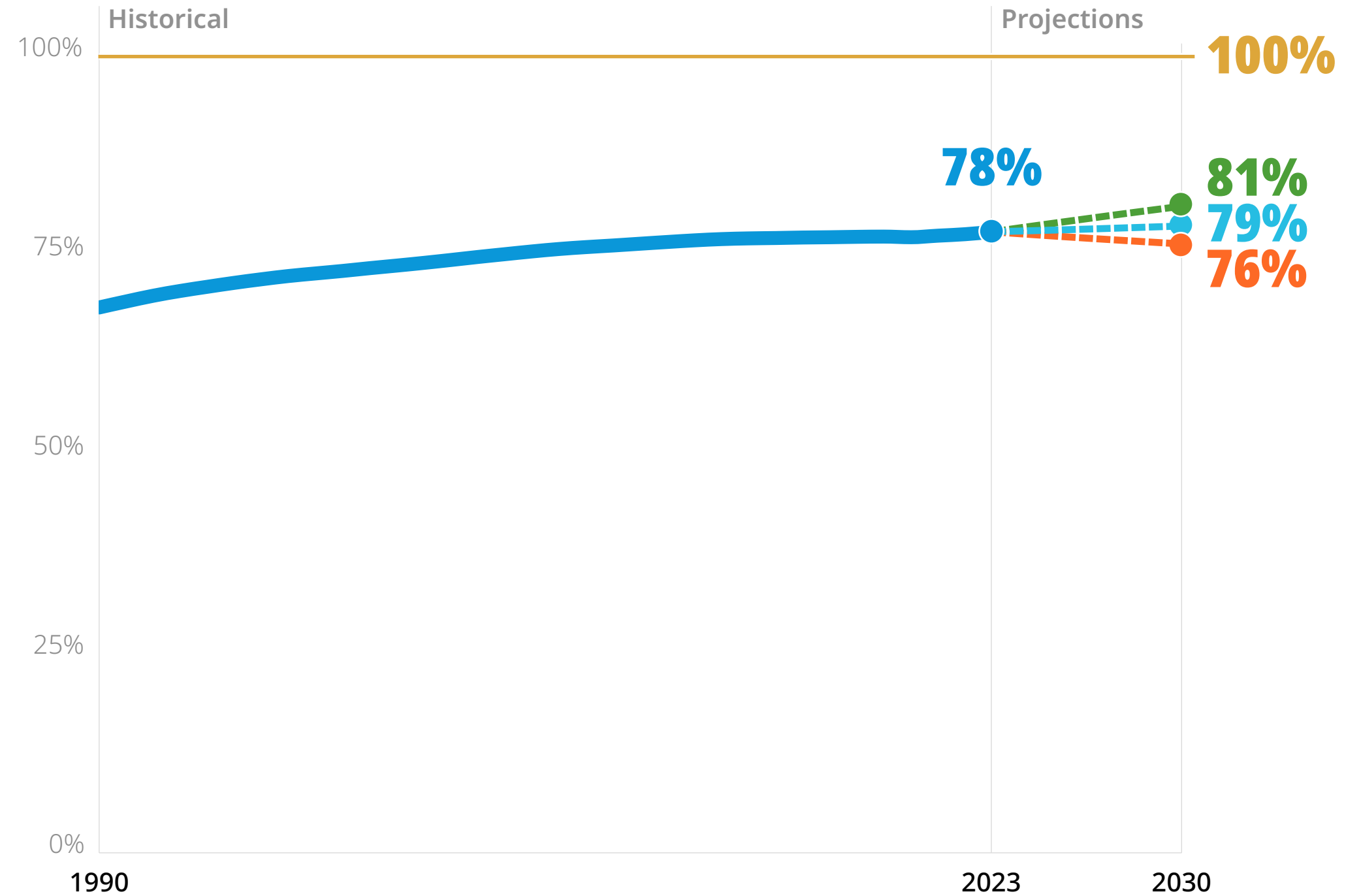
Legend

| 2030 target | Historical average | Worse | Reference | Better |

Universal Health Coverage

3 GOOD HEALTH AND WELL-BEING

SDG Target 3.8

Achieve universal health coverage for all.

Coverage of essential health services is recovering following pandemic reversals, increasing from an index score of 58 in 2020 to 61 in 2023. Although more people are projected to receive quality and affordable essential health services, a score of 63 is estimated for 2030—missing the target score of 100.

Performance score of the UHC effective coverage index

Historical   Projections

100

75

61

65
63
61

50

25

0

1990   2023   2030

Legend

| 2030 target | Historical average | Worse | Reference | Better |

Smoking
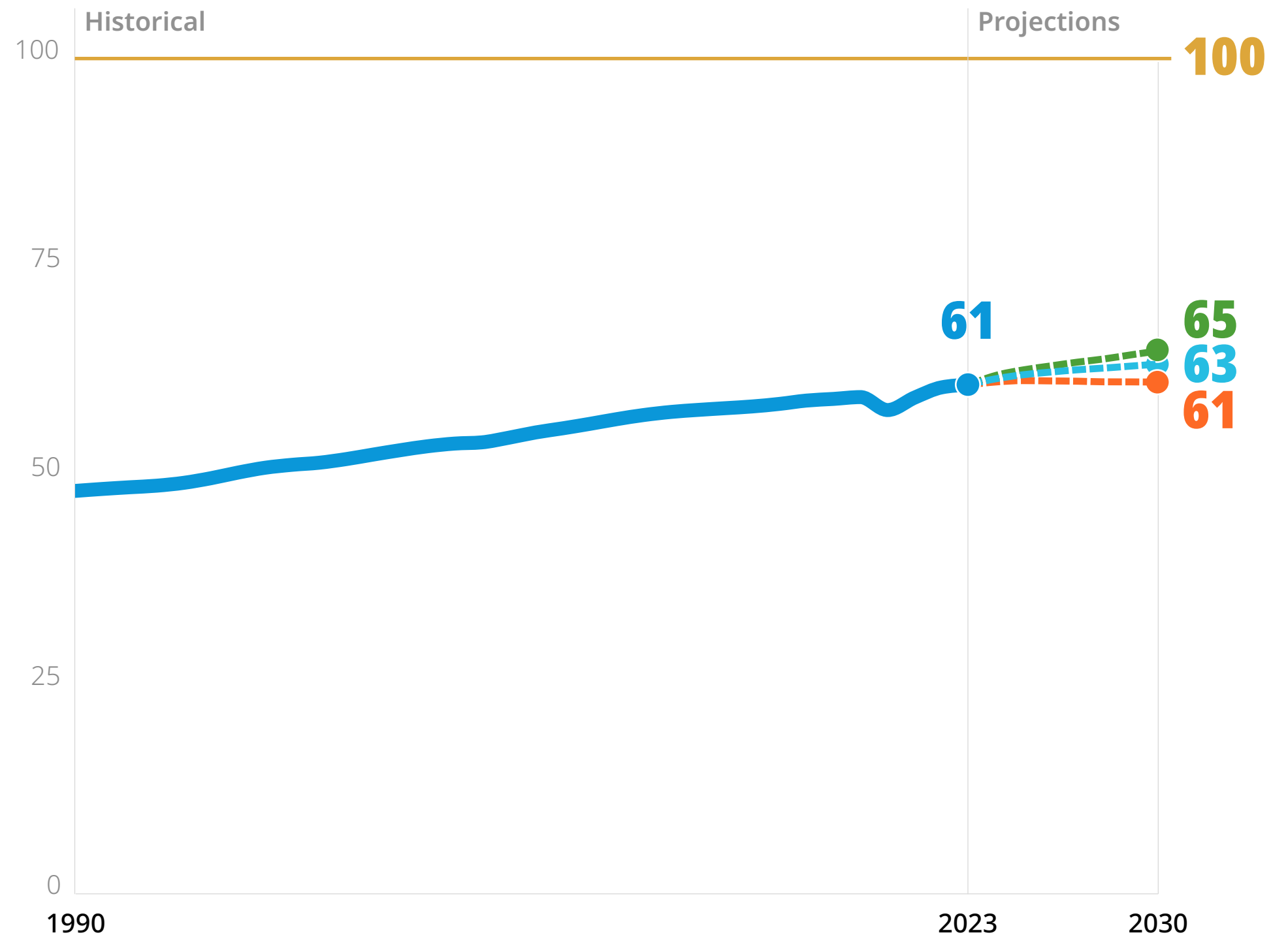
**3 GOOD HEALTH AND WELL-BEING**

SDG Target 3.A

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

Globally, the percentage of people aged 15 and older who use any tobacco product has declined over the last decade, reaching 18% in 2023. Projections estimate further decline to 17% by 2030.

Age-standardized smoking prevalence among people ages 15 and older

Historical

Projections

18%

18%
17%
16%

1990   2023   2030
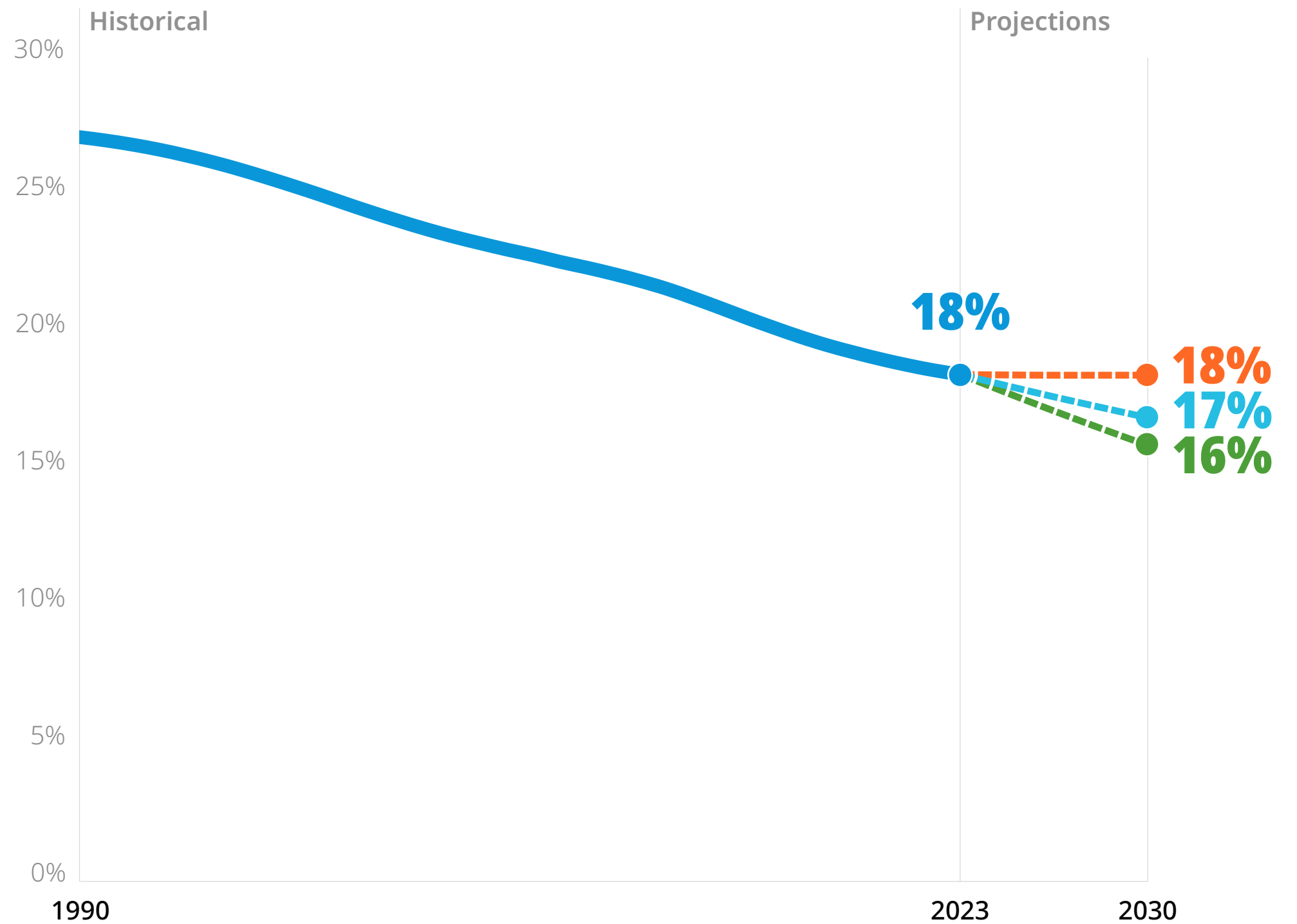
Legend

| Historical average | Worse | Reference | Better |

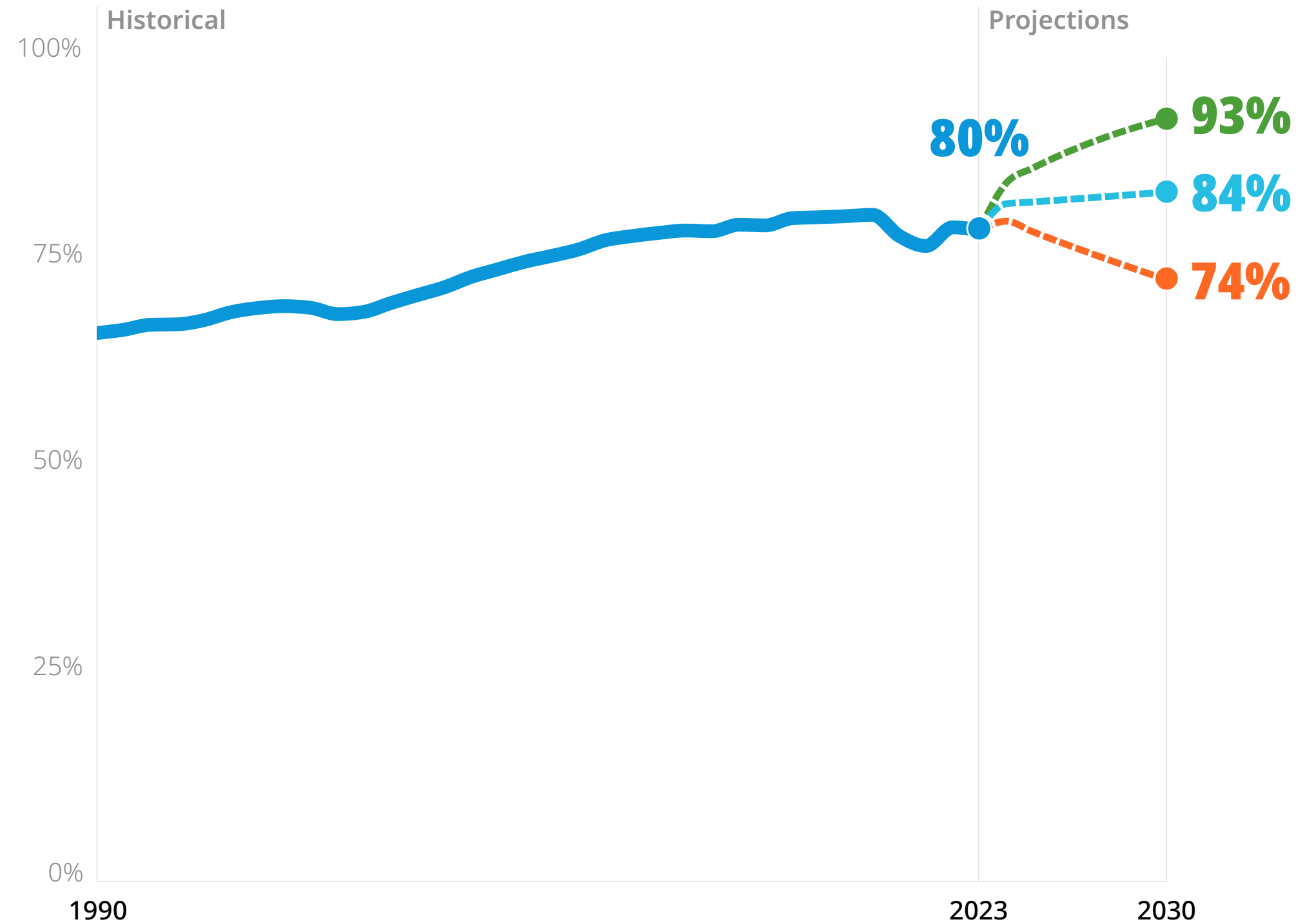# Vaccines

3 GOOD HEALTH AND WELL-BEING

SDG Target 3.B

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

The global estimate for diphtheria, tetanus, and pertussis (DTP) third-dose vaccine coverage is showing uneven recovery from COVID-related disruptions to 80% in 2023. There has been no change since 2022. By 2030, DTP (third-dose) vaccine coverage is estimated to be 84%. These global estimates mask significant differences at the subnational level that need to be better understood to address inequities in vaccine coverage.

Coverage of DTP (third dose)

Historical   Projections

100%

80%

93%

84%

75%

74%

50%

25%

0%

1990   2023   2030

Legend

Historical average   Worse   Reference   Better
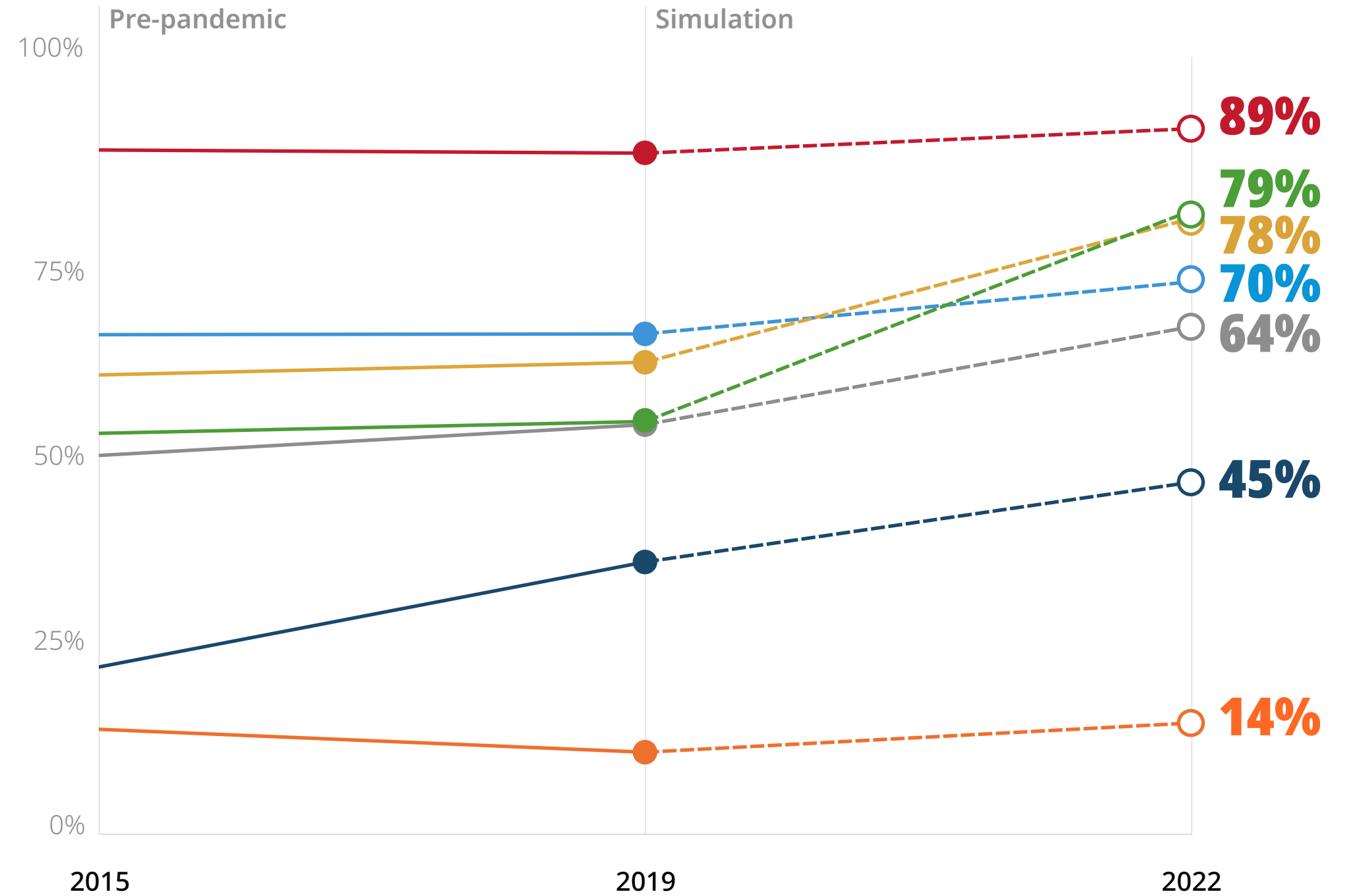
Education

4 QUALITY EDUCATION

SDG Target 4.1

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

Proportion of children who cannot read and understand a simple text by age 10

Pre-pandemic | Simulation

- 89% Sub-Saharan Africa
- 79% Latin America and Caribbean
- 78% South Asia
- 70% Middle East and North Africa
- 64% Global
- 45% East Asia and Pacific
- 14% Europe and Central Asia

2015   2019   2022

Legend

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

Global | East Asia and Pacific | Europe and Central Asia

Before the COVID-19 pandemic, half of children in low- and middle-income countries were not able to read and understand a text by age 10, even if they were in school. The latest simulations suggest this has risen to two-thirds of children in low- and middle-income countries.

Gender Equality

5 GENDER EQUALITY

SDG Target 5

Achieve gender equality and empower all women and girls.

Nearly three-quarters of the SDG targets—particularly those under SDG 1 (poverty), SDG 4 (education), SDG 5 (gender equality), and SDG 8 (decent work)—are directly or significantly reliant on gender equality. Yet no country is on track to achieve gender equality across the SDGs by 2030. If the current trends continue, global gender equality won't be achieved until the 22nd century.

SDG Gender Index score

Historical   Projections

64   65   66   69

2015   2019   2022   2030
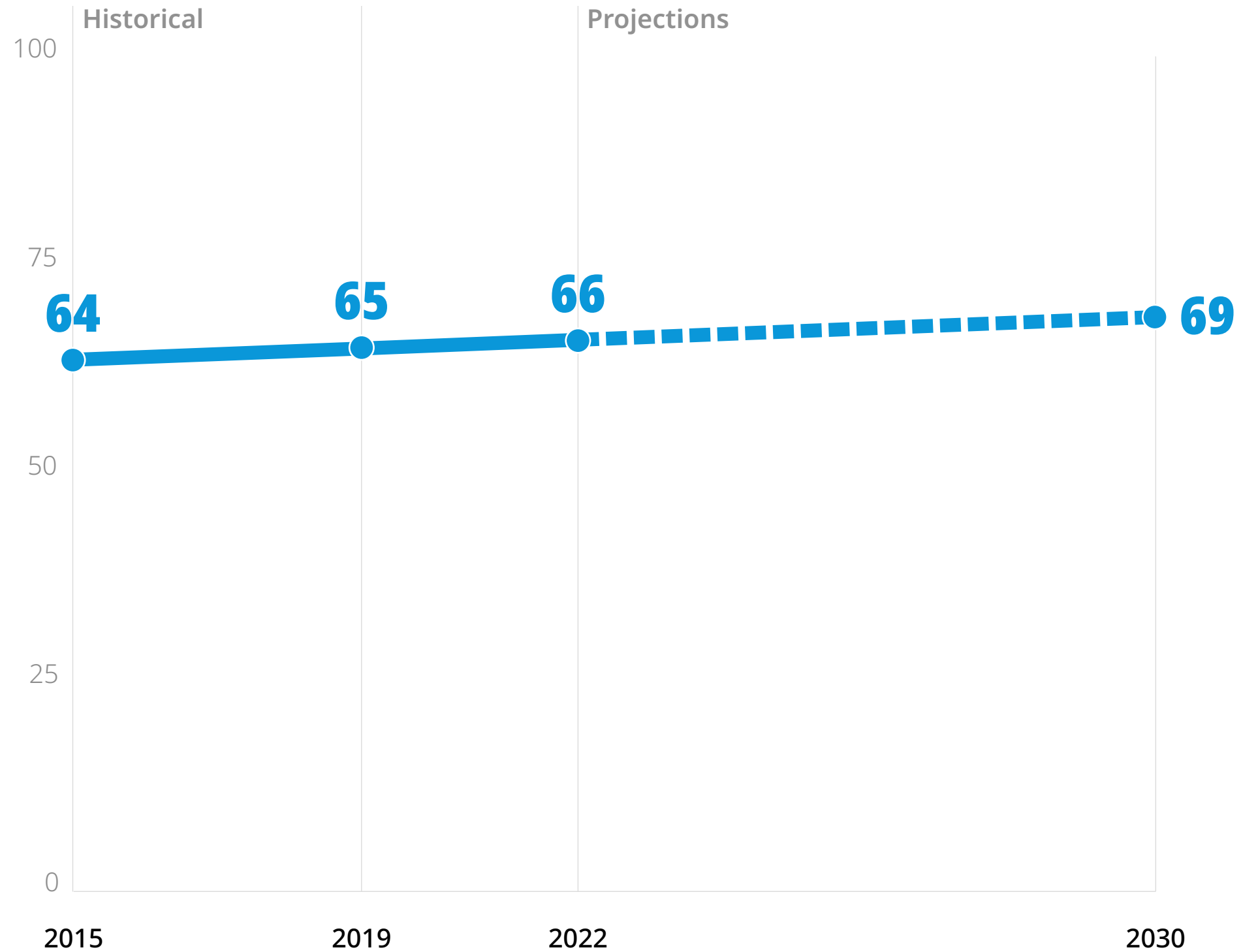
Legend

Global
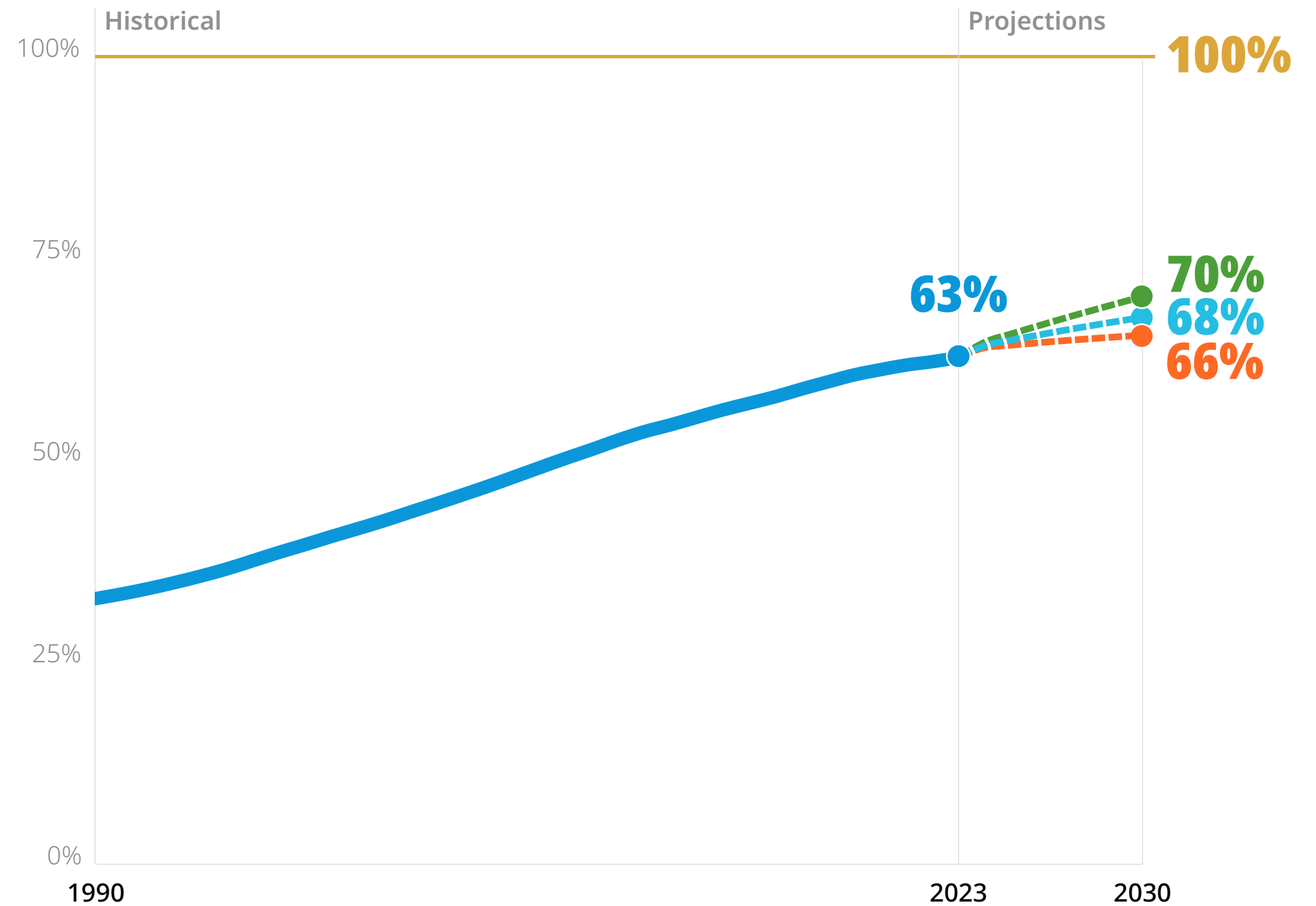
Sanitation

6 CLEAN WATER AND 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 proportion of the population using safely managed sanitation has been rising—up to 63% in 2023. By 2030, it is projected that more than two-thirds of the global population will be using safely managed sanitation—missing the target to ensure safe sanitation for all.
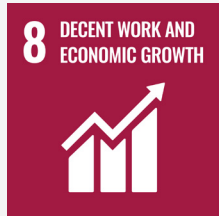
Proportion of population using safely managed sanitation

Historical | Projections

100%

75%

50%

25%

0%

1990 · 2023 · 2030

63%

100%

70%
68%
66%

Legend

| 2030 target | Historical average | Worse | Reference | Better |

Inclusive Financial Systems

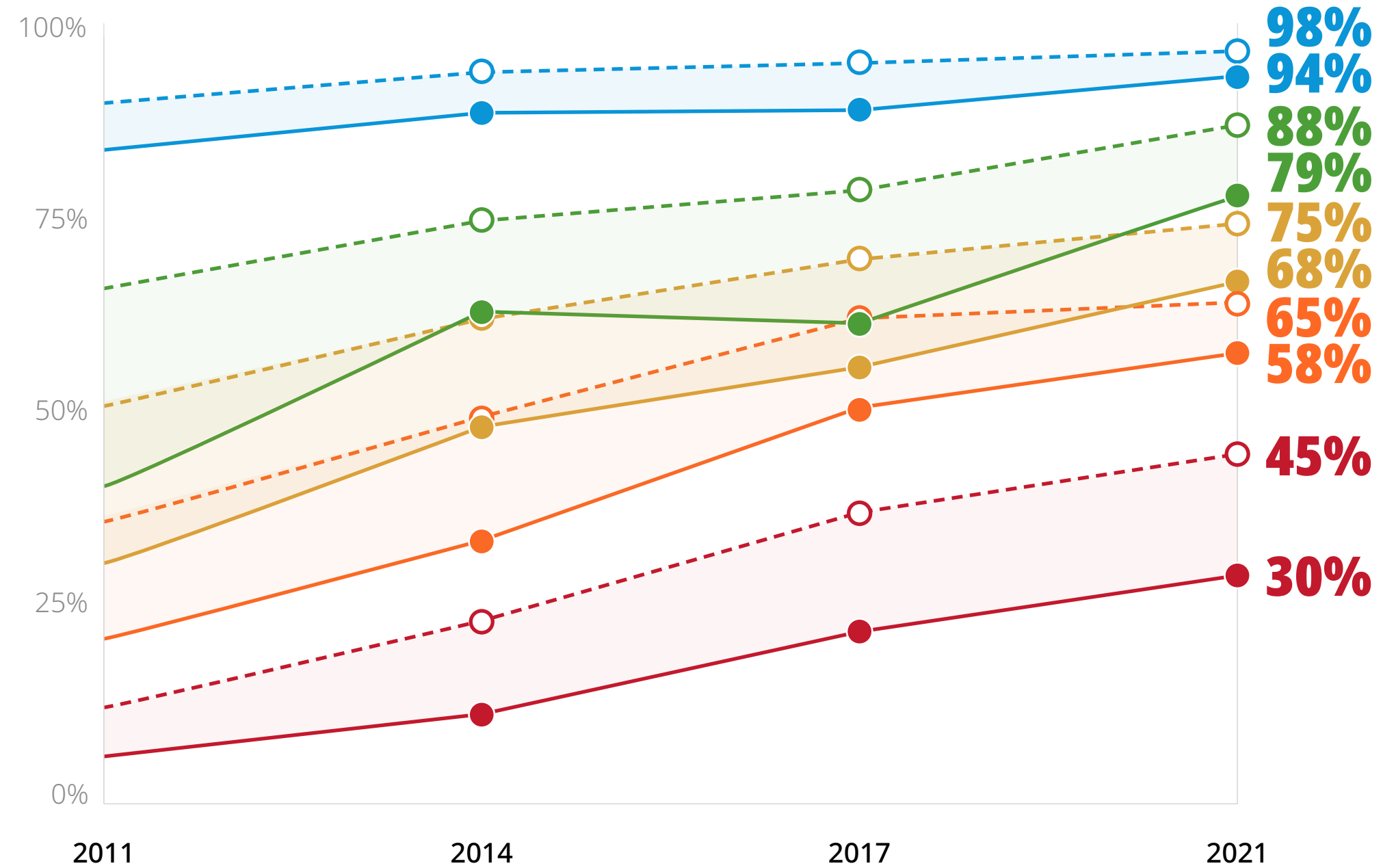**8 DECENT WORK AND ECONOMIC GROWTH**

SDG Target 8.10

Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance, and financial services for all.
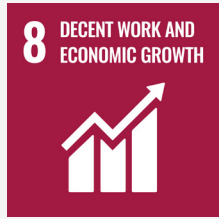
Percentage of adults (ages 15 and older) with an account at a bank or other financial institution or with a mobile-money service provider, poorest and richest

Over the past decade, the world has made rapid progress in expanding financial inclusion. Globally, 76% of adults now own a financial account, up from 51% a decade ago.

Legend

High-income countries   Upper-middle-income countries   Middle-income countries

Lower-middle-income countries   Low-income countries   —— Poorest   - - - Richest

Inclusive Financial Systems
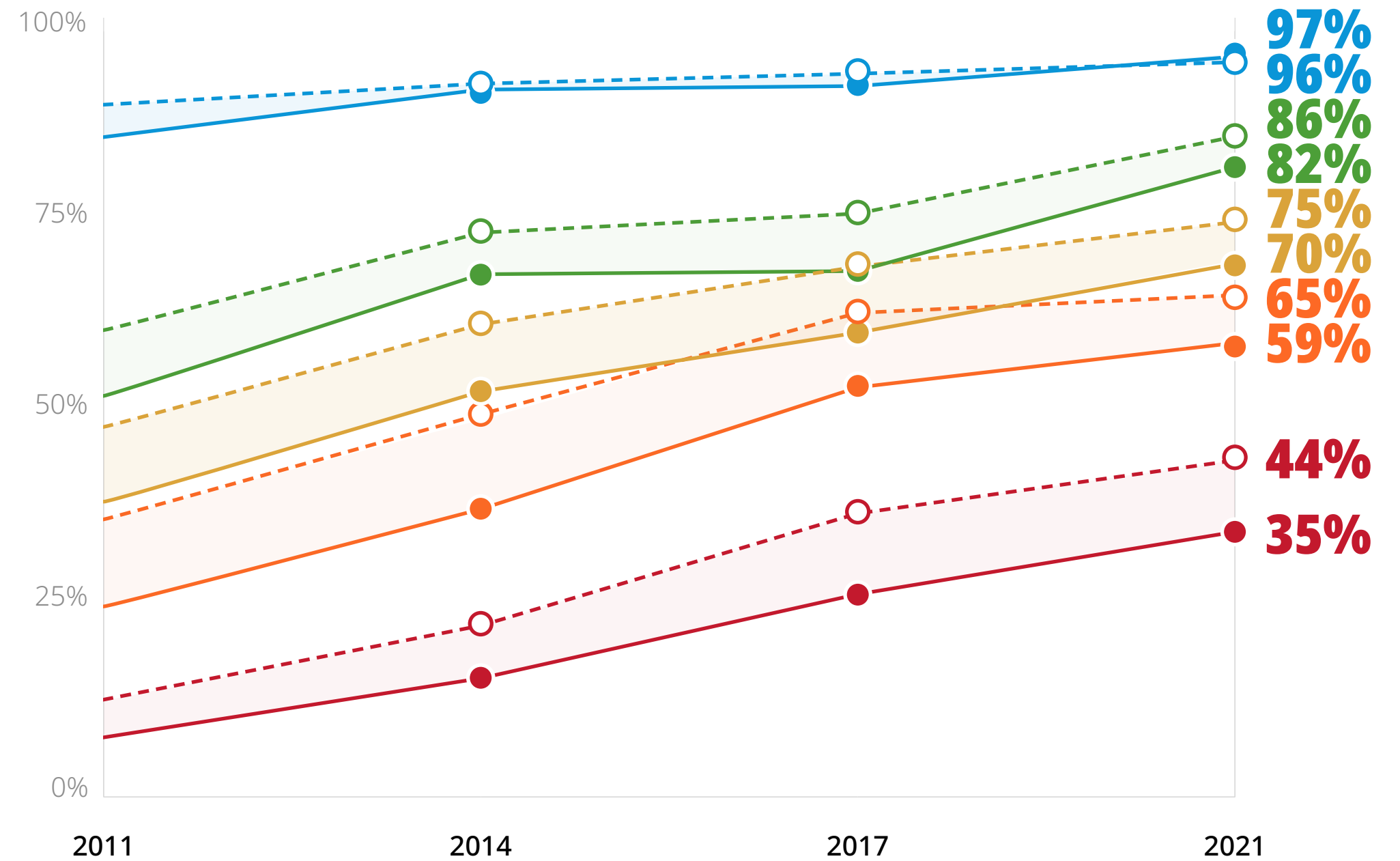
8 DECENT WORK AND ECONOMIC GROWTH

SDG Target 8.10

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

Percentage of adults (ages 15 and older) with an account at a bank or other financial institution or with a mobile-money service provider, women and men

Importantly, the gender gap in account ownership is decreasing.

Legend

High-income countries   Upper-middle-income countries   Middle-income countries

Lower-middle-income countries   Low-income countries   —— Women   - - - Men

2024 Data Sources and Notes

The data sources for facts and figures featured in the 2024 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/2024GKReportDataSources.

The Race to Nourish a Warming World
Institute for Health Metrics and Evaluation. (2024). *Financing global health 2023: The future of health financing in the post-pandemic era.* https://www.healthdata.org/research-analysis/library/financing-global-health-2023-future-health-financing-post-pandemic-era

Stalling health financing puts progress at risk
Institute for Health Metrics and Evaluation. (2024). *Financing global health 2023: The future of health financing in the post-pandemic era.* https://www.healthdata.org/research-analysis/library/financing-global-health-2023-future-health-financing-post-pandemic-era

Global Burden of Disease Collaborative Network. (2024). *Global Burden of Disease 2021: Findings from the GBD 2021 Study.* https://www.healthdata.org/research-analysis/library/global-burden-disease-2021-findings-gbd-2021-study

United Nations Inter-agency Group for Child Mortality Estimation. (2024). *Levels & trends in child mortality: Report 2023.* https://childmortality.org/wp-content/uploads/2024/03/UNIGME-2023-Child-Mortality-Report.pdf

Hoogeveen, J., Mistiaen, J. A. & Wu, H. (2024). *Accelerating Poverty Reduction in Sub-Saharan Africa Requires Stability.* World Bank. https://blogs.worldbank.org/en/africacan/accelerating-poverty-reduction-sub-saharan-africa-requires-stability

ONE Campaign. (2024). *Official Development Assistance (ODA).* https://data.one.org/topics/official-development-assistance/

United Nations Children's Fund. (2024). *Child food poverty: Nutrition deprivation in early childhood.* https://www.unicef.org/media/157661/file/Child-food-poverty-2024.pdf

In 2024, UNICEF released its first report on child food poverty. Its analysis found that currently, over 440 million children around the world experience food poverty. UNICEF defines child food poverty as children's inability to access and consume a nutritious and diverse diet in early childhood.

Also, the World Health Organization (WHO) released global estimates of specific forms of malnutrition. In 2022, WHO estimates that 148.1 million children under age 5 were too short for their age (stunting), 45 million were too thin for their height (wasting), and 37 million were too heavy for their height (overweight).

Institute for Health Metrics and Evaluation. (2024, August). [Bespoke modeling. Full methodology is detailed below].

Nations can't grow if their people can't
1,000 Days. (n.d.). *From cradle to career: The lifelong impact of early nutrition on minds and futures.* https://thousanddays.org/updates/from-cradle-to-career-the-lifelong-impact-of-early-nutrition-on-minds-and-futures/

Horton, S., Shekar, M., McDonald, C., Mahal, A., & Brooks, J. K. (2010). *Scaling up nutrition: What will it cost? World Bank.* https://openknowledge.worldbank.org/server/api/core/bitstreams/7cf62331-2e10-523e-acb8-17d71e8ce779/content

Hoddinott, J., Maluccio, J., Behrman, J. R., Martorell, R., Melgar, P., Quisumbing, A. R., Ramirez-Zea, M., Stein, A. D., & Yount, K. M. (2011). *The consequences of early childhood growth failure over the life course* (Discussion Paper 01073). International Food Policy Research Institute. https://www.almendron.com/tribuna/wp-content/uploads/2019/07/the-consequences-of-early-childhood-growth-failure-over-the-life-course.pdf

World Bank. (2023). *The World Bank and nutrition.* https://www.worldbank.org/en/topic/nutrition/overview

United Nations Children's Fund, WHO, & World Bank Group (2023). *Levels and trends in child malnutrition: UNICEF/WHO/World Bank Group joint child malnutrition estimates: Key findings of the*

2023 edition. https://www.who.int/publications/i/item/9789240073791

Impact of Increased Milk Production
Headey, D., & de Vries, A. (2024). *Can dairy development reduce stunting at scale? Projections for India, Ethiopia, Kenya, Tanzania and Nigeria for 2020-2050* [Unpublished manuscript]. International Food Policy Research Institute.

Impacts of Food Fortification in Nigeria and Ethiopia
Bill & Melinda Gates Foundation & Institute for Health Metrics and Evaluation Simulation Science Team. (2024, August). [Bespoke modeling].

Impact of MMS in Low- and Middle-income countries
Bill & Melinda Gates Foundation & Burnet Institute. (2024, August). [Bespoke modeling]. Full methodology is detailed below.

In May 2024, a collaborative of private philanthropies (the Bill & Melinda Gates Foundation, Children's Investment Fund Foundation, Eleanor Crook Foundation, and Kirk Humanitarian released a global investment roadmap designed to catalyze and prioritize action and investment in multiple micronutrient supplements (MMS). The plan presents an opportunity to reach at least 260 million women in 45 high-burden countries with MMS by the end of 2030, an ambition that would save more than 600,000 lives, improve birth outcomes for more than 5 million babies, and prevent anemia in over 15 million pregnant women. Read the roadmap, *Healthier Pregnancies and Brighter Futures for Mothers and Babies.*

Ensuring more productive cows and safer milk
Headey, D., & de Vries, A. (2024). *Can dairy development reduce stunting at scale? Projections for India, Ethiopia, Kenya, Tanzania and Nigeria for 2020-2050* [Unpublished manuscript]. International Food Policy Research Institute.

Fortifying the global pantry against micronutrient deficiencies
United Nations Children's Fund. (2023, March). *Iodine.* https://data.unicef.org/topic/nutrition/iodine/

Bill & Melinda Gates Foundation & Institute for Health Metrics and Evaluation Simulation Science Team. (2024, August). [Bespoke modeling].

National Population Commission. (2019). *Nigeria: Demographic and Health Survey 2018. Federal Republic of Nigeria.* https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf

Exploring the feasibility of fortifying bouillon is only one piece of the comprehensive nutrition program led by the Government of Nigeria. See additional notes from Mrs. Bako-Aiyegbusi,mni:

In my country, the nutrition-specific interventions target immediate causes of malnutrition such as food intake or childcare practices, whereas nutrition-sensitive interventions focus on underlying factors such as resource availability and accessibility. Some of the nutrition specific programmes being implemented in Nigeria include addressing treatment of severe acute malnutrition, disease management (e.g., oral rehydration salts for diarrhea), maternal infant and young child nutrition (early initiation of breastfeeding, exclusive breastfeeding, minimum dietary diversity, minimum acceptable diet, responsive feeding), access to health services, hygiene, and sanitation.

Aside [from] the above, other supplementation programmes (such as vitamin A supplementation, deworming twice a year, IFAS and MMS for pregnant women and women of reproductive age), fortification and biofortification are ongoing in the country. The mandatory staple food vehicles for large-scale guided food fortification include salt fortified with iodine, vegetable oil, sugar, wheat, and maize flour fortified with vitamin A. Likewise, Nigeria is introducing large-scale guided voluntary fortification of rice in line with laid-down rules and standards.

Expanding access to better prenatal vitamins
Bill & Melinda Gates Foundation & Burnet Institute. (2024, August). [Bespoke modeling]. Full methodology is detailed below.

Financing progress through the Child Nutrition Fund
Global Fund. (2024). *About the Global Fund.* https://www.theglobalfund.org/en/about-the-global-fund/

Methodology for Goalkeepers 2024 Bespoke Modeling

Measuring the impact of climate change on child malnutrition
The Institute for Health Metrics and Evaluation (IHME) modeled the impacts of climate change on

malnutrition, including child stunting and wasting, the details of which are described below.

IHME analyzed approximately 1 million geolocated child observations from 126 Demographic and Health Surveys, covering 54 countries, to quantify the relationship between climate variables (e.g., mean annual temperature, days more than 30 degrees Celsius), household income, and the prevalence of childhood stunting (height-for-age) and wasting (weight-for-height). The resulting statistical models were used to predict future stunting and wasting prevalence using climate variable forecasts from the Coupled Model Intercomparison Project 6 (CMIP6) ensemble projections. We considered the CMIP6 SSP2-4.5 scenario as the reference or most likely scenario. A second-stage model was used to forecast the residual trends in stunting and wasting prevalence not captured through base income and temperature model. We included the Socio-demographic Index (SDI) as a predictor in the second-stage model. Both the first- and second-stage models were to obtain final forecasts of stunting prevalence over time. In addition to the reference forecast, we compared the reference scenario to a scenario where 2024 climate variables were held constant into the future.

References:
Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., Thépaut, J-N. (2023). *ERA5 hourly data on single levels from 1940 to present.* Copernicus Climate Change Service Climate Data Store. https://doi.org/10.24381/cds.adbb2d47

ICF. (n.d.). *Demographic Health Survey data.* http://www.dhsprogram.com

Institute for Health Metrics and Evaluation. (2024). *Financing global health 2023: The future of health financing in the post-pandemic era.* https://www.healthdata.org/research-analysis/library/financing-global-health-2023-future-health-financing-post-pandemic-era

Pörtner, H.-O., Roberts, D. C., Tignor, M., Poloczanska, E. S., Mintenbeck, K., Alegría, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., Okem, A., & Rama, B. (Eds.). (2022). *Climate change 2022: Impacts, adaptation, and vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press. https://doi.org/10.1017/9781009325844

Muñoz Sabater, J. (2019). *ERA5-Land hourly data from 1950 to present.* Copernicus Climate Change Service Climate Data Store. https://doi.org/10.24381/cds.e2161bac

Measuring impact of multiple micronutrient supplementation in low- and middle-income countries

Methods: Bespoke modeling was conducted by   the foundation in collaboration with Burnet Institute. We aimed to estimate the potential impact of multiple micronutrient supplementation (MMS) on maternal, neonatal, and infant burden in low- and middle-income countries (LMICs) from 2023 to 2040. To achieve this, we designed a dynamic compartmental modeling framework reflective of target populations, conditions, and interventional windows across the pregnancy,

postpartum, newborn, and infancy periods. Within this framework, we built a series of deterministic transition models in which compartments were assigned rates of pregnancy, live birth, condition-specific incidence, and mortality to define population characteristics and outcomes. Receipt of MMS was assumed to affect the transition rates between compartments. Estimated impact on averted burden was measured by overall and condition-specific cases, deaths, and disability-adjusted life years (DALYs). Importantly, we counted stillbirths as deaths and calculated DALYs for stillbirths accordingly.

In addition to a baseline scenario where MMS was not introduced and condition burden forecasts were dependent only on secular trends, we ran counterfactual scenarios of increasing coverage of MMS among pregnant women attending at least one antenatal care visit during pregnancy. Our baseline forecasts of condition burden from 2023 to 2040 depended on forecasts of key drivers, including live births, antenatal care utilization, in-facility delivery, and prevalence of cesarean section operations. We used live birth forecasts produced by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington for the 2023 Goalkeepers Report and conducted forecasts of other drivers as a function of IHME forecasts of the Socio-demographic Index (SDI). Cause-specific condition incidence and burden forecasts were calibrated at a regional level to IHME Global Burden of Disease (GBD) 2019 estimates for the year 2019 and then projected to 2040 based on live birth forecasts to forecast secular trends. Counterfactual scenarios were compared against this baseline to quantify the condition burden averted by

MMS. To estimate the change in maternal mortality ratio (MMR), neonatal mortality rate (NMR), and infant mortality rate (IMR), we aggregated the deaths averted by causes specific to each target population from the counterfactual scenario where MMS was introduced. To ensure consistency with Goalkeepers 2023 reference estimates of MMR, NMR, and IMR, we found the percentage of deaths averted in our models and applied that value to the Goalkeepers 2023 mortality estimates to quantify impact.

Data: We used published literature, available primary data sets, and IHME GBD 2019 estimates to assign values to the demographic, epidemiological, and health system parameters in our models. Models used region-specific data inputs where possible for three regional groupings: South Asia, sub-Saharan Africa, and other LMICs comprising countries in Latin America, North Africa/Middle East, and East/Southeast Asia/Oceania. We based MMS effect size assumptions on published literature and available primary data.

Acknowledgments

Explore the Data

IHME general methodology
Our primary data partner, IHME, produced estimates and forecasts for 13 of the Sustainable Development Goal (SDG) indicators included in the 2024 Goalkeepers Report. IHME worked together with many partners and used novel methods to generate a set of contemporary estimates, some as part of the Global Burden of Disease project. The indicator estimates presented may differ from other sources, particularly at the subnational level, due to differences in statistical models, data inputs, and assumptions used between modeling groups. The section below provides detail on how each indicator is estimated.

Indicators estimated by IHME
IHME produced estimates and forecasts for 13 of the SDG indicators included in the Goalkeepers Report. The section below provides details on how each indicator is estimated.

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. Estimates leveraged several methods and data processing improvements, including ensemble model predictions for severity-specific stunting prevalence and mean height-for-age z-scores, further disaggregation of under-5 age groups. This led to improved estimates broadly, with the most notable changes in the youngest age groups (under 6 months) and in a number of countries, including Democratic People's Republic of Korea, Ecuador, Japan, Libya, Mauritius, Puerto Rico, Togo, and Tonga. Forecasts of stunting prevalence were produced using the methods described above in the section on climate change and child malnutrition. Briefly, forecasts of stunting prevalence were driven by climate scenarios of days above 30 degrees Celsius, income, the Socio-demographic Index (SDI) and temporal trends. The better and worse scenarios were produced by taking the 85th and 15th percentile rates of change observed across location-years in the past and applying those rates of change to all locations in the future.

Maternal mortality ratio
The maternal mortality ratio (MMR) is defined as the number of maternal deaths among women ages 15–49 during a given time period per 100,000 live births during the same time period. It depicts the risk of maternal death relative to the number of live births to approximate the risk of death in pregnancy. Projections to 2030 were modeled using an ensemble approach to forecast MMR, using SDI as a key driver.

Differences in MMR estimates from the 2023 Goalkeepers Report are primarily driven by the addition of new input data. These include new location-years of sibling history data from household surveys, including surveys from several countries in sub-Saharan Africa. Data added since the last report cover additional pandemic years, primarily in locations with vital registration systems. Several location-years of Demographic and Health Surveys (DHS)

input data were also reprocessed with a correction to noise reduction methods, which generally resulted in decreases in input cause fractions across the time series. Estimates of all-cause mortality were also updated with new data, which impact maternal death counts and ultimately, MMR.

Data added since the last report cover additional pandemic years, primarily in locations with vital registration systems. These were sufficient country-years of data for 2020 and onward to capture pandemic-year trends, and no additional corrections to account for the COVID-19 pandemic were performed. This is in contrast to the 2023 Goalkeepers Report, where we modeled COVID-impact-free MMR through 2021 and separately modeled the excess in indirect maternal deaths during the pandemic years using data from 30 countries with pandemic-year vital registration already available.

Under-5 mortality rate
The under-5 mortality rate (U5MR) is the probability of death between birth and age 5. It is expressed as the number of deaths per 1,000 live births. Estimates used all available data from vital registration, sample registration, surveys, and censuses, which were modeled via spatiotemporal Gaussian process regression. Projections were based on a combination of key drivers, including Global Burden of Disease (GBD) risk factors, selected interventions (e.g., vaccines), and SDI. Most of the changes in U5MR estimates in the current Goalkeepers Report results came from new and additional input mortality data we have incorporated since the previous Goalkeepers Report. Methodological changes included using vital registration and survey

data directly for 2020 and 2021 and not adding in separately modeled estimates of excess mortality observed during the COVID-19 pandemic. This was due to increased availability of data during the pandemic period that showed no robust evidence of a strong or consistent raising or lowering of child mortality.

References:
GBD 2021 Demographics Collaborators. (2024). Global age-sex-specific mortality, life expectancy, and population estimates in 204 countries and territories and 811 subnational locations, 1950–2021, and the impact of the COVID-19 pandemic: A comprehensive demographic analysis for the Global Burden of Disease Study 2021. *The Lancet*, 403(10440), 1989–2056. https://doi.org/10.1016/S0140-6736(24)00476-8

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. Estimates used all available data from vital registration, sample registration, surveys, and censuses, which were modeled via spatiotemporal Gaussian process regression as the conditional probability of dying in the neonatal period given death in the under-5 period, then converted into neonatal mortality rates. Projections were based on a combination of key drivers, including GBD risk factors, selected interventions (e.g., vaccines), and SDI. Most of the changes in neonatal mortality estimates in this year's Goalkeepers Report are the result of new data and the methodological changes to the under-5 mortality rate estimates.

References:
GBD 2021 Demographics Collaborators. (2024). Global

age-sex-specific mortality, life expectancy, and population estimates in 204 countries and territories and 811 subnational locations, 1950–2021, and the impact of the COVID-19 pandemic: A comprehensive demographic analysis for the Global Burden of Disease Study 2021. *The Lancet*, 403(10440), 1989–2056. https://doi.org/10.1016/S0140-6736(24)00476-8

HIV
IHME estimates the HIV rate as new HIV infections per 1,000 population. Changes in Goalkeepers 2024 incidence were due to updates made during GBD23 estimation, which reflect substantial data updates from the following sources. PHIA: Five countries published their first ever reports for 2020–2023, and seven countries provided new microdata. Household Surveys: 13 countries provided new surveys. Case reports: 54 countries were updated, with recent years providing 546 additional country-years. UNAIDS: 145 countries provided refreshed time series in their Spectrum country files.

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. Although TB estimates for Goalkeepers 2024 are similar to those for Goalkeepers 2023 at the global level, they do differ slightly for select locations due to new input data used in estimates of risk exposures related to TB and used as covariates in the modeling process.

We also evaluated the impact of the COVID-19 pandemic on mortality and TB diagnoses in two recent publications. Due to data availability and varying results from these analyses, we did not implement a COVID-specific adjustment for GBD tuberculosis estimates but will continue to explore further options as more data become available.

Projections to 2030 were modeled using an ensemble approach to forecast the incidence of TB, using SDI as a key driver to capture the effects of the COVID-19 pandemic on income per capita and education.

References:
GBD 2021 Tuberculosis Collaborators. (2024). Global, regional, and national age-specific progress towards the 2020 milestones of the WHO End TB Strategy: A systematic analysis for the Global Burden of Disease Study 2021. *The Lancet Infectious Diseases*, 24(7), 698–725. https://doi.org/10.1016/S1473-3099(24)00007-0

Ledesma, J. R., Basting, A., Chu, H. T., Ma, J., Zhang, M., Vongpradith, A., Novotney, A., Dalos, J., Zheng, P., Murray, C. J. L., & Kyu, H. H. (2023). Global-, regional-, and national-level impacts of the COVID-19 pandemic on tuberculosis diagnoses, 2020–2021. *Microorganisms*, 11(9), 2191. https://doi.org/10.3390/microorganisms11092191

Malaria
IHME estimates the malaria rate as the number of new cases per 1,000 population. To estimate malaria incidence in 2020 and 2021, we took into account reports regarding pandemic-related disruptions to treatment-seeking. These reports were used to apply an adjustment to estimates of effective treatment with an antimalarial drug (AM), which were used as a covariate when modeling malaria prevalence and, subsequently, clinical incidence of P. falciparum infections in sub-Saharan Africa. Projections to 2030 were derived using an ensemble model. First, coverages of AM and insecticide treated bednets (ITNs) were forecast as a function of the Socio-demographic Index (SDI), which was itself predicted by projections of income per capita and education. For countries that had available data on both intervention coverages, malaria incidence was forecast through 2030 using an ensemble approach, which incorporated past trends and forecasts of AM and ITN coverage to produce the projections. For countries where there were no available data on AM and/or ITN coverages, an ensemble approach was used based upon past trends in incidence as well as projections of SDI, which incorporated the effects of the COVID-19 pandemic through income per capita and education.

Due to reporting lags, there were still relatively few data sets available to inform pandemic-related impacts on malaria incidence. The WHO PULSE surveys, which were used to adjust 2020 and 2021 incidence results, were only applied to 33 countries in Africa, and a comparable data set amenable with which to apply this methodology to other regions was lacking. Furthermore, although the PULSE surveys currently allowed us to make preliminary estimates of malaria pandemic-related impacts, the surveys were potentially biased because they were based only on individual assessments by public health officials of how the pandemic impacted care-seeking.

References:
World Health Organization. (2022). *Third round of the global pulse survey on continuity of essential health services during the COVID-19 pandemic: Interim report - November–December 2021.* https://www.who.int/publications/i/item/WHO-2019-nCoV-EHS_continuity-survey-2022.1

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 trematodiases, Guinea worm, soil-transmitted helminths (STH, comprising hookworm, trichuriasis, and ascariasis), leishmaniasis, leprosy, lymphatic filariasis, onchocerciasis, rabies, schistosomiasis, and trachoma. Based on an updated literature review and due to data gaps, lags in availability, and challenges in accounting for the likely disruptions to NTD surveillance during the pandemic, we did not estimate a COVID-19 effect on any NTD causes. Modeling studies and available data suggest that the COVID pandemic likely resulted in disruptions to NTD epidemiology, though these disruptions are likely to vary by disease and location and may be variably amenable to mitigation through increased control efforts (Hollingsworth et al., 2021). Although modeling studies can characterize potential disruptions under different scenarios, reliable data to quantify the true magnitude of pandemic effects on NTD epidemiology are sparse. Projections to 2030 used an ensemble model, driven both by trends in the past as well as projections of SDI, which incorporated disruptions from the COVID-19 pandemic on income per capita and education.

References:
Hollingsworth, T. D., Mwinzi, P., Vasconcelos, A., & de Vlas, S. J. (2021). Evaluating the potential impact of interruptions to neglected tropical disease programmes due to COVID-19. *Transactions of The Royal Society of Tropical Medicine and Hygiene*, 115(3), 201–204. https://doi.org/10.1093/trstmh/trab023

Chen, Y., Li, N., Lourenço, J., Wang, L., Cazelles, B., Dong, L., Li, B., Liu, Y., Jit, M., Bosse, N. I., Abbot, S., Velayudhan, R., Wilder-Smith, A., Tian, H., & Brady, O. J. (2022). Measuring the effects of COVID-19-related disruption on dengue transmission in southeast Asia and Latin America: A statistical modelling study. *The Lancet Infectious Diseases*, 22(5), 657–667. https://doi.org/10.1016/S1473-3099(22)00025-1

Family planning
Our analysis of Performance Monitoring for Action surveys and other pandemic era surveys and review of the literature did not demonstrate any consistent or significant reduction in contraception use due to the pandemic. As a result, we did not incorporate a separate pandemic effect into estimates of the met need indicator. Changes to the historical estimates can be attributed primarily to the addition of new data from 19 countries: Benin, Burkina Faso, Comoros, Côte d'Ivoire, Eswatini, Ethiopia, Gabon, Ghana, India, Kenya, Mozambique, Nepal, Niger, Philippines, Thailand, Trinidad and Tobago, Tunisia, Uganda, and the United Republic of Tanzania. We model met need via three underlying components of the indicator—any contraceptive use, proportion of use that is modern, and the proportion of non-use that is unmet need—separately for partnered and unpartnered women. This

modeling approach aligns with data restrictions such as surveying only partnered (married or in-union) women and allows us to construct the full range of family planning indicators.

References:
Performance Monitoring for Action. (2020). Data. https://www.pmadata.org/data

Bradley, Sarah E. K., Croft, T. N., Fishel, J. D., & Westoff, C. F. (2012). *Revising unmet need for family planning* [DHS Analytical Studies No. 25]. ICF International. https://dhsprogram.com/pubs/pdf/AS25/AS25%5b12June2012%5d.pdf

Universal health coverage
The universal health coverage (UHC) effective coverage index is a metric 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 and older). These indicators fall within several health service domains: promotion, prevention, and treatment.

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 scaled 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 noncommunicable diseases include scaled 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 noncommunicable diseases also include scaled mortality-to-prevalence ratios for stroke, chronic kidney disease, epilepsy, asthma, chronic obstructive pulmonary disease, diabetes, and the risk-standardized death rate due to ischemic heart disease. The effective coverage indicators are weighted in the index according to the potential health gain that each country could achieve if it were to improve coverage of that indicator.

To produce forecasts of the UHC index for 2022–2030, a meta-stochastic frontier 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 forecast to 2030 using a linear regression with exponential weights across time for each country level. These forecast inefficiencies, along with forecast total health spending per capita estimates, were substituted into the previously fit frontier to obtain forecast UHC for all countries for 2022–2030.

Effects due to the pandemic were included in our final results for the years 2020 and 2021 with some exceptions. Antiretroviral therapy coverage scores and met demand for family planning were not adjusted due

to limitations in data as described in previous sections. Adjustments for vaccine delivery are described in the vaccines section. For other indicators (19 out of 23), in the absence of data to inform the correspondence between reductions in utilization and reductions in coverage, we applied 25% of the reduction in monthly missed health care visits (excluding routine services). Details of the estimation of missed health care visits is described in last year's report. UHC was adjusted for countries with major conflicts, including Ukraine, Palestine, and Sudan using data from the Uppsala Conflict Data Program.

References:
Bill & Melinda Gates Foundation. (2022). *2022 Goalkeepers report: The future of progress.* https://dhsprogram.com/pubs/pdf/AS25/AS25%5b12June2012%5d.pdf

Smoking
IHME measures the age-standardized prevalence of any current use of smoked tobacco among those ages 15 and older. IHME collates information from available representative surveys that include questions about self-reported current use of tobacco and information on the type of tobacco product smoked (including cigarettes, cigars, pipes, hookahs, as well as local products). IHME converts all data to its standard definition of any current smoking within the last 30 days so that meaningful comparisons can be made across locations and over time. Projections to 2030 used SDI as a key driver, which incorporates projections of income per capita, education, and the effect 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 estimated the pandemic era (2020–2023) effects on vaccine coverage via administrative data coverage. To estimate disruptions in vaccine coverage during the COVID-19 pandemic, IHME used administrative vaccine coverage data collected through the 2024 Joint Reporting Form. First, we assembled a "shock-free" time series of administrative vaccine coverage data, omitting country-year-vaccine data points for which countries reported stockouts or for which other known service-delivery disruptions made sudden decreases in vaccine coverage plausible. In this step, we omitted all data points from 2020 to 2023 for all countries due to the COVID pandemic. Second, we fit spatiotemporal Gaussian process regression (ST-GPR) models to this shock-free administrative time series, producing estimates of expected administrative coverage in the absence of disruptions. Third, we compared the reported administrative coverage to these expectations to estimate the magnitude of disruption implied by the administrative data for each country, vaccine, and year. Last, we used these estimated disruptions in administrative coverage to generate as covariates in our final ST-GPR coverage models, which were fit to survey data and bias-adjusted administrative data. If administrative data were missing for 2020–2023, we imputed disruptions using vaccine- and year-specific distributions of observed disruptions in countries with available administrative data, propagating uncertainty

throughout this imputation process. Trends in 2023 country-reported data informed our decision to continue applying disruptions in this year. This approach allowed us to harness the magnitude of coverage disruptions implied by administrative data while still adjusting for bias in these data. To account for rapid expansions in coverage in MCV2 and PCV3 in years following country-specific introductions, models for these two vaccines included a first stage of hierarchical spline models, where country-specific expansions models were informed by global expansion patterns.

References:
World Health Organization. (2023). *The big catch-up: An essential immunization recovery plan for 2023 and beyond.* https://www.who.int/publications/i/item/9789240075511

Sanitation
IHME estimates the proportion of population with access to safely managed sanitation. As defined by the Joint Monitoring Programme (JMP), a safely managed facility must meet three criteria: it is not shared with multiple households, it is an improved sanitation facility, and its wastewater is disposed of safely (World Health Organization [WHO], 2021). Safe wastewater disposal can consist of being treated and disposed of in situ, stored temporarily and treated off-site, or transported through a sewer and treated (WHO, 2021). Safely managed treated wastewater must have received at least secondary treatment (WHO, 2021). 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); households without improved sanitation (flush toilet not piped to sewer or septic tank, pit latrine without a slab or open pit, bucket, hanging toilet or hanging latrine, no facilities); and wastewater treatment type for sewer-connected households, as defined by the JMP for Water Supply and Sanitation.

For the 2024 Goalkeepers Report, we developed models to estimate two components of safely managed sanitation: the proportion of sewer-connected facilities that are safely managed and the proportion of improved, non-sewer facilities that are safely managed. For both components we selected the final model from a collection of candidate models based on out-of-sample root-mean-squared error (RMSE) estimated by cross-validation. Candidate models varied in model type (MR-BRT Bayesian spline cascade models versus shape constrained additive models [SCAM]), and predictive covariates (SDI, lag distributed income per capita [LDI], and both linear and log transformations); and, for the Bayesian spline cascade models, we tested models that varied in the strength of the priors used in the spline cascade.

Data for estimating the proportion of sewer-connected facilities that are safely managed were extracted from Eurostat, Aquastat, Demographic and Health Surveys (DHS), UNICEF Multiple Indicator Cluster Surveys (MICS), the Organisation for Economic Co-operation and Development, and national surveys (Andorra, Austria, Ireland, Republic of Korea, and Singapore). The resulting estimates from this model were multiplied by the existing IHME estimates of the

proportion of the population with sewer-connected facilities to estimate the proportion of the population with safely managed sewer-connected facilities.

Data for estimating the proportion of improved, non-sewer facilities that are safely managed were extracted from Eurostat, DHS, MICS, and national surveys (Canada, Norway, and the United States). Crosswalks were performed to estimate toilet type and wastewater treatment where data were unknown within survey microdata. The resulting estimates from this model were multiplied by the IHME estimates of the proportion of the population with improved, non-sewer-connected facilities to estimate the proportion of the population with safely managed improved non-sewer facilities.

We estimated the proportion of the total population with safely managed sanitation as the sum of the proportion of the population with safely managed sewer-connected facilities and the proportion of the population with safely managed improved non-sewer facilities.

Updates this year include updating input data, and a change in model type for the improved, non-sewer facilities that are safely managed estimates. Data updates included re-extracting from updated databases, incorporating new sources, and outlier-ing data that overlapped across databases. The improved, non-sewer facilities that are safely managed model changed from a SCAM model in 2023 to a MR-BRT Bayesian spline cascade model, based on the RMSE results of cross-validation.

References:
World Health Organization & UNICEF Joint Monitoring Programme. (2021). *SDG indicator metadata.* https://washdata.org/sites/default/files/2022-01/jmp-2021-metadata-sdg-621a.pdf

IHME indicator sources
Data source information for each indicator is below. A detailed reporting of data sourcing for GBD 2021 estimates can be found at https://ghdx.healthdata.org/gbd-2021/sources

Indicator and Component	Goalkeepers 2024 Total Sources
Child mortality	26,745
Child stunting	1,695
Family planning (met need)	1,197
Malaria	13,611
Maternal mortality	8,006
Neonatal mortality	26,745
HIV	5,115
NTD chagas	1,085
NTD visceral leishmaniasis	4,590
NTD cutaneous and mucocutaneous leishmaniasis	662

Indicator and Component	Goalkeepers 2024 Total Sources
NTD African trypanosomiasis	2,970
NTD schistosomiasis	3,398
NTD cysticerocosis	3,548
NTD cystic echinococcosis	3,397
NTD lymphatic filariasis	487
NTD onchocerciasis	351
NTD trachoma	114
NTD dengue	3,568
NTD rabies	4,059
NTD ascariasis	3,550
NTD trichuriasis	205
NTD hookworm disease	208
NTD food-borne trematodiases	57
NTD leprosy	1,595
NTD guinea worm disease	450
Sanitation safely managed	1,244

Smoking prevalence	4,172
Tuberculosis	4,582
UHC maternal disorders	8,336
UHC met need	1,197
UHC live births	47,665
UHC neonatal mortality	20,634
UHC diphtheria	3,821
UHC pertussis	9,291
UHC tetanus	4,075
UHC DTP vaccination	10,165
UHC measles	12,351
UHC measles vaccination	3,024
UHC LRI	4,407
UHC diarrhea	6,137
UHC HIV treatment	5,155
UHC TB	4,059
UHC lymphoid leukemia	7,624

UHC asthma	2,804
UHC diabetes	4,005
UHC IHD treatment	3,991
UHC stroke	4,017
UHC chronic kidney disease	4,397
UHC chronic obstructive pulmonary disease	2,820
UHC cervical cancer	7,627
UHC breast cancer	7,812
UHC uterine cancer	7,635
UHC colon and rectum cancer	7,800
UHC epilepsy	3,798
UHC appendicitis	3,871
UHC paralytic ileus and intestinal obstruction treatment	3,737
Vaccine coverage DTP3	9,772
Vaccine coverage MCV2	3,158
Vaccine coverage PCV3	2,013

Indicator Estimates from Other Sources

Poverty

World Bank. *Poverty headcount ratio at $2.15 a day (2017 PPP)* (% of population) [Data set]. Retrieved July 2023 from https://data.worldbank.org/indicator/SI.POV.DDAY

For methodology, see:
World Bank. (2024). *Poverty and inequality platform methodology handbook.* https://datanalytics.worldbank.org/PIP-Methodology/

Agriculture

Food and Agriculture Organization of the United Nations. (2024). *Average annual income from agriculture, PPP (constant 2011 international USD)* [Data set]. Retrieved June 2024 from https://dataexplorer.fao.org

Small food producers' income growth for selected countries with at least two entries in the data set are included. For all countries without data for 2014 and 2019, the earliest and most recent years were used to calculate income growth. Small food producers' income growth is calculated per country using years listed below:

Location	Year Range
Burkina Faso	2014–2019
Côte d'Ivoire	2008–2019
Ethiopia	2014–2019
Ghana	2013–2017
India	2005–2012
Malawi	2011–2020
Mali	2014–2019
Mongolia	2014–2019
Niger	2011–2019
Nigeria	2013–2019
Senegal	2011–2021
Sierra Leone	2011–2018
Tanzania	2009–2019
Uganda	2010–2020

Education

World Bank, UNESCO Institutes for Statistics, UNICEF, USAID, Bill & Melinda Gates Foundation, & Foreign, Commonwealth, and Development Office. (2022). *The state of global learning poverty: 2022 Update* [Conference edition]. https://www.unicef.org/media/122921/file/StateofLearningPoverty2022.pdf

Source for Learning Poverty 2022 simulations:
Azevedo, J. P., Demombynes, G., & Wong, Y. N. (2023). Why has the pandemic not sparked more concern for learning losses in Latin America? The perils of an invisible crisis. *Education for Global Development.* https://blogs.worldbank.org/en/education/why-hasnt-pandemic-sparked-more-concern-learning-losses-latin-america-perils-invisible

Gender equality

The Equal Measures 2030 (EM2030) SDG Gender Index is the most comprehensive global tool to measure progress toward gender equality aligned to the Sustainable Development Goals (SDGs). The index tracks 56 key gender indicators that provide the "big picture" across and within 14 of the 17 SDGs.

It is the only index that adds a gender lens to each of the goals, including the many SDGs that lack such a lens in the official framework. Going beyond SDG 5 (the single goal dedicated to gender equality) is important in capturing the broader trends that influence progress on gender equality and highlighting how issues such as hunger, poverty, and climate change affect girls and women.

The 2024 index covers 139 countries, which represent 96% of the world's women and girls.
The index tracks scores for three reference years: 2015, 2019, and 2022 and forecasts a scenario for 2030 based on current trends.

This is the third edition of the SDG Gender Index—it was previously released in 2019 and 2022. It is one of the few global gender indices to be formally audited by the Competence Centre on Composite Indicators and Scoreboards (JRC-COIN) at the European Union's Joint Research Centre.

The index was developed by a coalition of national, regional, and global leaders from feminist networks, civil society, and international development.

Resources:
To download 2024 index data and the latest index report and for more information about index methodology, see: https://equalmeasures2030.org/2024-sdg-gender-index

To access interactive index data visualizations, see: https://equalmeasures2030.org/2024-sdg-gender-index/explore-the-data/

To view the technical audit conducted by the COIN center of the EU's Joint Research Centre, see https://equalmeasures2030.org/2024-sdg-gender-index/about-the-index/

Equal Measures 2030. (2024). *A gender equal future in crisis? Findings from the 2024 SDG Gender Index.* https://equalmeasures2030.org/2024-sdg-gender-index

Inclusive financial systems
The "Income" comparison refers to what the World Bank calculates as account ownership of the richest 60% of households versus the poorest 40% of households.

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19.* World Bank. https://openknowledge.worldbank.org/handle/10986/37578

World Bank. (2022). *Account ownership at a financial institution or with a mobile-money-service provider (% of population ages 15+)* [Data set]. Global Findex Database. Retrieved June 2023 from https://data.worldbank.org/indicator/FX.OWN.TOTL.ZS

For methodology, see:
World Bank. (2022). Survey methodology. In *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19* (pp. 181–197). https://thedocs.worldbank.org/en/doc/f3ee545aac6879c27f8acb61abc4b6f8-0050062022/original/Findex-2021-Methodology.pdf