

The Global Threat of Antibiotic Resistance

Health experts, gathering at the U.N., have begun to shift their focus to try to provide access to basic drugs in countries where preventable deaths from infections occur too frequently.



Mycobacterium tuberculosis, a type of bacteria that causes tuberculosis, has become increasingly resistant to antibiotics. Credit...James Cavallini/BSIP/Universal Images Group, via Getty Images

An impoverished family in Africa is unable to afford a 50-cent course of antibiotics to save the life of a child with a simple bacterial infection. Is such a tragedy best described as a case of antimicrobial resistance, the slow-motion health emergency caused by the misuse of lifesaving antibiotics?

For more than a decade, [antimicrobial resistance](#) has been framed as a problem of excess. The willy-nilly consumption of antibiotics, scientists said, has rendered the drugs less effective, leading to the unnecessary death of millions, many of them poor.

But as global health officials gathered at the United Nations on Thursday to discuss the challenges posed by antimicrobial resistance, many have been promoting a more expansive understanding of the problem. It's one based on preventing treatable infections through improved sanitation, higher vaccination rates and increased access to anti-infective drugs in lower-income countries.

“Millions of people around the world have never even taken an antibiotic because they can’t afford them,” said Dr. Ramanan Laxminarayan, an economist and epidemiologist who has been promoting this new approach to antimicrobial resistance, much of it detailed in a [recent series](#) of journal articles in The Lancet. “We’re trying to move away from the issue of resistance, which is hard for the public to

understand, and more to entitlement, which is that everyone should have access to an effective antibiotic.”

Threading that needle — promoting greater access to antibiotics in some places while seeking to limit their use in others — won’t be easy.

In the eight years since the U.N. held its first high-level meeting on antimicrobial resistance, the world has become increasingly familiar with the threats posed by untreatable infections.

Drug-resistant pathogens kill almost 1.3 million people around the world each year and contribute to the deaths of nearly five million others, according to the U.N. A more recent estimate [published in The Lancet](#) suggests that more than 39 million people will die from antibiotic-resistant infections between now and 2050.

Without meaningful action, the effects of this death toll on the global economy could be staggering. [A report](#) published on Wednesday by the Center for Global Development estimated that drug-resistant infections could lead to a \$1.7 trillion reduction in economic output by 2050, much of it driven by lost productivity or the early deaths of family breadwinners.

“Antimicrobial resistance could unwind 100 years of medical progress, making infections that are easily treatable today a death sentence,” Tedros Adhanom Ghebreyesus, the World Health Organization director general, said at a news conference on Thursday to kick off the [daylong meeting](#). “No country is immune to this threat, but low- and middle-income countries bear the greatest burden.”

In many ways, antimicrobial resistance, or A.M.R., is unavoidable. Over time, pathogens can evolve to outsmart the drugs designed to kill them. Excessive use of antimicrobials, however, accelerates the process.

“A.M.R. is fascinating because it’s evolution in action,” said Peter Sogaard Jorgensen, a senior researcher at the Stockholm Resilience Center in Sweden and author of a [new study](#) that details the importance of government action to combat the problem. “But the selection pressures from antibiotics is causing an evolution that has devastating consequences for humanity.”

At the same time, the pipeline for new drugs has largely dried up, the result of a broken marketplace for antimicrobials that has [driven the world’s biggest pharmaceutical companies](#) from the field.

There have been notable achievements since the [first high-level meeting](#) on antimicrobial resistance was held in 2016. Nearly 90 percent of all countries have made plans to combat A.M.R. — the main call to action of that inaugural session. And half a dozen organizations in the United States and Europe, some lavishly funded, have sprung up to address the problem. Antibiotic stewardship, the practice of ensuring that antibiotics are used appropriately, has become a familiar mantra in hospitals around the world, even if it’s sometimes ignored.

Powerful new medical devices, which can quickly identify pathogens and then recommend the appropriate antibiotic, promise to transform prescribing habits — at least at medical institutions that can afford them. Artificial intelligence, many hope, will one day provide poorer nations an affordable way to quickly diagnose and treat infections with greater precision.

But many of the underlying issues that fuel antimicrobial resistance remain unchanged. The excessive use of antibiotics in livestock and on fish farms continues to rise, especially in the developing world, and many doctors haphazardly dispense antibiotics to patients. In the United States, nearly [a third of all antibiotic prescriptions](#) are unnecessary, according to the Centers for Disease Control and Prevention.

And although a majority of the world's nations have created antimicrobial resistance action plans, fewer than a third of them have received government funding to turn those plans into action.

“The challenge is getting world leaders to understand that this is an investment with great returns,” said Dr. Jean Pierre Nyemazi, who leads a W.H.O. effort on antimicrobial resistance that includes the U.N. agencies focused on agriculture, animal health and the environment.

This year's meeting reflects the evolving approach to fighting antimicrobial resistance, one that acknowledges the complexity of the problem — and the undue burden faced by the world's poor. An earlier emphasis on new drug development and better stewardship of existing medications has given way to a recognition that new antimicrobials are simply too expensive for much of humanity.

Dr. Laxminarayan, the lead author of [the Lancet series](#) that was published in May, said infections tied to a lack of basic sanitation killed far more people than antibiotic-resistant infections. The study attributed roughly 6.5 million deaths each year to infections treatable with inexpensive antibiotics.

Many of the newest antibiotics [are not even available](#) for sale in low- and middle-income countries. “Stewardship is important but it needs to be strongly balanced against access,” said Dr. Laxminarayan, the founder and president of One Health Trust, a nonprofit that emphasizes the interconnection between drug resistance and environmental and animal health.

Still, the lack of new medications remains a primary focus of policymakers in Europe and the United States, where the shrinking arsenal of effective antibiotics and the emergence of so-called superbugs have captured public attention.

The dearth of new drugs is directly tied to the perverse economics of discovering and marketing a new antibiotic or antifungal medication, a yearslong process that can cost more than \$1 billion when factoring in the research failures along the way.

But making money from new antimicrobials isn't easy. Unlike medications for diabetes, rheumatoid arthritis and other chronic conditions that can earn pharmaceutical companies huge profits, antibiotics are taken only for days or weeks. And the newest, most effective antimicrobials are often sparingly prescribed for fear they, too, will lose their curative punch. When they are priced too high, as is often the case, hospitals leave them on the shelf.

“The market for antibiotics is broken,” said Takuko Sawada, the board chair of Shionogi, a century-old Japanese pharmaceutical company once famed for its groundbreaking antibiotics.

But over the past three decades, she said, the drugmaker has shifted its focus to the more lucrative realm of antiviral medications, most notably H.I.V., influenza and Covid-19. “Young researchers don't want to come into the field of antibiotic research so we don't have as much innovation,” she said. “That is bad for the whole world.”

A recent partnership between Shionogi and a nonprofit organization, the [Global Antibiotic Research & Development Partnership](#), or GARDP, seeks to alter the punishing financial calculus of discovering and selling new antimicrobials by underwriting some of those costs.

When Shionogi could not find any partners willing to manufacture and distribute its newest antibiotic in much of the world, the company approached GARDP, which joined forces with the Clinton Health Access Initiative to manufacture and commercialize the drug in 135 countries through a licensing arrangement.

Cefiderocol, which received approval from the Food and Drug Administration in 2019 after 30 years of research, is highly effective at treating complicated urinary tract infections, hospital-acquired

pneumonia and other tough-to-treat bacterial infections.

Dr. Manica Balasegaram, GARDP's executive director, described the agreement with Shionogi as the first of its kind and "very complex." But, he said, many tools for addressing antimicrobial resistance were already available.

"I see A.M.R. as a low-hanging opportunity to really demonstrate tangible action between countries, and between the public and private sector, using solutions we've already been discussing for a long time," he said. "I'm just sick of seeing policy reports. Frankly, what we need is more action."

The question is whether world leaders, and the wider public, will be galvanized by a threat that is often invisible and difficult to understand. The problem can also seem less urgent compared with armed conflict, rising sea levels and nuclear proliferation — all other issues high on the agenda at the U.N. General Assembly this week.

Despite the slow progress, many public health advocates are optimistic. They compare the challenges posed by antimicrobial resistance with climate change, another tough-to-comprehend global threat that has drawn increased international attention in recent years.

Ara Darzi, a member of the House of Lords and a cancer surgeon who is the executive chair of [the Fleming Initiative](#), a new nonprofit in Britain that promotes wider access to antibiotics and diagnostic tools, said he was hopeful that antimicrobial resistance, despite its tangled complexity, would one day become more widely understood and seen for the crisis it was.

"We need new science, but we also have to find a way to engage people the way climate change did," he said. "Because at the end of the day, science alone will not get us out of this crisis. We have to change human behavior."