

Over 750,000 antimicrobial resistance deaths preventable yearly via vaccines, water, sanitation and infection control

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Speaking at the [World Health Assembly](#), authors of a new *Lancet* Series call for urgent global action on antimicrobial resistance (AMR).

Authors say if the world does not prioritize action on AMR now, we will see a steady increase in the global death toll—currently 4.95 million per year from infections linked to AMR—with young infants, [elderly people](#), and people with chronic illnesses or requiring surgical procedures at the highest risk.

Improving and expanding existing methods to prevent infections, such as hand hygiene, regular cleaning and sterilization of equipment in health care facilities, availability of safe drinking water, effective sanitation and use of pediatric vaccines, could prevent over 750,000 deaths associated with AMR every year in low- or middle-income countries (LMICs), estimates a new modeling analysis as part of a new four paper Series published in *The Lancet*.

Each year, an estimated 7.7 million deaths globally are caused by bacterial infections—1 in 8 of all global deaths, making bacterial infections the second largest cause of death globally. Out of these bacterial infection deaths, almost 5 million are associated with bacteria that have developed resistance to antibiotics. Authors of the new *Lancet* Series on [antimicrobial resistance](#) call for support for sustainable access to antibiotics to be central to ambitious and actionable targets on tackling AMR introduced at the High-Level Meeting of the United Nations General Assembly in September 2024.

AMR puts the most vulnerable at further risk

Series co-author, Professor Iruka Okeke of the University of Ibadan, Nigeria, says, "Access to [effective antibiotics](#) is essential to patients

worldwide. A failure to provide these antibiotics puts us at risk for not meeting the UN [sustainable development goals](#) on child survival and healthy aging. Effective antibiotics prolong lives, reduce disabilities, limit health care costs and enable other life-saving medical actions such as surgery. However, antimicrobial resistance is on the rise—accelerated by inappropriate use of antibiotics during the COVID-19 pandemic—threatening the backbone of modern medicine and already leading to deaths and disease which would have once been prevented."

A [recent study](#) in *The Lancet* estimated that 7.7 million deaths were caused by non-tuberculosis bacterial infections in 2019, of which almost 5 million were associated with bacterial AMR and 1.3 million directly caused by bacterial pathogens resistant to the antibiotics available to treat them.

The new Series highlights how babies, children, the elderly and people with chronic illness are most vulnerable to AMR as they have a higher risk of contracting bacterial infections in general.

AMR is a huge threat to newborn survival around the world. A third of deaths in newborn babies globally are caused by infections and half of those to sepsis (a potentially lethal system-wide response to infection). Increasingly, the bacteria or fungi which cause these infections are no longer responding to most readily available antibiotics, for example, in a study including 11 countries across Africa, Asia, Europe, and Latin America between 2018-2020, 18% of babies with sepsis did not survive despite being given antibiotics.

Elderly and chronically ill people also face significant risk from AMR, especially when seeking treatment for medical conditions in hospitals and long-term care facilities. AMR undermines the safety of common medical procedures such as organ transplants, joint replacements, cancer chemotherapy, and treatment of Non-Communicable Diseases such as

cardiovascular disease, diabetes and chronic lung illnesses.

"As an infectious disease clinical pharmacist, I was already acutely aware of the huge problem the world is facing with AMR. However, the issue of AMR suddenly became personal when my mother developed an infection from a drug-resistant bacteria in her kidneys and urinary tract after receiving surgery in hospital. In Lebanon, as in many countries, our health system is ill prepared to protect patients against AMR—there are gaps in effective infection control and sanitation practices, significant medication shortages, and antimicrobials, if available, are often prescribed for inappropriate uses.

"My mother is only one example of the millions of patients globally who develop an antimicrobial resistant infection while in hospital each year," says one of the authors on a linked Comment to the Series, Nour Shamas, clinical pharmacist and member of The WHO Task Force of AMR Survivors.

She continues, "Although people who are very young, elderly, living in dire conditions, or are regular hospital patients are at a higher risk of contracting a resistant infection, AMR can impact anyone. It is up to all of us—policymakers, health care professionals, patients and wider society—to call for urgent global prioritization for reducing the spread of infectious diseases and development of resistance, increasing research in understudied issues such as women's health, and ensuring access to antimicrobials and that they are used judiciously."

Existing infection prevention methods can prevent AMR-associated deaths

According to co-author Professor Joseph Lewnard of the University of California in Berkeley, "Focusing on interventions with demonstrated

effectiveness in preventing infections must be at the heart of global action to tackle AMR. Preventing infections reduces the use of antibiotics and reduces selection pressure for AMR so that the drugs will work when they are most needed."

Novel modeling analysis undertaken for the Series estimates existing infection prevention methods could prevent 750,000 deaths associated with AMR infections a year. The analysis estimates:

- Improving infection prevention and control in [health care facilities](#), including better hand hygiene and more regular cleaning and sterilization of equipment, could save up to 337,000 lives a year.
- Universal access to safe drinking water and effective sanitation in community settings could prevent approximately 247,800 deaths annually.
- Expanding the roll out of some pediatric vaccines, such as pneumococcal vaccines which help protect against pneumonia and meningitis, and introducing new ones, such as RSV vaccines for pregnant mothers, could save 181,500 lives a year.

Co-author Yewande Alimi of Africa CDC, says, "Our findings highlight how public health actions to prevent infections in the first place should be prioritized as a strategy to tackle AMR as these methods have the potential to drastically reduce the number of deaths from AMR-associated infections. If we can focus on improving [infection](#) control methods, water and sanitation and vaccination in LMICs then it should be possible to reduce the number of deaths linked with AMR by 10% by 2030."

The Series also looks at the evidence for preventing resistance emerging in bacteria, alongside preventing infections in the first place.

Antibiotic stewardship (reducing the use of antibiotics when the benefit to patients is limited) is thought to reduce the selection pressure on bacteria to develop resistance. However, there is a lack of research in this area.

Co-author Dr. Esmita Charani of the University of Cape Town says, "The current limited evidence on the impact of antibiotic stewardship on AMR from low- and [middle-income countries](#) does not mean it is not a key intervention that needs focus, but rather makes it difficult to anticipate the effects of antibiotic stewardship in those countries. We urgently need studies to investigate the impact to help inform future policies and interventions fit for different contexts."

A rethinking of antibiotic development investment is needed

Co-author Dr. Ursula Theuretzbacher of the Center for Anti-Infective Agents in Vienna, Austria, says, "We need to see a complete rethink in how we approach discovery and development of new antibiotics with a focus on innovation, affordability, and sustainable availability."

The increasing number of bacterial infections that are no longer responding to any available antibiotics indicate an urgent need to invest in—and ensure global access to—new antibiotics, vaccines, and diagnostic tests.

The traditional model of drug development, which depends on the likelihood of high profits to motivate investment, is not working for antibiotics. Most new antibiotics are not registered in LMICs, but even if registered, they would likely be unaffordable.

The authors say new, publicly funded models of antibiotic development

based on public-private partnerships could increase the amount of novel alternatives, as well as lower patients' out-of-pocket cost, making them more accessible.

They also call for greater funding for AMR prevention programs in general, as funding for AMR significantly lags behind that for diseases with smaller burdens such as HIV, malaria, and TB.

Co-author Professor Ramanan Laxminarayan, President of the One Health Trust and Senior Research Scholar at Princeton University, says, "Reducing the impact of AMR through pharmaceuticals is not simply a matter of developing new antibiotics. Unless access and affordability are guaranteed, the vast number of deaths from resistant bacterial infections will continue unabated. Reducing the cost of drug development would help keep antibiotics affordable, as shown by the public-private partnerships for medications to treat malaria and neglected tropical diseases. It's time for similar tactics in antibiotic development."

AMR targets for 2030 must address the need for sustainable access to effective antibiotics

AMR will be addressed for the second time during a High-Level Meeting as part of the upcoming United Nations General Assembly in September 2024.

The Series proposes ambitious yet achievable global targets for 2030, which the authors argue should be adopted at the meeting within a framework of universal access to antibiotics, the "10-20-30 by 2030" goals:

- A 10% reduction in mortality from AMR by scaling up public health interventions to prevent infections in the first place,

reducing both antibiotic use and resistance and enabling great access.

- A 20% reduction in inappropriate human antibiotic use by reducing use of antibiotics for mild respiratory infections that generally do not require antibiotics.
- A 30% reduction in inappropriate animal antibiotic use to be achieved by incremental actions in many sectors. Policy examples could include:
 - no use of medically important antimicrobials for growth promotion in animals
 - no use of highest-priority, critically important antimicrobials for preventative treatment in animals
 - all antibiotics to be given under the guidance of a veterinary professional.

The Series also calls for the establishment of an independent scientific body—an Independent Panel on Antimicrobial Access and Resistance—to expand the evidence base for policy implementation and to inform new targets.

"The window of opportunity to ensure our ability to treat bacterial infections is shrinking. For too long, the problem of AMR has been seen as either not urgent or too difficult to solve. Neither is true. We need immediate action and the tools to do so are widely available. We hope that this September, the United Nations High-Level Meeting will ensure that there is also the global will to act," says Professor Ramanan Laxminarayan.

A *Lancet* Editorial publishing alongside the Series says, "AMR is complex. Many pathogens need to be targeted. It thrives in poverty. It connects human, animal and environmental health. The political declaration that emanates from the second high-level meeting on AMR will be judged on how its recommendations are implemented, not the

words on the page. This *Lancet* Series gives clear, evidence-based guidance on how to reach achievable targets that will save lives, mitigate AMR, and enhance food security. Key will be resolving the differing needs and priorities of high-income, middle-income, and low-income countries."

More information: The Lancet Series on antimicrobial resistance, *The Lancet* (2024). www.thelancet.com/series/antibiotic-resistance

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