

# Pandemic of antibiotic resistance is killing children in Bangladesh

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Resistance to antibiotics is common and often deadly among children with pneumonia in Bangladesh, according to a new study coauthored by researchers from Massachusetts General Hospital (MGH) with

colleagues at the International Centre for Diarrhoeal Disease Research, Bangladesh (abbreviated as icddr,b). This study, which appears in the journal *Open Forum Infectious Diseases*, offers an early warning that a pandemic of potentially deadly antibiotic resistance is under way and could spread around the globe.

The study was led by Mohammad Jobayer Chisti, MD, Ph.D., a senior scientist in icddr,b's Nutrition and Clinical Services Division. Chisti was inspired to conduct the research when he observed that the hospital affiliated with icddr,b was admitting more and more young children with [pneumonia](#) who were highly resistant to treatment with standard antibiotics. "At our hospital, dozens of kids died of pneumonia between 2014 and 2017, despite receiving the World Health Organization's recommended antibiotics and enhanced respiratory support," says Chisti.

Pneumonia is an infection of the lungs that causes fluid and pus to fill air sacs, producing cough, fever, trouble breathing, and other symptoms. Without effective treatment, the infection can be fatal; pneumonia is the most common cause of death in young children, according to the World Health Organization. In small children, pneumonia can be caused by viruses, but certain types of bacteria are common sources of infection, too. In the United States and other high-income countries, Staphylococcus ("staph"), Streptococcus ("strep"), and Haemophilus influenzae are the most common bacterial causes of pneumonia, which usually respond well to [antibiotic therapy](#). Vaccines for the latter two have saved countless lives worldwide.

However, when Chisti and his colleagues examined health records of more than 4,000 children under age five with pneumonia admitted to their hospital between 2014 and 2017, they found that a very different pattern of bacterial infections was occurring. The usual staph and strep infections that commonly cause pneumonia in the United States and elsewhere were relatively rare. Among the children who had a positive

culture, [gram-negative bacteria](#) were responsible for 77 percent of the infections, including Pseudomonas, E. coli, Salmonella and Klebsiella.

"That's totally different than what I'm used to in my practice in Boston," says Jason Harris, MD, MPH, co-first author of the study and chief of the division of Pediatric Global Health at the Massachusetts General Hospital for Children. Unfortunately, he adds, "the gram-negative bacteria we saw in these kids are notorious for being antibiotic resistant." To wit: Some 40 percent of the gram-negative bacterial infections in this study resisted treatment with first- and second-line antibiotics that are routinely used to treat pneumonia. More alarming, children who had antibiotic-resistant bacterial infections were 17 times more likely than others without bacterial infections to die.

Harris believes that these results are clear evidence that longstanding concerns that antibiotic resistance will become a deadly menace are no longer theoretical—the problem has taken root. "These kids are already dying early because of antibiotic-resistant bacteria, from what would be a routine [infection](#) in other parts of the world," says Harris. "And this was at one hospital in Bangladesh. Extrapolate these findings across a country of 163 million people, and then to a larger region where antibiotic resistance is emerging, and the overall numbers are probably huge."

There is an urgent need to address factors that are promoting antibiotic resistance in Bangladesh, says Tahmeed Ahmed, Ph.D., executive director of icddr,b and senior author of the study. For starters, antibiotics can be purchased without a prescription in the country and many people use them to self-treat conditions such as dysentery, cold, cough and fever. Misuse of antibiotics promotes the spread of bacteria that resist the medications. "We may be able to reduce this emerging bacterial resistance by improving antibiotic stewardship, particularly in the outpatient setting," says Ahmed. Lab testing for diagnosis of bacterial

infections is also inadequate in the country. "What's more, lack of access to clean water and adequate sanitation helps spread bacteria that are resistant to antibiotics," adds Ahmed. Improvements in health care infrastructure and policy changes to rein in the misuse of [antibiotics](#) are essential, he argues, though Ahmed notes that Bangladesh's health care system also needs better access to more advanced antibiotic therapies for resistant infections.

If these and other steps aren't taken now, it's only a matter of time before the problem of widespread deadly antibiotic resistance spreads around the world, notes Harris. "We know that acquisition of antibiotic resistance is very common in travelers, and that when highly resistant bacteria crop up in one part of the world, they ultimately crop up everywhere," he says, comparing the problem to another current global health care crisis. "If COVID-19 was a tsunami, then emerging antibiotic resistance is like a rising flood water. And it's kids in Bangladesh who are already going under."

**More information:** Mohammad Jobayer Chisti et al, Antibiotic-Resistant Bacteremia in Young Children Hospitalized With Pneumonia in Bangladesh Is Associated With a High Mortality Rate, *Open Forum Infectious Diseases* (2021). [DOI: 10.1093/ofid/ofab260](https://doi.org/10.1093/ofid/ofab260)

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