Antimicrobial resistance crisis a major threat to human health

Frank Gaglioti
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A stark warning of the impact of antimicrobial resistance (AMR) or so-called superbugs was issued in January by Sally Davies, who was Britain's chief medical officer from 2010 to 2019. She told the *Guardian*: "About a million people die every year because of the spread of microbial resistance, and that figure will rise over the next 25 years. It is really scary."

Davies has long advocated for measures to resolve what has become a major health crisis and, in 2013, wrote a book titled *The Drugs Don't Work: A Global Threat*. In 2022 the issue became very personal when her 38-year-old god daughter Emily Hoyle, who suffered from cystic fibrosis and was severely immune compromised, died after acquiring a drug-resistant lung infection.

"I've started calling it [AMR] the Grand Pandemic.… It's the third most important underlying cause of death in the world," she told *The Naked Scientists*.

The death toll Davies calculates, while shocking, may be a significant underestimation. An editorial published in the prestigious British medical journal, the *Lancet,* last May, "Antimicrobial resistance: an agenda for all," cited a study from 2022 that "almost 5 million deaths per year are associated with drug-resistant bacteria, with a higher burden among low-income and middle-income countries."

The *Lancet* also published an important assessment of the developing AMR crisis in September 2024 entitled "Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050."

"Our forecasts show that an estimated 1·91 million (1·56–2·26) deaths attributable to AMR and 8·22 million (6·85–9·65) deaths associated with AMR could occur globally in 2050," the researchers stated. When compared to their estimate for 2021 of 1.14 million deaths, their forecast represents a 67.5 percent increase in annual deaths in the next 25 years directly attributed to bacterial AMR.

The study also predicted: "Super-regions with the highest all-age AMR mortality rate in 2050 are forecast to be south Asia and Latin America and the Caribbean."

The emergence of antibiotic-resistant strains threatens to set back the world 100 years to the age when even a minor infection from a cut or an infection acquired during childbirth could result in a life-threatening condition.

This only changed with the development of the first antibiotic, penicillin, in 1928 by Alexander Fleming in London. Penicillin only became widely used during World War II when mass production was developed in the 1940s in the US by Howard Florey and Ernst Chain to treat wounded soldiers. This was the start of the "antibiotic era."

It is difficult to imagine today the impact of infection not only on individuals but on whole populations. Infectious diseases such as syphilis, scarlet fever, pneumonia, rheumatic fever, bacterial meningitis and diphtheria ravaged societies. Infections acquired during surgery were eliminated enabling the development of more complex surgical procedures.

Antibiotics virtually eliminated puerperal (childbed) fever, caused by *Streptococcus pyogenes* which was a major cause of maternal death. Penicillin greatly reduced the risk of infection during more complicated birth procedures such as C-sections. Infectious diseases had vast social and political implications. The rise of superbugs threatens the return of these diseases.

Antibiotic resistance develops as a natural consequence of the use of antibiotic drugs. The use of a particular drug eliminates organisms susceptible to that antibiotic, allowing any survivors to develop into a resistant strain. Over time, particularly with widespread overuse of antibiotics, strains emerge resistant to an ever-wider range of drugs.

Today a handful of antibiotics are reserved to attempt to deal with the most-deadly resistant bacteria. This includes Carbapenems used to treat multi-drug resistant *Klebsiella pneumoniae* usually found in urine and *Pseudomonas aeruginosa* that commonly exists in the environment, in water, plants and soil, causing pneumonia and infecting the urinary tract, blood and wounds. Along with several other antibiotics of last resort, they have to be used very judiciously as they can also have severe side effects.

The discovery of antibiotics was a great scientific and medical discovery, but under capitalism such breakthroughs are perverted and distorted in the interests of profit. In her *Guardian* interview, Davies points to some of these issues.

She especially highlights the massive overuse of antibiotics in agriculture where 70 percent of all antibiotics are used on livestock—a huge arena for the evolution of antibiotic-resistant bacteria. While some antibiotics are reserved for the exclusive use of the agriculture industry many human antibiotics are used as well. The drugs are not used to treat sick animals but to prevent infection in order to enable agribusinesses to keep animals in cramped and unsanitary conditions, and thus boost profits.

Davies explained that the overuse of antibiotics enables

superbugs to become established in the environment: “If you’ve got intensive farming where a lot of antibiotics are used or a busy hospital that has a poor sewage system, resistant bacteria can get into waterways. Winds blow over these patches of contaminated land or water and pick up bacteria and genes with resistance in them, then let them rain down in other places. That is how pernicious this problem has become.”

A paper by Zahra Ardakani and her team at the University of Bologna in Italy titled “Evaluating the contribution of antimicrobial use in farmed animals to global antimicrobial resistance in humans” was published in *One Health* in December 2023. It found that the nonresponse to antibiotics frequently used in animal farming is also high in human patients. At the same time, it is low for the antibiotics rarely used on animals.

The researchers explained: “For example, *E. coli* resistance to Aminopenicillins is found at 73.3 percent (extremely high), while *E. coli* resistance to Glycylcyclines, banned in animal farming, is 0.78 percent (very low resistance). For *S. aureus*, resistance to Macrolides represents 56.0 percent, considered very high, while resistance to Vancomycin, a more recent antibiotic banned in animal farming, is very low (0.22 percent).”

“This evidence shows the importance of avoiding the use of critical antibiotics for both humans and farmed animals,” Ardakani et al. commented.

While Davies focuses on agriculture, general practitioners and hospitals, often acting under pressures of time and patient expectations, are a significant contributor to the development of antibiotic resistance. Doctors, who prescribe antibiotics for viral conditions such as the flu, know antibiotics will not combat viruses and will at best prevent secondary infections. Patients, who stop taking the full course of their anti-biotic because they feel better, also contribute to the development of drug resistance. Hospitals in particular are a hotspot for antibiotic resistance as antibiotics are over used and vulnerable patients become a reservoir for the superbugs.

According to the Infectious Diseases Society of America (IDSA) “Nearly 2 million Americans per year develop hospital-acquired infections (HAIs), resulting in 99,000 deaths—the vast majority of which are due to antibacterial-resistant pathogens.”

In some hospitals where anti-resistant microbes have become entrenched, this can lead to serious complications and even death. In 2021, at the University Hospital in Geneva in Switzerland, resistant *Enterobacter cloacae* infected patients in the intensive care unit. The bacteria were spread through the hospital’s plumbing and ventilation system.

The lack of new drugs to combat antibiotic resistance strains is not an accident. As Davies explained, the giant pharmaceutical companies are simply not uninterested in funding the necessary research.

“We’ve had no new classes of antibiotics come into routine use since the late 80s and the market model that would promote the creation of new ones is broken. If you develop a new antibiotic, it might be used by someone for a weekly course once a year. Where’s the profit in that?… So there is no incentive for them to try to develop new antibiotics. It is a real headache,” she commented.

Antibiotic resistant microbes have become a particular problem for poor countries as the use of antibiotics is not regulated and they are often readily available, leading to their misuse. The prevalence of infectious diseases and the lack of proper medical care has led to the inappropriate use of antibiotics for viral conditions such as HIV/Aids. Many of these societies lack clean drinking water and basic sanitation and people live in overcrowded conditions providing a perfect breeding ground for superbugs. In agriculture, antibiotics are used to boost the productivity of livestock and to keep the animals healthy. Any developing superbugs can be easily transferred to the human population. Antibiotic resistant microbes can be spread internationally through travel and migration.

Although Davies and other principled scientists have taken an important stance in highlighting the AMR crisis, their aim is to pressure governments to act to resolve the crisis.

Davies commented on the *Lancet*: “Global burden of bacterial antimicrobial resistance 1990–2021” study: “This landmark study confirms that the world is facing an antibiotic emergency, with devastating human costs for families and communities across the world. It substantiates our calls to all sectors to take decisive action now to save lives and save modern medicine for generations to come, and address the needs of low-and-middle income countries who bear the greatest tragedies from AMR.”

Not surprisingly, Davies’ remarks, despite her previous role as chief medical officer, have fallen on deaf ears. Governments around the world have used the ongoing COVID pandemic to ditch their support for public health, dismantling even minimal mitigation measures as an impost on the profits of the oligarchs. In this case, a virus is being allowed to debilitate and kill, and mutate unimpeded into new and potentially deadlier strains.

In November 2021, British Prime Minister Boris Johnson notoriously blurted out the attitude of ruling classes around the world: “No more f***ing lockdowns, let the bodies pile high in their thousands!” Now Robert F. Kennedy Jr., a notorious anti-vaxxer and purveyor of quack remedies, has been installed by Trump as health secretary in the United States.

Principled scientists and health workers cannot defeat this onslaught on their own, but need to turn to the working class to fight for a socialist perspective to restructure society to meet the basic needs of humanity, not the profits of the obscenely rich.