

# Economics can help tackle the global challenge of antimicrobial resistance

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Applying the economics of climate change to antimicrobial resistance could help to avert the 10 million deaths that are predicted to occur by 2050 if urgent action isn't taken, research involving University of Exeter finds.

As antibiotic use grows, bacteria are becoming increasingly resistant to treatment. Antimicrobial resistance (AMR) jeopardises modern healthcare which relies on access to antibiotics to prevent and treat infections associated with routine medical procedures.

Economic analyses have successfully informed recommendations by the Intergovernmental Panel on Climate Change and decisions made by the international community, such as the Paris Agreement. Using economic analyses to inform action on AMR could help to accelerate change.

Recent reports commissioned by the U.K. government estimate that if no action is taken, by 2050 AMR will cause up to 10 million annual deaths globally. The substantial effect on the health and productivity of the workforce may also reduce gross domestic product (GDP) by 2 to 3.5 percent. A review published in *Science* argues that a range of economic levers can help tackle the challenges AMR presents, including assessing the full social cost of antibiotic use when the impact of resistance levels on health and GDP are taken into account.

Co-author Professor Richard Smith at the University of Exeter added: "If the cost of antibiotics increases, via taxation or quotas, it will be vital to develop mechanisms to reduce the risk that they will only be taken by those who can afford them. Future research must consider ways to reduce overall antibiotic consumption without restricting essential access. There is an opportunity for economists across many fields to engage with this pressing global problem."

The development of new antibiotics is rarely profitable and most major pharmaceutical companies have left the field. The review argues that new ways are needed to make antibiotic development profitable, decoupling profits from volumes sold, a recommendation that is in line with the U.K.'s five-year [national action plan](#), published in January. Incentives should also be offered for developing interventions that

reduce antibiotic use.

In high-income countries today, people take for granted the relative safety of procedures such as hip replacement and caesarean sections, but before the discovery of penicillin, infection from a minor scratch could be fatal.

Lack of access to antibiotics still results in more deaths worldwide than antibiotic resistance. Lead author, Dr. Laurence Roope, of the Health Economics Research Centre (HERC) in the Nuffield Department of Population Health, University of Oxford said "In low- and middle-income countries inadequate access to antibiotics among the poor is often coupled with over-consumption of antibiotics by the middle classes. It is estimated that universal provision of antibiotics could avert 75 percent of deaths from pneumonia in children under the age of five in these countries. Balancing the need to reduce overall antibiotic use with expanding essential access is a difficult but important challenge."

The review draws parallels between the challenges presented by AMR and those of [climate change](#). The consumption of both antibiotics and carbon can provide valuable short-term benefits but imposes longer-term costs. People often feel little incentive to change their behaviour because the adverse consequences may occur far into the future. Moreover, the future [adverse consequences](#) are unlikely to be avoided unless many other people also decide to reduce their carbon and antibiotic consumption.

In countries where prescribing and dispensing of drugs are not separated, doctors may have financial incentives to prescribe antibiotics. A system in which GP practices are taxed on each antibiotic they prescribe, or a tax is applied at a local or national level might provide an effective incentive for reducing prescriptions and the revenue raised could be invested in antibiotic development. An alternative may be to establish a

regulatory body that gives prescribers permits or quotas for prescribing, then lets the market determine the price.

Widespread use of antibiotics in farming also contributes to AMR. 80 percent of [antibiotic use](#) in the US is in agriculture and aquaculture where they are used to promote livestock growth or as low cost substitutes for hygiene measures to prevent infections. Taxes and quotas could be used to discourage unnecessary use of antibiotics in animals and reinvested in research and development.

Co-author Dr. Sarah Wordsworth, also at HERC said: "The development of new [antibiotics](#) needs to be profitable regardless of prices and sales volume. We need better incentives to encourage pharmaceutical companies to reengage with antibiotic development. We require both 'push' incentives such as research grants and tax credits, to bring down R&D costs, and 'pull' mechanisms to provide sufficiently attractive returns on investment for developers."

**More information:** Laurence S. J. Roope et al. The challenge of antimicrobial resistance: What economics can contribute, *Science* (2019). [DOI: 10.1126/science.aau4679](https://doi.org/10.1126/science.aau4679)

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