

Introducing the GRAM Project: Estimating the Global Burden of Antimicrobial Resistance

To address the growing threat of antimicrobial resistance (AMR), leaders in global health research came together to create the Global Research on Antimicrobial Resistance (GRAM) Project, a partnership between IHME and the University of Oxford.

GRAM aims to provide robust, comprehensive, and timely evidence on the global burden of AMR, to help drive awareness, support better surveillance efforts, and prompt policy action to control AMR, including facilitating antimicrobial stewardship.



Image: CDC

Our aims and objectives

- Consolidate, review, and analyse all available data and scientific information on AMR worldwide, to generate comparable AMR burden estimates for pathogen-drug combinations and clinical syndromes, from 1990 to the present, for all 195 countries and territories included in the Global Burden of Disease (GBD) study.
- Produce geospatial maps of AMR burden as detailed as the data will allow, to enable policymakers and researchers to tailor interventions based on the local burden of disease.
- Promote the widespread dissemination of the results to the public, the development community, academics, and policymakers via the use of tools and interactive data visualisations.

The global burden of drug-resistant infections

Our project focuses initially on AMR in the following bacterial pathogens, but we aim to extend our work to all relevant pathogen-drug-clinical syndrome combinations globally.

Pathogens	Antibiotic
<i>Salmonella enterica</i> serovars Typhi and Paratyphi	Fluoroquinolones, chloramphenicol
Non-typhoidal <i>Salmonellae</i>	Fluoroquinolones
<i>Shigella</i> species	Fluoroquinolones
<i>Staphylococcus aureus</i>	Methicillin
<i>Streptococcus pneumoniae</i>	Penicillin
<i>Escherichia coli</i>	Third-generation cephalosporins, fluoroquinolones
<i>Klebsiella pneumoniae</i> complex	Third-generation cephalosporins, carbapenems
<i>Mycobacterium tuberculosis</i> complex	First-line: isoniazid, rifampicin Second-line: fluoroquinolones, amikacin, capreomycin, kanamycin
<i>Neisseria gonorrhoeae</i>	Third-generation cephalosporins

RATIONALE:

Why do we need AMR in the GBD study?

The GRAM Project emerged in response to major gaps in data on the geographical prevalence of AMR and its risk factors globally; the absence of a formal framework for combining worldwide surveillance findings; and, lack of consensus on diagnostic methodology, data collection, and the global standards and definitions needed to facilitate comparison and evaluation of programmes to tackle AMR.

Reports by the World Health Organisation, European Centre for Disease Prevention and Control, and UK Government have raised concerns about increasing rates of AMR globally – e.g., with one study by the UK's O'Neill Review (2016) estimating that drug-resistant infections claim 700,000 lives each year, and that without proactive mitigation the number could rise to 10 million per year by 2050.

To address concerns about this potentially serious health risk, the GBD study can provide a scientifically rigorous and comprehensive framework for estimating the burden of AMR, as well as the epidemiological granularity needed by policymakers to address it.

About Us

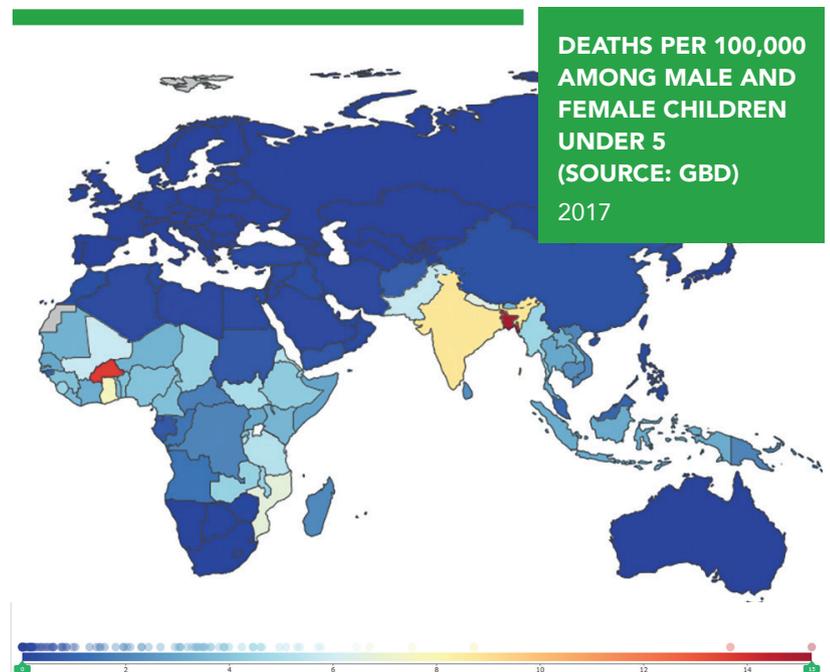
The Institute for Health Metrics and Evaluation is an independent global health research centre at the University of Washington that provides rigorous and comparable measurement of the world's most important health problems and evaluates the strategies used to address them. IHME is recognised as one of the preeminent global health research organisations in the world.

GRAM is a partnership between IHME and the University of Oxford, with support from the UK Department of Health's Fleming Fund, the Bill & Melinda Gates Foundation, and the Wellcome Trust. In Oxford, GRAM is the flagship project of the Oxford GBD Group, established at the Big Data Institute in 2018.

GRAM is directed by Strategic Lead Prof Alan Lopez, who co-authored the seminal Global Burden of Disease Study in 1996 with IHME Director Prof Chris Murray. Other senior staff include Dr Christiane Dolecek, Prof Susanna Dunachie, and Dr Catrin Moore, of the University of Oxford, and Prof Andy Stergachis of the University of Washington.

Typhoid and Paratyphoid: a case study

- The GBD currently estimates global health loss due to typhoid and paratyphoid.
- The addition of AMR to the GBD will show how much typhoid- and paratyphoid-related health loss is due to disease-resistant infections versus other causes, strengthening knowledge of the disease burden both for AMR and overall.



Typhoid and paratyphoid killed approximately 23,500 male and female children under 5 globally in 2017.*

More accurate measures of drug-resistant infections could tell us:

- The variation in the burden of drug resistance by geographic location
- Which interventions might improve public health at the local, national, or international levels

*Uncertainty interval: 10,644 – 44,294; SOURCE: GBD Compare

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