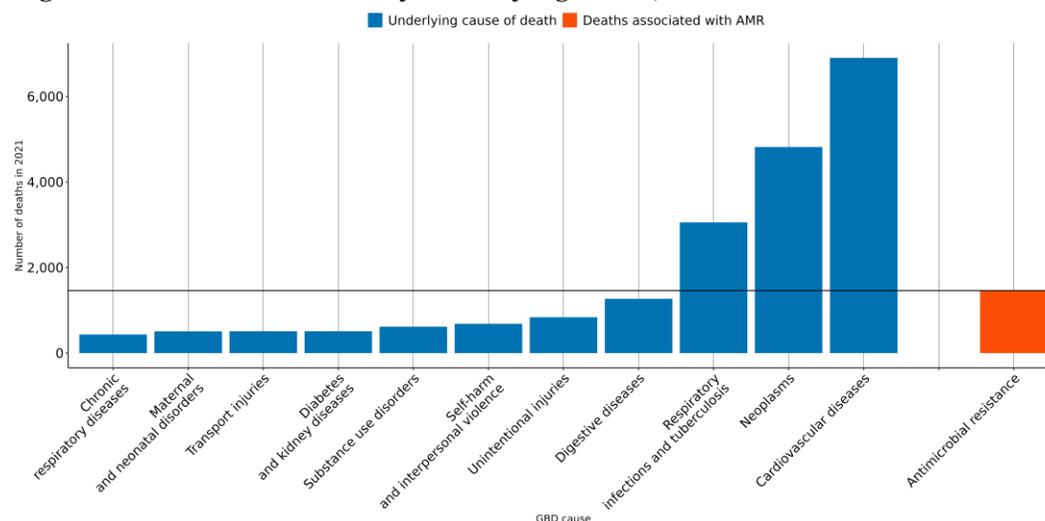


# The burden of antimicrobial resistance (AMR) in Mongolia

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **500 lives** have been lost each year since 1990 in Mongolia due to AMR.
- In 2021, there were an estimated **374 UI (266-481)** deaths attributable to AMR and **1,460 UI (1,220-1,710)** deaths associated with AMR in this location.
- The largest number of deaths associated with AMR in 2021 occurred among those aged **50 to 69** in the country.
- Among the most deadly pathogen-drug combinations in 2021 were multi-drug resistant *Mycobacterium tuberculosis* (excluding extensive drug-resistance), *Staphylococcus aureus* resistant to methicillin and *Streptococcus pneumoniae* resistant to carbapenems.

Figure 1 Number of deaths by underlying cause, and those associated with AMR in 2021



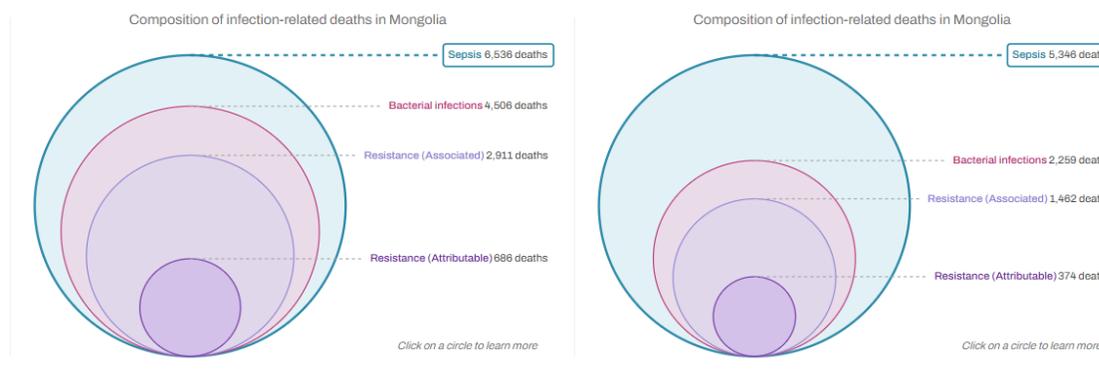
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying cause of death by itself.
- At the [2024 United Nations General Assembly high level meeting on antimicrobial resistance](#), country members agreed to aim for a **10% reduction** compared to 2019 baseline (**from 4.95 to 4.45 million**) in the global number of deaths associated with AMR by 2030. But [our forecast](#) indicates that in absence of concerted action, deaths associated with AMR could reach **5.5 million** (UI 4.8 - 6.2) if current trends continue. For Mongolia, a 10% reduction means to decrease the number of deaths associated with AMR to **1,440**, but currently the trend for this country could reach up to **2,050 UI [1,680-2,500]** AMR-associated deaths in 2030.

## AMR in Mongolia

### Key takeaways

- Antimicrobial Resistance (AMR) is a major global health threat, over *a million lives* have been lost each year since 1990.
- Globally, 4.71 (95% Uncertainty Interval (UI) 4.2-5.2) million deaths were associated with bacterial drug-resistant infections in 2021.
- And 1.14 (UI 1 - 1.3) million deaths were attributable to bacterial drug-resistant infection in the same year.
- *39 (UI 33 - 46) million deaths* directly attributable to bacterial AMR are projected to occur between 2025-2050 unless concerted action is taken. This equates to three deaths every minute.

Figure 2 Comparing 30 years of infection related deaths, and those associated with and attributable to AMR in Mongolia between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Mongolia** in 2021, there were an estimated **374 UI (266-481)** deaths attributable to AMR and **1,460 UI (1,220-1,710)** deaths associated with AMR. Here “*attributable deaths*” are considered to be those that would have been prevented had the drug-resistant bacteria causing the infections not been drug-resistant. “*Associated deaths*” are considered to be those that would not have occurred had the infections been prevented entirely.
- Across 204 countries, **Mongolia has the 94th highest** age-standardized mortality rate associated with AMR in 2021.
- *Table 1* shows the bacteria which caused most deaths in 2021 (↑ indicates an increasing estimated annual rate between 1990-2021, ↓ indicates a decreasing annual trend), and *table 2* shows the pathogen-drug combinations which caused most deaths in 2021.

Table 1. Bacteria which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden rank	Overall susceptible and resistant		Associated		Attributable	
	UI (range)	Change	UI (range)	Change	UI (range)	Change
	Mycobacterium tuberculosis 461 UI (283-640)	↓	Staphylococcus aureus 255 UI (204-306)	↑	Staphylococcus aureus 75 UI (58-92)	↑
	Staphylococcus aureus 318 UI (285-351)	↑	Klebsiella pneumoniae 232 UI (207-257)	↓	Streptococcus pneumoniae 61 UI (44-78)	↓
	Streptococcus pneumoniae 283 UI (249-317)	↓	Streptococcus pneumoniae 227 UI (183-271)	↓	Klebsiella pneumoniae 44 UI (35-54)	↓
	Klebsiella pneumoniae 246 UI (220-271)	↓	Escherichia coli 187 UI (161-212)	↓	Mycobacterium tuberculosis 40 UI (0-127)	↑
	Pseudomonas aeruginosa 213 UI (191-235)	↓	Pseudomonas aeruginosa 115 UI (87-143)	↓	Escherichia coli 39 UI (31-47)	↓
	Escherichia coli 207 UI (185-228)	↓	Mycobacterium tuberculosis 102 UI (29-224)	↑	Acinetobacter baumannii 33 UI (29-38)	↓
	Acinetobacter baumannii 85 UI (76-95)	↓	Acinetobacter baumannii 84 UI (74-93)	↓	Pseudomonas aeruginosa 30 UI (21-39)	↓
	Enterobacter spp. 65 UI (58-72)	↑	Enterobacter spp. 55 UI (48-62)	↓	Enterobacter spp. 14 UI (10-19)	↑
	Enterococcus faecalis 62 UI (55-69)	↑	Enterococcus faecium 38 UI (34-42)	↑	Serratia spp. 9 UI (8-11)	↓
	Serratia spp. 51 UI (45-57)	↓	Serratia spp. 35 UI (30-41)	↓	Enterococcus faecalis 6 UI (3-8)	↑

Annualized rate of change (1990-2021):  
 <-3% (dark blue), -1.5% to 0% (light blue), 1.5% to 3% (red), >5.0% (dark red)  
 -3% to -1.5% (medium blue), 0% to 1.5% (pink), 3% to 5% (orange)

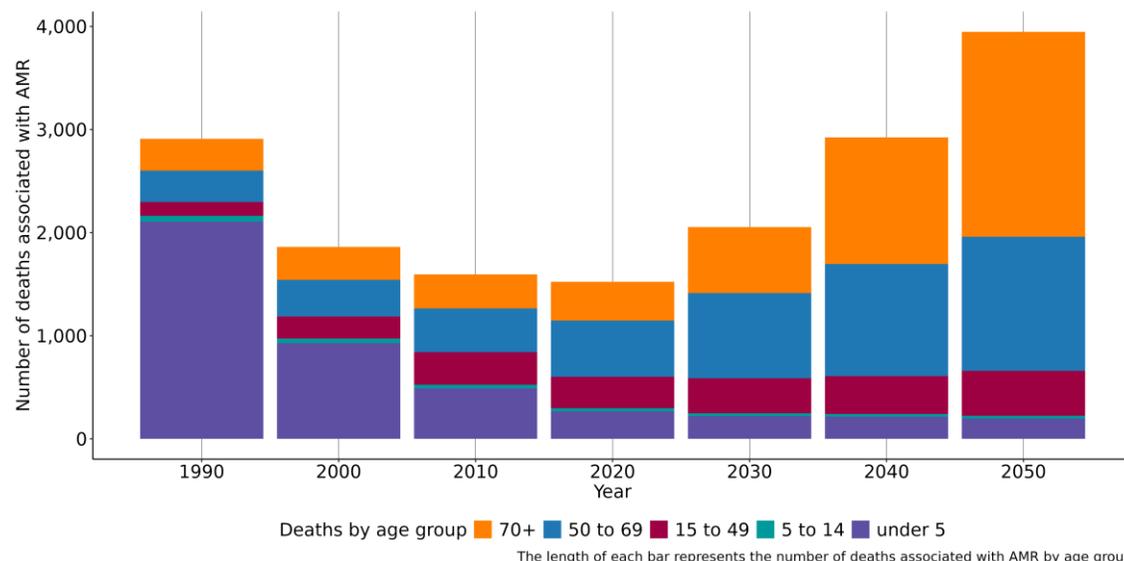
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	UI (range)	Change	UI (range)	Change
	Klebsiella pneumoniae TMP-SMX 230 UI (205-255)	↓	Staphylococcus aureus Methicillin 55 UI (41-69)	↑
	Staphylococcus aureus Methicillin 225 UI (165-285)	↑	Streptococcus pneumoniae Carbapenems 42 UI (29-56)	↓
	Escherichia coli Aminopenicillin 180 UI (148-213)	↓	Mycobacterium tuberculosis MDR excluding XDR 27 UI (0-89)	↑
	Streptococcus pneumoniae TMP-SMX 180 UI (128-231)	↓	Acinetobacter baumannii Carbapenems 16 UI (12-20)	↓
	Streptococcus pneumoniae Beta-Lactam/Lactamase Inhib. 165 UI (115-215)	↓	Klebsiella pneumoniae TMP-SMX 15 UI (8-23)	↓
	Streptococcus pneumoniae Carbapenems 151 UI (109-194)	↓	Escherichia coli 3GC 14 UI (10-18)	↑
	Escherichia coli Beta-Lactam/Lactamase Inhib. 132 UI (112-151)	↓	Mycobacterium tuberculosis XDR 13 UI (0-40)	↑
	Escherichia coli TMP-SMX 129 UI (105-154)	↓	Pseudomonas aeruginosa Carbapenems 12 UI (7-17)	↓
	Escherichia coli 3GC 125 UI (97-152)	↑	Staphylococcus aureus TMP-SMX 10 UI (6-14)	↑
	Staphylococcus aureus TMP-SMX 124 UI (80-169)	↑	Klebsiella pneumoniae Aminoglycosides 9 UI (6-12)	↓

Annualized rate of change (1990-2021):  
 <-3% (dark blue), -1.5% to 0% (light blue), 1.5% to 3% (red), >5.0% (dark red)  
 -3% to -1.5% (medium blue), 0% to 1.5% (pink), 3% to 5% (orange)

- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) bloodstream infections (1,190 UI (1,070-1,320)), lower respiratory infection (excl. COVID) (817 UI (704-929)), tuberculosis (461 UI (283-640)), peritoneal and intra-abdominal infections (262 UI (227-297)) and infections of the skin and subcutaneous systems (100 UI (82-117)).

Figure 3. Number of deaths associated with AMR by age group between 1990-2020 and 2050 projection



- In Mongolia, people aged under 5 experienced the largest number of deaths associated with AMR in 1990 but this changed by 2021 as the largest number of deaths occurred among the 50 to 69. This indicates that prevention of infections among the under 5 has contributed to the reduction in the number of AMR associated deaths. In 2021, the number of deaths associated with AMR among the 50 to 69 was 537 UI (438-637), whereas the mortality rate per 100,000 was 463 UI (381-545).

### Data sources for Mongolia

In total, 520 million individual records or isolates covering 19,513 study-location-years were used as input data to our estimation process. The subset of input data for this country is shown below.

Table 3. Data inputs for Mongolia by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	2,706	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	118	Isolates
Microbial or laboratory data with outcome	2010-2021	6,216	Isolates
Literature studies	1990-2021	828	Cases/isolates/susceptibility tests

## More information

### *About GRAM:*

The purpose of the Global Research on AntiMicrobial resistance (GRAM) project is to **generate accurate and timely estimates of the magnitude and trends in antimicrobial resistance (AMR) burden** across the world, which can be used to inform treatment guidelines and agendas for decision-making and research, detect emerging problems and monitor trends to inform global strategies, as well as facilitate the assessment of interventions over time.

GRAM is the flagship project of the University of Oxford–IHME Strategic Partnership. GRAM was launched with support from the United Kingdom Department of Health and Social Care’s Fleming Fund, and the Wellcome Trust.

### *All resources:*

For all resources on AMR analysis at IHME, visit <https://www.healthdata.org/antimicrobial-resistance>.

To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#).

### *Data sources:*

To download the list of data input sources by country, and AMR results by region, visit the [Global Health Data Exchange \(GHDx\)](#).

### *Contact us:*

- For inquiries about the analysis and questions from government officials, health departments, or research institutions: [engage@healthdata.org](mailto:engage@healthdata.org)
- For media-related inquiries: [media@healthdata.org](mailto:media@healthdata.org)
- **Bluesky:** @ihmeuw.bsky.social
- **Twitter:** @IHME\_UW
- **Facebook:** <https://www.facebook.com/IHMEUW>
- **LinkedIn:** <https://www.linkedin.com/company/institute-for-health-metrics-and-evaluation>