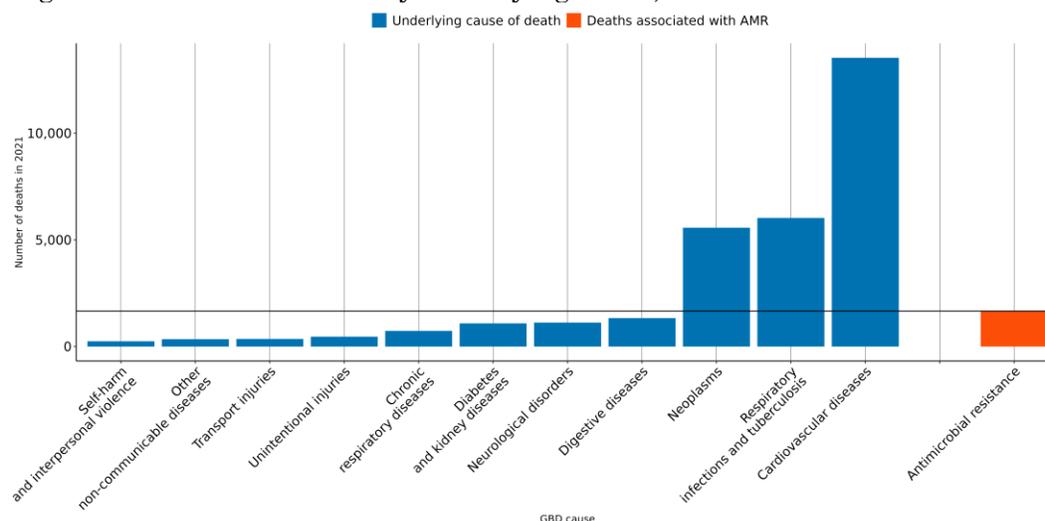


The burden of antimicrobial resistance (AMR) in Armenia

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **400 lives** have been lost each year since 1990 in Armenia due to AMR.
- In 2021, there were an estimated **373 UI (269-478)** deaths attributable to AMR and **1,660 UI (1,300-2,030)** deaths associated with AMR in this location.
- The largest number of deaths associated with AMR in 2021 occurred among those aged **70+** in the country.
- Among the most deadly pathogen-drug combinations in 2021 were *Staphylococcus aureus* resistant to methicillin, *Pseudomonas aeruginosa* resistant to carbapenems and *Acinetobacter baumannii* resistant to carbapenems.

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



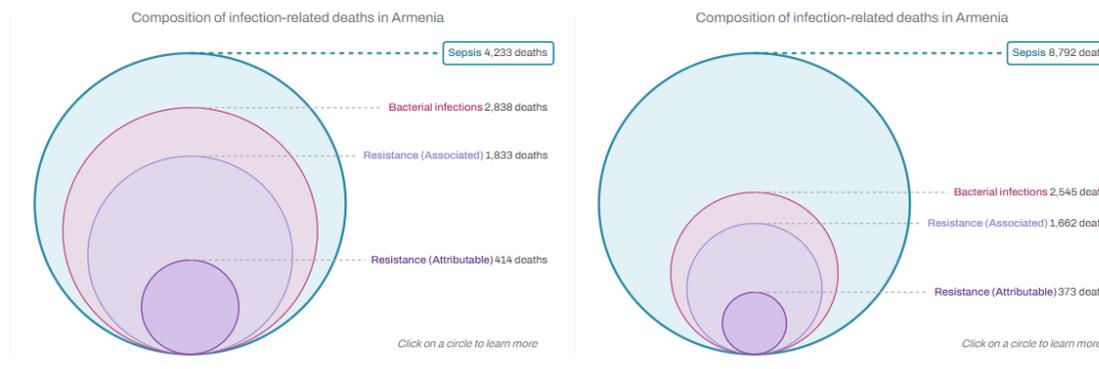
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Armenia, a 10% reduction means to decrease the number of deaths associated with AMR to **1,560**, but currently the trend for this country could reach up to **1,690 UI [1,270-2,190]** AMR-associated deaths in 2030.

AMR in Armenia

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 Armenia between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Armenia** in 2021, there were an estimated **373 UI (269-478)** deaths attributable to AMR and **1,660 UI (1,300-2,030)** 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, **Armenia has the 67th lowest** 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)

	Overall susceptible and resistant	Associated	Attributable
Burden rank	Staphylococcus aureus 544 UI (481-606) ↑	Staphylococcus aureus 320 UI (214-426) ↑	Staphylococcus aureus 71 UI (36-106) ↑
	Escherichia coli 355 UI (313-396) ↑	Escherichia coli 292 UI (222-362) ↑	Escherichia coli 60 UI (41-80) ↑
	Streptococcus pneumoniae 332 UI (293-371) ↓	Klebsiella pneumoniae 215 UI (182-248) ↓	Klebsiella pneumoniae 49 UI (40-58) ↓
	Pseudomonas aeruginosa 283 UI (250-315) ↑	Streptococcus pneumoniae 184 UI (124-244) ↓	Acinetobacter baumannii 45 UI (40-50) ↓
	Klebsiella pneumoniae 274 UI (242-305) ↓	Pseudomonas aeruginosa 166 UI (131-201) ↓	Pseudomonas aeruginosa 44 UI (33-55) ↓
	Acinetobacter baumannii 115 UI (101-128) ↓	Acinetobacter baumannii 113 UI (100-126) ↓	Streptococcus pneumoniae 28 UI (16-41) ↓
	Enterococcus faecalis 88 UI (77-100) ↑	Enterobacter spp. 63 UI (55-72) ↓	Enterobacter spp. 20 UI (15-24) ↓
	Enterobacter spp. 81 UI (71-90) ↓	Enterococcus faecalis 60 UI (52-68) ↑	Enterococcus faecalis 10 UI (6-14) ↑
	Proteus spp. 68 UI (59-76) ↑	Proteus spp. 50 UI (38-61) ↑	Serratia spp. 10 UI (7-13) ↓
	Enterococcus faecium 65 UI (57-73) ↑	Enterococcus faecium 48 UI (41-55) ↑	Proteus spp. 8 UI (5-11) ↑

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

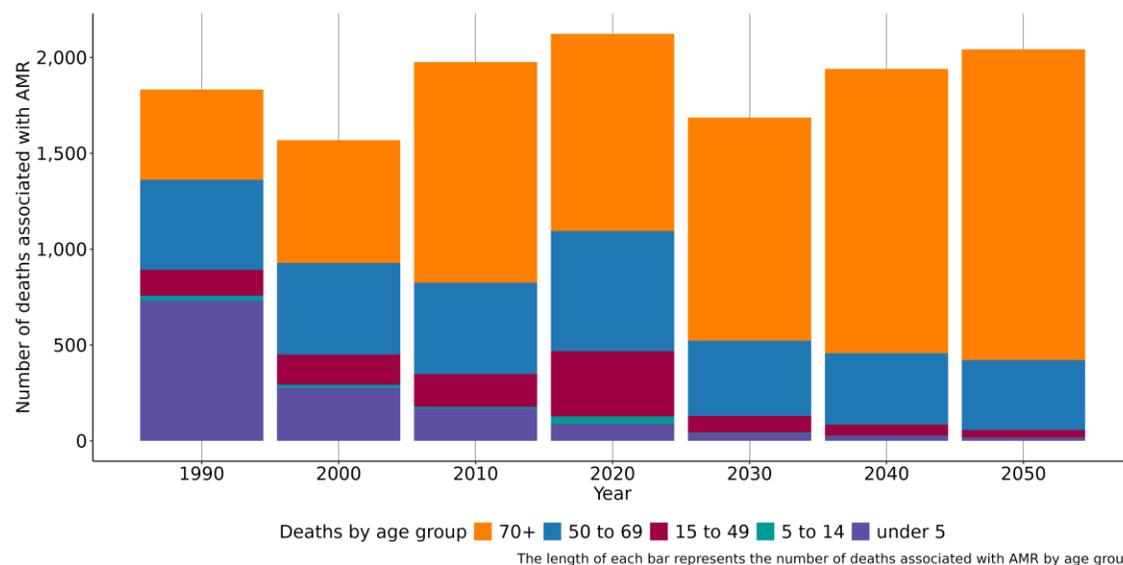
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

	Associated	Attributable
Burden Rank	Escherichia coli Aminopenicillin 263 UI (143-383) ↑	Staphylococcus aureus Methicillin 44 UI (15-73) ↑
	Staphylococcus aureus Macrolides 236 UI (183-289) ↑	Acinetobacter baumannii Carbapenems 22 UI (17-27) ↑
	Escherichia coli TMP-SMX 204 UI (154-254) ↑	Pseudomonas aeruginosa Carbapenems 20 UI (13-27) ↑
	Staphylococcus aureus Methicillin 184 UI (56-313) ↑	Escherichia coli 3GC 16 UI (10-21) ↑
	Klebsiella pneumoniae TMP-SMX 180 UI (147-213) ↓	Klebsiella pneumoniae Aminoglycosides 13 UI (10-17) ↑
	Klebsiella pneumoniae Aminoglycosides 171 UI (142-201) ↑	Streptococcus pneumoniae Carbapenems 13 UI (6-19) ↓
	Escherichia coli Fluoroquinolones 169 UI (74-264) ↑	Acinetobacter baumannii Fluoroquinolones 12 UI (9-14) ↓
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 156 UI (113-198) ↓	Escherichia coli Fluoroquinolones 11 UI (4-18) ↑
	Streptococcus pneumoniae TMP-SMX 155 UI (95-214) ↓	Escherichia coli TMP-SMX 11 UI (6-15) ↑
	Escherichia coli 3GC 148 UI (86-210) ↑	Staphylococcus aureus Macrolides 10 UI (7-14) ↑

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

- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) lower respiratory infection (excl. COVID) (1,380 UI (1,200-1,560)), bloodstream infections (1,300 UI (1,150-1,460)), peritoneal and intra-abdominal infections (458 UI (397-520)), urinary tract infections and pyelonephritis (225 UI (185-265)) and infections of the skin and subcutaneous systems (103 UI (82-123)).

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



- In Armenia, 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 70+. 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 70+ was 988 UI (758-1,220), whereas the mortality rate per 100,000 was 404 UI (310-498).

Data sources for Armenia

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 Armenia by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	398	Study-year datapoints
Microbial or laboratory data without outcome	2010-2021	64	Isolates
Literature studies	1990-2009	101	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:

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