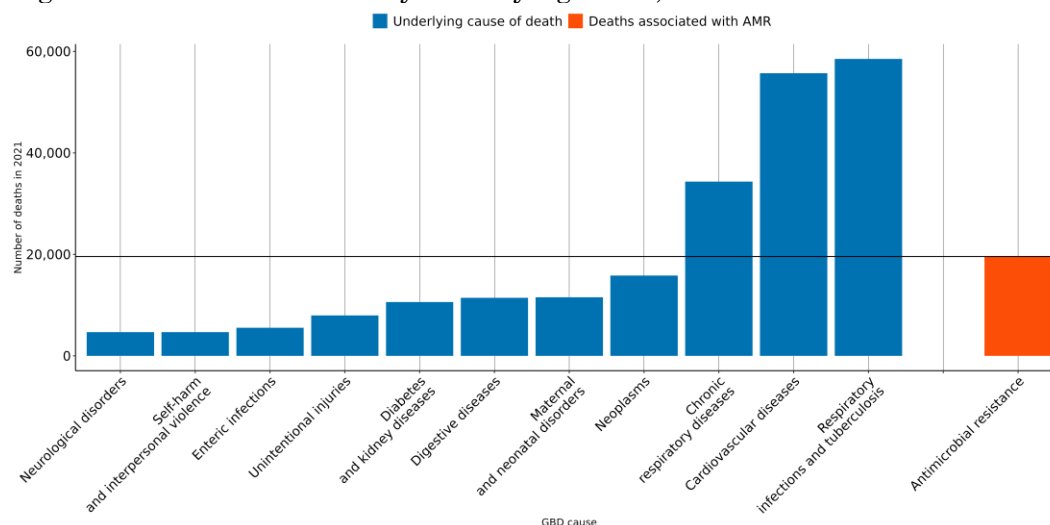


The burden of antimicrobial resistance (AMR) in Nepal

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **6,000 lives** have been lost each year since 1990 in Nepal due to AMR.
- In 2021, there were an estimated **4,710 UI (3,610-5,810)** deaths attributable to AMR and **19,600 UI (15,400-23,700)** 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, *Klebsiella pneumoniae* resistant to carbapenems and *Acinetobacter baumannii* resistant to carbapenems.

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



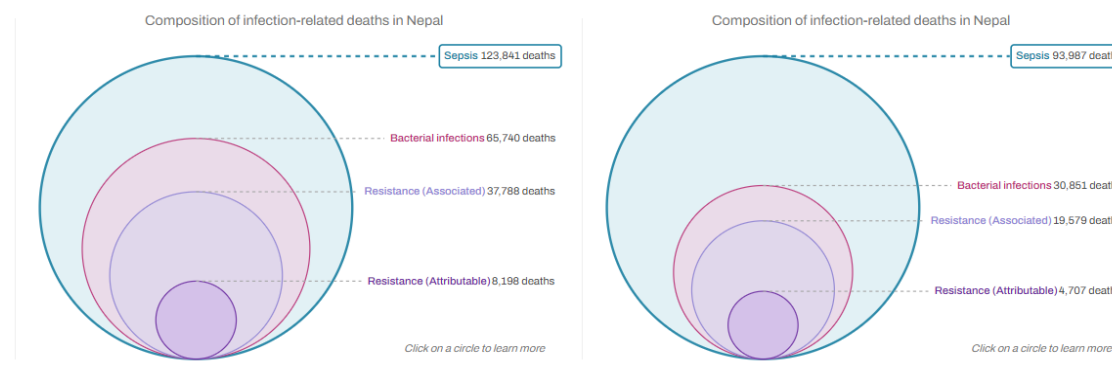
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Nepal, a 10% reduction means to decrease the number of deaths associated with AMR to **18,500**, but currently the trend for this country could reach up to **20,400 UI [15,500-26,300]** AMR-associated deaths in 2030.

AMR in Nepal

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 Nepal between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Nepal** in 2021, there were an estimated **4,710 UI (3,610-5,810)** deaths attributable to AMR and **19,600 UI (15,400-23,700)** 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, **Nepal has the 60th 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		
	Mycobacterium tuberculosis 6,900 UI (4,490-9,300)	↓		Klebsiella pneumoniae 2,930 UI (2,350-3,510)	↓		Klebsiella pneumoniae 888 UI (701-1,070)	↓	
	Klebsiella pneumoniae 3,310 UI (2,690-3,930)	↓		Staphylococcus aureus 2,660 UI (2,100-3,230)	↑		Acinetobacter baumannii 660 UI (536-784)	↓	
	Streptococcus pneumoniae 3,280 UI (2,620-3,940)	↓		Escherichia coli 2,610 UI (2,150-3,080)	↓		Staphylococcus aureus 624 UI (470-777)	↑	
	Staphylococcus aureus 3,210 UI (2,610-3,810)	↑		Streptococcus pneumoniae 2,500 UI (1,790-3,200)	↓		Escherichia coli 622 UI (496-748)	↓	
	Escherichia coli 2,950 UI (2,440-3,460)	↓		Pseudomonas aeruginosa 2,160 UI (1,710-2,600)	↓		Pseudomonas aeruginosa 532 UI (380-684)	↓	
	Pseudomonas aeruginosa 2,550 UI (2,070-3,020)	↓		Acinetobacter baumannii 1,700 UI (1,370-2,030)	↓		Streptococcus pneumoniae 407 UI (219-595)	↓	
	Acinetobacter baumannii 1,790 UI (1,450-2,130)	↓		Salmonella Typhi 795 UI (301-1,290)	↓		Mycobacterium tuberculosis 234 UI (0-655)	↑	
	Salmonella Typhi 1,010 UI (400-1,620)	↓		Mycobacterium tuberculosis 756 UI (198-1,740)	↑		Enterobacter spp. 143 UI (111-174)	↓	
	Group B Streptococcus 717 UI (552-881)	↓		Enterobacter spp. 490 UI (385-595)	↓		Serratia spp. 88 UI (65-112)	↓	
	Enterobacter spp. 682 UI (552-811)	↓		Enterococcus faecalis 443 UI (350-537)	↑		Salmonella Typhi 84 UI (14-153)	↓	

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

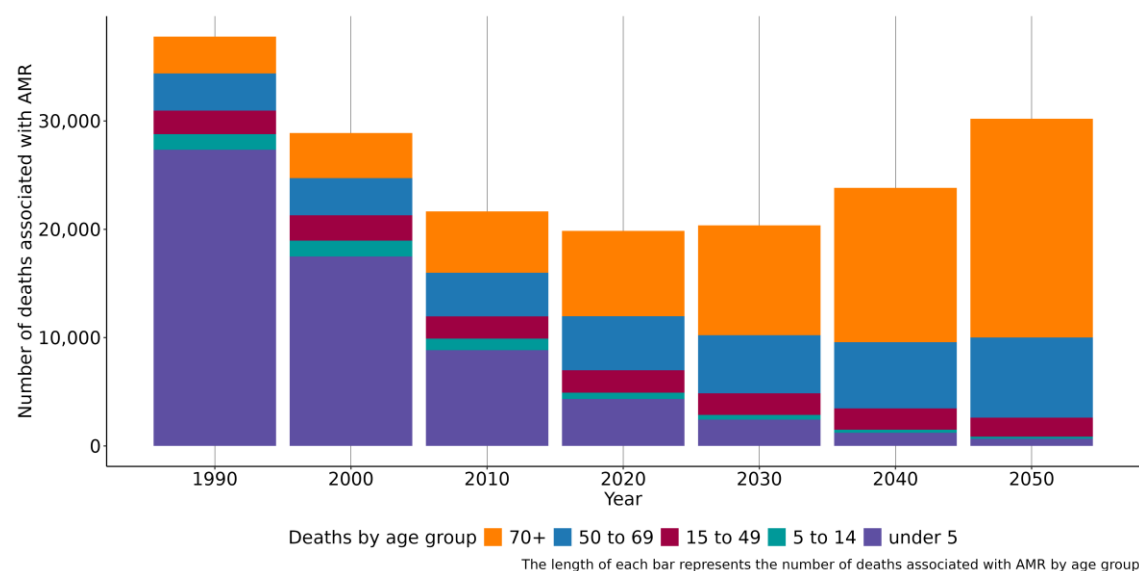
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated			Attributable		
	Klebsiella pneumoniae Aminoglycosides	2,670 UI (2,130-3,210)	↓	Staphylococcus aureus Methicillin	339 UI (226-451)	↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib.	2,630 UI (2,030-3,230)	↓	Klebsiella pneumoniae Carbapenems	314 UI (225-403)	↑
	Klebsiella pneumoniae 3GC	2,450 UI (1,950-2,950)	↓	Acinetobacter baumannii Carbapenems	294 UI (210-377)	↑
	Streptococcus pneumoniae TMP-SMX	2,350 UI (1,630-3,060)	↓	Streptococcus pneumoniae Carbapenems	245 UI (118-372)	↓
	Escherichia coli Aminopenicillin	2,260 UI (1,710-2,810)	↓	Mycobacterium tuberculosis MDR excluding XDR	220 UI (0-625)	↑
	Klebsiella pneumoniae Fluoroquinolones	1,960 UI (1,500-2,430)	↓	Klebsiella pneumoniae Aminoglycosides	217 UI (156-277)	↓
	Pseudomonas aeruginosa Aminoglycosides	1,950 UI (1,510-2,390)	↓	Escherichia coli 3GC	189 UI (112-267)	↑
	Escherichia coli 3GC	1,950 UI (1,520-2,370)	↓	Pseudomonas aeruginosa Carbapenems	181 UI (94-267)	↓
	Staphylococcus aureus Macrolides	1,820 UI (1,430-2,220)	↑	Acinetobacter baumannii Fluoroquinolones	180 UI (141-219)	↓
	Staphylococcus aureus Fluoroquinolones	1,760 UI (1,380-2,140)	↑	Pseudomonas aeruginosa Aminoglycosides	166 UI (115-216)	↓

Annualized rate of change (1990-2021):
 <-3% (dark blue), -3% to -1.5% (medium blue), -1.5% to 0% (light blue), 0% to 1.5% (pink), 1.5% to 3% (red), 3% to 5% (dark red), >5.0% (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 (13,000 UI (10,400-15,500)), lower respiratory infection (excl. COVID) (12,800 UI (10,100-15,500)), tuberculosis (6,900 UI (4,490-9,300)), diarrhea (4,170 UI (1,880-6,460)) and urinary tract infections and pyelonephritis (1,880 UI (1,430-2,320)).

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



- In Nepal, 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 7,910 UI (6,230-9,600), whereas the mortality rate per 100,000 was 679 UI (534-824).

Data sources for Nepal

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 Nepal by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	1,990	Study-year datapoints
Microbial or laboratory data without outcome	2010-2021	3,898	Isolates
Microbial or laboratory data with outcome	2010-2021	6,818	Isolates
Literature studies	1990-2021	37,995	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	76,912	Antibiotic susceptibility test

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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