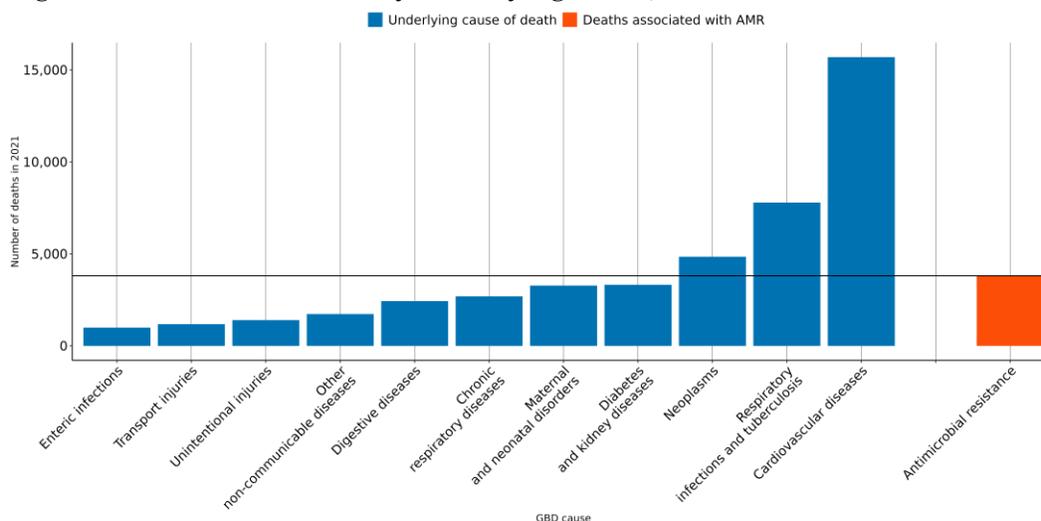


The burden of antimicrobial resistance (AMR) in the Lao People’s Democratic Republic

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **1,000 lives** have been lost each year since 1990 in the Lao People’s Democratic Republic due to AMR.
- In 2021, there were an estimated **838 UI (591-1,080)** deaths attributable to AMR and **3,810 UI (2,740-4,880)** 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 *Acinetobacter baumannii* resistant to anti-pseudomonal penicillin / beta-lactamase inhibitors, *Acinetobacter baumannii* resistant to carbapenems and *Streptococcus pneumoniae* resistant to carbapenems.

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



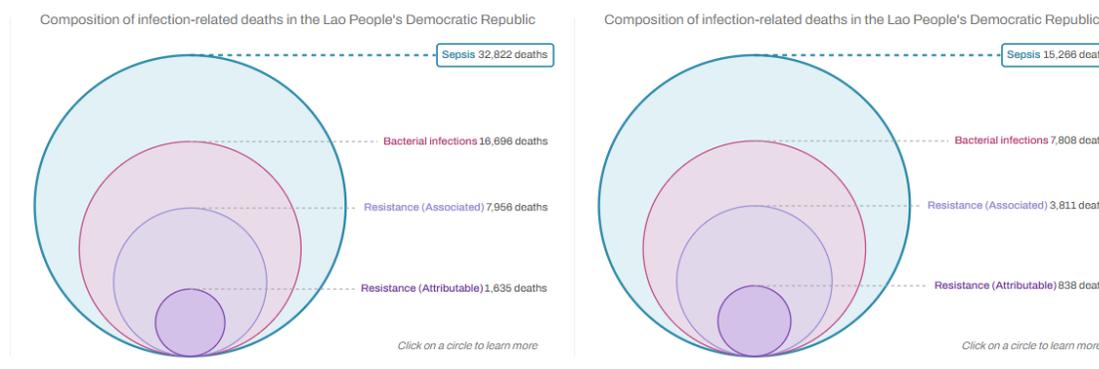
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 the Laos, a 10% reduction means to decrease the number of deaths associated with AMR to **3,700**, but currently the trend for this country could reach up to **4,210 UI [3,040-5,780]** AMR-associated deaths in 2030.

AMR in the Lao People’s Democratic Republic

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 the Lao People’s Democratic Republic between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In the Lao People’s Democratic Republic in 2021, there were an estimated **838 UI (591-1,080)** deaths attributable to AMR and **3,810 UI (2,740-4,880)** 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, **the Lao People’s Democratic Republic has the 65th 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 1,780 UI (1,110-2,460) ↓	Klebsiella pneumoniae 673 UI (491-855) ↓	Acinetobacter baumannii 162 UI (125-198) ↓
Streptococcus pneumoniae 1,130 UI (865-1,400) ↓	Streptococcus pneumoniae 651 UI (407-894) ↓	Klebsiella pneumoniae 155 UI (108-202) ↓	
Klebsiella pneumoniae 914 UI (709-1,120) ↓	Escherichia coli 567 UI (439-695) ↓	Streptococcus pneumoniae 121 UI (61-182) ↓	
Staphylococcus aureus 694 UI (546-843) ↑	Acinetobacter baumannii 461 UI (354-568) ↓	Escherichia coli 118 UI (87-148) ↓	
Pseudomonas aeruginosa 657 UI (512-802) ↓	Pseudomonas aeruginosa 357 UI (246-469) ↓	Pseudomonas aeruginosa 83 UI (52-113) ↓	
Escherichia coli 602 UI (468-736) ↓	Staphylococcus aureus 343 UI (204-482) ↓	Staphylococcus aureus 54 UI (34-74) ↓	
Acinetobacter baumannii 512 UI (399-624) ↓	Enterobacter spp. 121 UI (92-149) ↓	Enterobacter spp. 37 UI (28-46) ↓	
Group B Streptococcus 200 UI (146-253) ↓	Serratia spp. 90 UI (66-114) ↓	Serratia spp. 25 UI (18-32) ↓	
Serratia spp. 164 UI (125-202) ↓	Proteus spp. 80 UI (60-101) ↑	Enterococcus faecalis 13 UI (8-18) ↓	
Salmonella Typhi 156 UI (46-267) ↓	Enterococcus faecalis 76 UI (58-94) ↑	Proteus spp. 13 UI (9-17) ↑	

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% (yellow)

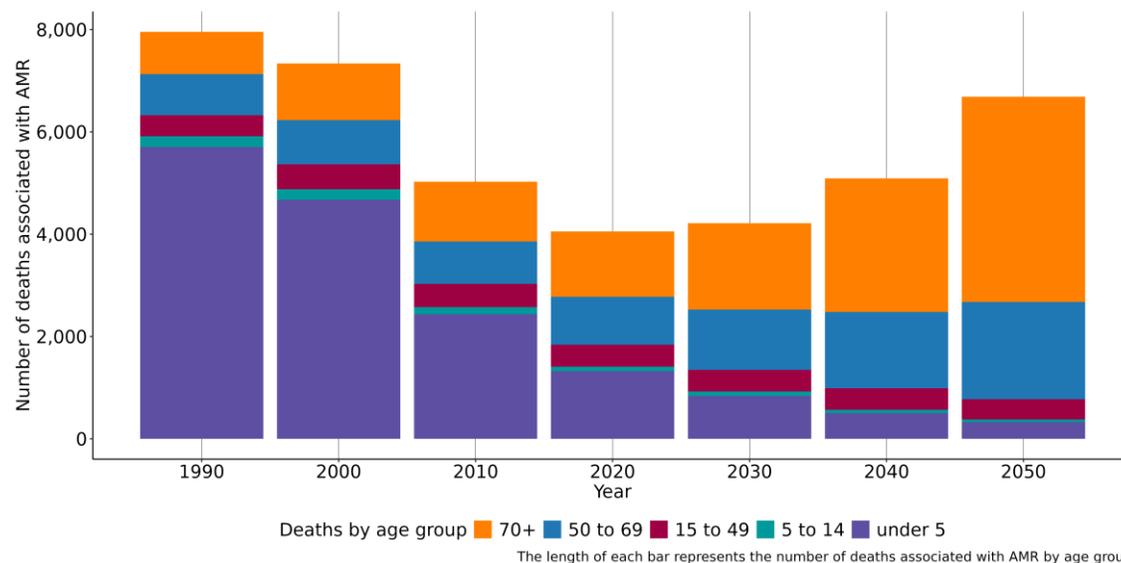
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated	Attributable
	Escherichia coli Aminopenicillin 552 UI (424-679) ↓	Streptococcus pneumoniae Carbapenems 70 UI (31-110) ↓
Klebsiella pneumoniae Aminoglycosides 550 UI (404-697) ↓	Acinetobacter baumannii Anti-pseudomonal 70 UI (54-87) ↓	
Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 544 UI (351-736) ↓	Acinetobacter baumannii Carbapenems 44 UI (25-62) ↑	
Klebsiella pneumoniae Fluoroquinolones 496 UI (348-643) ↑	Klebsiella pneumoniae Aminoglycosides 42 UI (28-56) ↓	
Acinetobacter baumannii Anti-pseudomonal 449 UI (343-555) ↓	Klebsiella pneumoniae Fluoroquinolones 38 UI (24-53) ↑	
Streptococcus pneumoniae TMP-SMX 430 UI (229-632) ↓	Escherichia coli 3GC 36 UI (20-52) ↑	
Acinetobacter baumannii Beta-Lactam/Lactamase Inhib. 426 UI (323-528) ↓	Pseudomonas aeruginosa Fluoroquinolones 32 UI (19-44) ↓	
Escherichia coli TMP-SMX 422 UI (325-519) ↓	Pseudomonas aeruginosa Anti-pseudomonal 30 UI (18-43) ↓	
Acinetobacter baumannii 4GC 419 UI (303-534) ↓	Acinetobacter baumannii Fluoroquinolones 28 UI (21-36) ↑	
Klebsiella pneumoniae TMP-SMX 402 UI (283-522) ↓	Klebsiella pneumoniae 3GC 23 UI (12-35) ↓	

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% (yellow)

- 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) (3,960 UI (3,050-4,870)), bloodstream infections (3,380 UI (2,580-4,170)), tuberculosis (1,780 UI (1,110-2,460)), diarrhea (825 UI (488-1,160)) and peritoneal and intra-abdominal infections (388 UI (278-497)).

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



- In the Lao People’s Democratic Republic, 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 1,230 UI (932-1,520), whereas the mortality rate per 100,000 was 638 UI (484-791).

Data sources for the Lao People’s Democratic Republic

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 the Lao People's Democratic Republic by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	1,419	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	53,250	Isolates
Microbial or laboratory data with outcome	1990-2021	4,455	Isolates
Literature studies	1990-2021	1,348	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	5,449	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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