# The burden of antimicrobial resistance (AMR) in Cambodia

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **3,000 lives** have been lost each year since 1990 in Cambodia due to AMR.

- In 2021, there were an estimated **2,810 UI (2,150-3,470)** deaths attributable to AMR and **11,900 UI (9,240-14,500)** 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 fluoroquinolones and *Acinetobacter baumannii* resistant to carbapenems.

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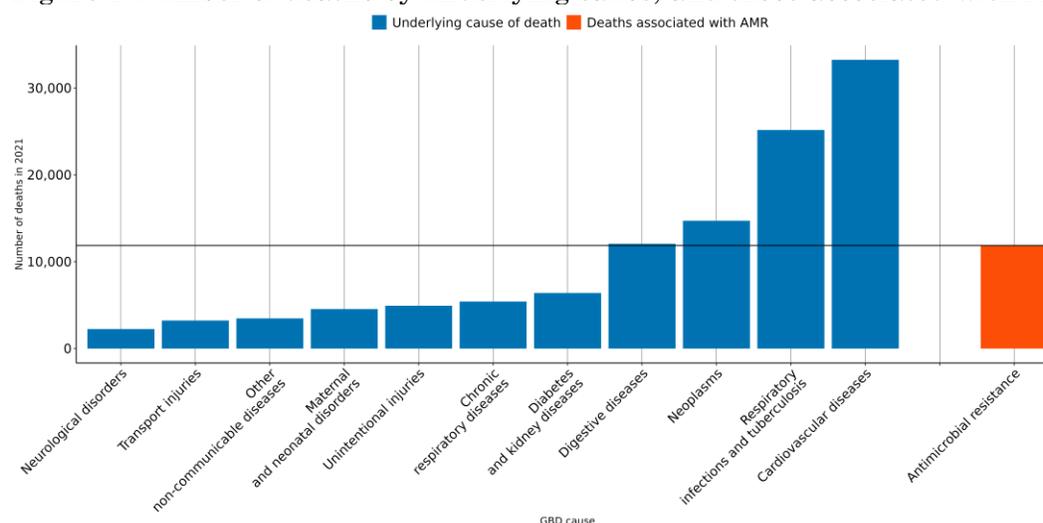

- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Cambodia, a 10% reduction means to decrease the number of deaths associated with AMR to **11,500**, but currently the trend for this country could reach up to **14,500 UI [10,400-19,000]** AMR-associated deaths in 2030.

AMR in Cambodia

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 Cambodia between 1990 and 2019.
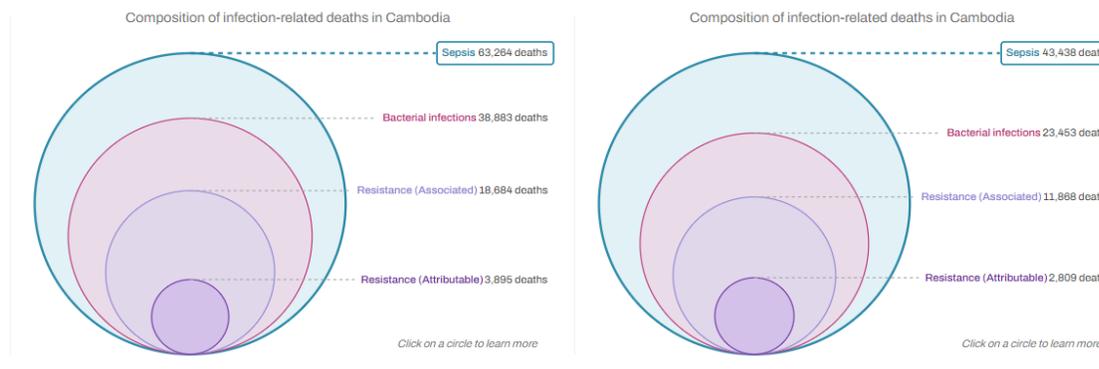
- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE)](#)

- In **Cambodia** in 2021, there were an estimated **2,810 UI (2,150-3,470)** deaths attributable to AMR and **11,900 UI (9,240-14,500)** 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, **Cambodia has the 45th 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 6,720 UI (4,030-9,400)	↓	Streptococcus pneumoniae 2,270 UI (1,680-2,850)	↓	Acinetobacter baumannii 529 UI (430-627)	↓
	Streptococcus pneumoniae 3,200 UI (2,560-3,840)	↓	Klebsiella pneumoniae 1,780 UI (1,380-2,180)	↓	Klebsiella pneumoniae 449 UI (342-557)	↓
	Klebsiella pneumoniae 2,470 UI (1,990-2,950)	↓	Escherichia coli 1,570 UI (1,260-1,880)	↓	Escherichia coli 376 UI (298-454)	↑
	Staphylococcus aureus 2,260 UI (1,830-2,690)	↑	Acinetobacter baumannii 1,410 UI (1,130-1,700)	↓	Streptococcus pneumoniae 364 UI (228-499)	↓
	Pseudomonas aeruginosa 1,930 UI (1,560-2,310)	↓	Staphylococcus aureus 1,260 UI (910-1,600)	↑	Pseudomonas aeruginosa 313 UI (218-409)	↓
	Escherichia coli 1,650 UI (1,330-1,970)	↓	Pseudomonas aeruginosa 1,230 UI (924-1,530)	↓	Staphylococcus aureus 306 UI (205-407)	↑
	Acinetobacter baumannii 1,550 UI (1,250-1,860)	↓	Enterobacter spp. 352 UI (284-419)	↑	Enterobacter spp. 120 UI (94-147)	↑
	Group B Streptococcus 451 UI (358-545)	↓	Salmonella Typhi 336 UI (111-562)	↓	Serratia spp. 81 UI (64-98)	↓
	Enterobacter spp. 403 UI (326-480)	↑	Serratia spp. 274 UI (220-327)	↓	Proteus spp. 40 UI (28-52)	↑
	Haemophilus influenzae 389 UI (309-469)	↓	Proteus spp. 242 UI (192-293)	↑	Enterococcus faecalis 39 UI (24-55)	↑

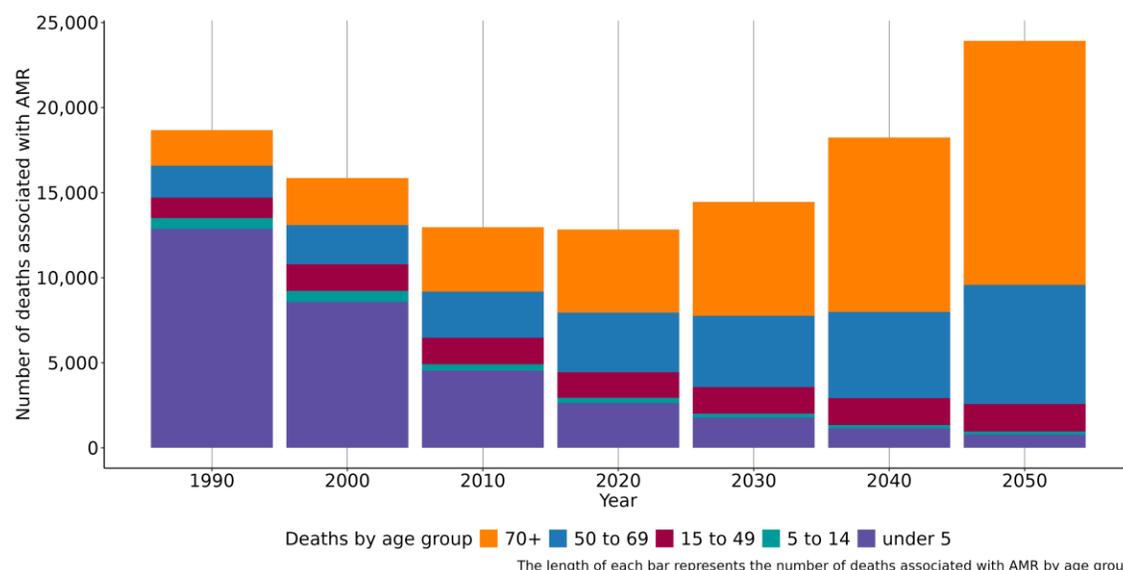Annualized rate of change (1990-2021): <-3%, -3% to -1.5%, -1.5% to 0%, 0% to 1.5%, 1.5% to 3%, 3% to 5%, >5.0%

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

Burden Rank	Associated			Attributable		
	Klebsiella pneumoniae Fluoroquinolones	1,660 UI (1,290-2,040)	↓	Acinetobacter baumannii Carbapenems	300 UI (215-385)	↑
	Streptococcus pneumoniae TMP-SMX	1,640 UI (1,100-2,190)	↓	Staphylococcus aureus Methicillin	212 UI (132-293)	↑
	Escherichia coli Aminopenicillin	1,520 UI (1,210-1,840)	↓	Klebsiella pneumoniae Fluoroquinolones	166 UI (113-219)	↓
	Streptococcus pneumoniae Macrolides	1,510 UI (1,120-1,900)	↑	Streptococcus pneumoniae Carbapenems	158 UI (76-239)	↓
	Acinetobacter baumannii 4GC	1,370 UI (1,080-1,660)	↓	Pseudomonas aeruginosa Carbapenems	122 UI (68-175)	↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib.	1,320 UI (935-1,710)	↓	Escherichia coli Fluoroquinolones	86 UI (51-121)	↑
	Acinetobacter baumannii Beta-Lactam/Lactamase Inhib.	1,310 UI (1,050-1,580)	↓	Escherichia coli Carbapenems	85 UI (54-116)	↑
	Escherichia coli Fluoroquinolones	1,310 UI (1,020-1,600)	↑	Escherichia coli 3GC	84 UI (47-120)	↑
	Escherichia coli TMP-SMX	1,120 UI (868-1,370)	↓	Acinetobacter baumannii 4GC	79 UI (54-103)	↓
	Klebsiella pneumoniae 3GC	1,060 UI (803-1,310)	↓	Klebsiella pneumoniae Carbapenems	77 UI (54-101)	↑

Annualized rate of change (1990-2021): <-3%, -3% to -1.5%, -1.5% to 0%, 0% to 1.5%, 1.5% to 3%, 3% to 5%, >5.0%

- 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) (13,200 UI (10,400-15,900)), bloodstream infections (7,220 UI (5,810-8,620)), tuberculosis (6,720 UI (4,030-9,400)), peritoneal and intra-abdominal infections (1,490 UI (1,060-1,910)) and diarrhea (1,210 UI (718-1,700)).

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

Deaths by age group ■ 70+ ■ 50 to 69 ■ 15 to 49 ■ 5 to 14 ■ under 5

The length of each bar represents the number of deaths associated with AMR by age group

- In Cambodia, 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 4,560 UI (3,710-5,410), whereas the mortality rate per 100,000 was 833 UI (678-989).

Data sources for Cambodia

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 Cambodia by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	1,885	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	1,687	Isolates
Microbial or laboratory data with outcome	2010-2021	6,201	Isolates
Literature studies	1990-2021	2,935	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	8,799	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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