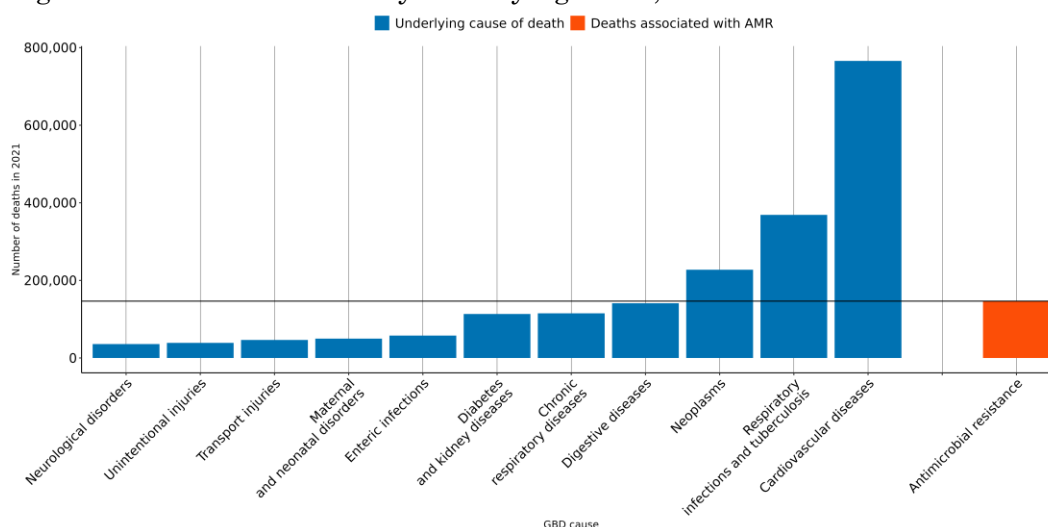


The burden of antimicrobial resistance (AMR) in Indonesia

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **40,000 lives** have been lost each year since 1990 in Indonesia due to AMR.
- In 2021, there were an estimated **36,500 UI (30,000-43,000)** deaths attributable to AMR and **147,000 UI (122,000-171,000)** 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, *Acinetobacter baumannii* resistant to carbapenems and *Acinetobacter baumannii* resistant to fluoroquinolones.

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



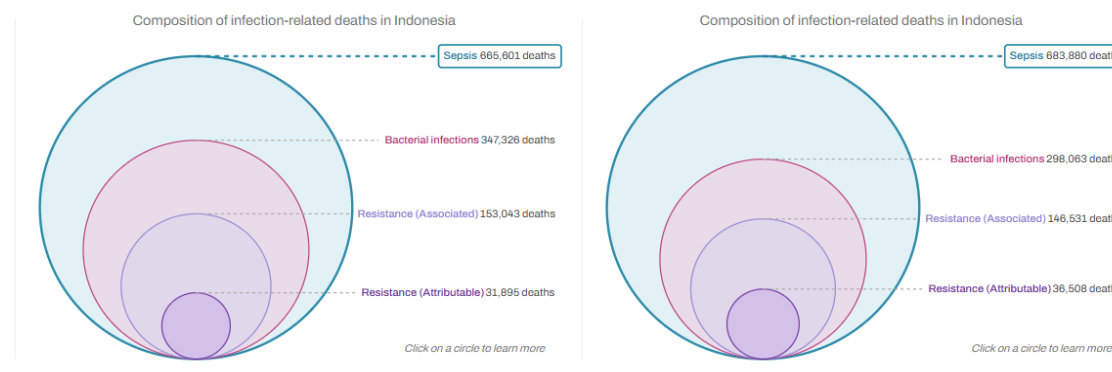
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Indonesia, a 10% reduction means to decrease the number of deaths associated with AMR to **133,000**, but currently the trend for this country could reach up to **182,000 UI [147,000-219,000]** AMR-associated deaths in 2030.

AMR in Indonesia

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 Indonesia between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Indonesia** in 2021, there were an estimated **36,500 UI (30,000-43,000)** deaths attributable to AMR and **147,000 UI (122,000-171,000)** 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, **Indonesia has the 72nd 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 87,800 UI (69,500-106,000)	↓	Acinetobacter baumannii 24,100 UI (20,100-28,200)	↑	Acinetobacter baumannii 9,340 UI (7,810-10,900)	↑
	Streptococcus pneumoniae 36,900 UI (31,200-42,500)	↓	Escherichia coli 23,900 UI (17,900-30,000)	↓	Escherichia coli 5,230 UI (3,720-6,750)	↓
	Acinetobacter baumannii 26,700 UI (22,300-31,200)	↑	Streptococcus pneumoniae 21,400 UI (15,700-27,200)	↓	Klebsiella pneumoniae 5,080 UI (4,080-6,080)	↑
	Staphylococcus aureus 26,100 UI (21,800-30,500)	↑	Klebsiella pneumoniae 19,600 UI (16,400-22,800)	↑	Staphylococcus aureus 4,660 UI (3,730-5,580)	↑
	Escherichia coli 25,700 UI (19,300-32,000)	↓	Staphylococcus aureus 16,200 UI (13,300-19,200)	↑	Pseudomonas aeruginosa 3,830 UI (2,870-4,790)	↑
	Klebsiella pneumoniae 25,000 UI (21,000-29,000)	↑	Pseudomonas aeruginosa 15,000 UI (12,200-17,800)	↑	Streptococcus pneumoniae 3,220 UI (2,000-4,440)	↓
	Pseudomonas aeruginosa 21,400 UI (17,900-24,900)	↑	Enterobacter spp. 4,590 UI (3,810-5,370)	↑	Enterobacter spp. 1,480 UI (1,210-1,750)	↑
	Salmonella Typhi 6,110 UI (2,330-9,890)	↓	Enterococcus faecalis 3,620 UI (2,940-4,290)	↑	Serratia spp. 708 UI (550-866)	↓
	Enterobacter spp. 5,970 UI (4,980-6,970)	↑	Proteus spp. 2,990 UI (2,440-3,530)	↑	Enterococcus faecalis 666 UI (403-929)	↑
	Enterococcus faecalis 5,450 UI (4,510-6,390)	↑	Enterococcus faecium 2,880 UI (2,360-3,410)	↑	Proteus spp. 463 UI (353-572)	↑

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% (very dark red)

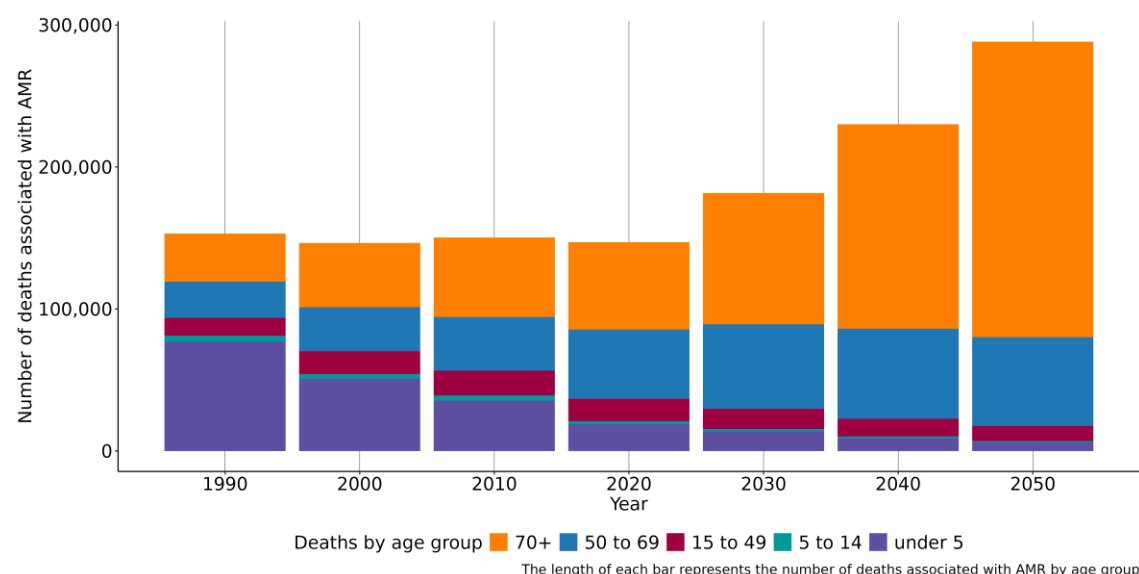
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	Escherichia coli Aminopenicillin 23,300 UI (17,200-29,300)	↓	Acinetobacter baumannii Carbapenems 3,840 UI (2,750-4,940)	↑
	Acinetobacter baumannii 3GC 20,800 UI (16,900-24,800)	↑	Staphylococcus aureus Methicillin 3,370 UI (2,390-4,350)	↑
	Acinetobacter baumannii 4GC 20,700 UI (16,700-24,800)	↑	Acinetobacter baumannii Fluoroquinolones 2,570 UI (2,020-3,110)	↑
	Acinetobacter baumannii Beta-Lactam/Lactamase Inhib. 20,700 UI (17,100-24,300)	↑	Escherichia coli 3GC 1,520 UI (807-2,240)	↑
	Acinetobacter baumannii Anti-pseudomonal 20,500 UI (16,800-24,200)	↑	Pseudomonas aeruginosa Carbapenems 1,440 UI (856-2,030)	↑
	Acinetobacter baumannii Fluoroquinolones 20,000 UI (16,300-23,800)	↑	Klebsiella pneumoniae 3GC 1,400 UI (884-1,910)	↓
	Acinetobacter baumannii Carbapenems 18,700 UI (14,700-22,700)	↑	Acinetobacter baumannii Aminoglycosides 1,220 UI (856-1,570)	↑
	Klebsiella pneumoniae 3GC 17,400 UI (14,500-20,300)	↑	Klebsiella pneumoniae Fluoroquinolones 1,210 UI (803-1,620)	↑
	Escherichia coli 3GC 16,900 UI (12,500-21,300)	↓	Escherichia coli Fluoroquinolones 1,090 UI (626-1,560)	↓
	Escherichia coli Fluoroquinolones 16,800 UI (11,900-21,700)	↑	Pseudomonas aeruginosa Fluoroquinolones 1,020 UI (662-1,380)	↑

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% (very dark 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) (102,000 UI (85,100-120,000)), bloodstream infections (102,000 UI (84,900-119,000)), tuberculosis (87,800 UI (69,500-106,000)), diarrhea (51,600 UI (26,000-77,200)) and peritoneal and intra-abdominal infections (20,100 UI (16,200-24,000)).

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



- In Indonesia, 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 61,500 UI (51,000-72,100), whereas the mortality rate per 100,000 was 638 UI (529-747).

Data sources for Indonesia

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 Indonesia by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	7,919	Study-year datapoints
Microbial or laboratory data without outcome	1990-2009	3,902	Isolates
Literature studies	1990-2021	5,792	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	62,206	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:

- For inquiries about the analysis and questions from government officials, health departments, or research institutions: engage@healthdata.org
- For media-related inquiries: 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>