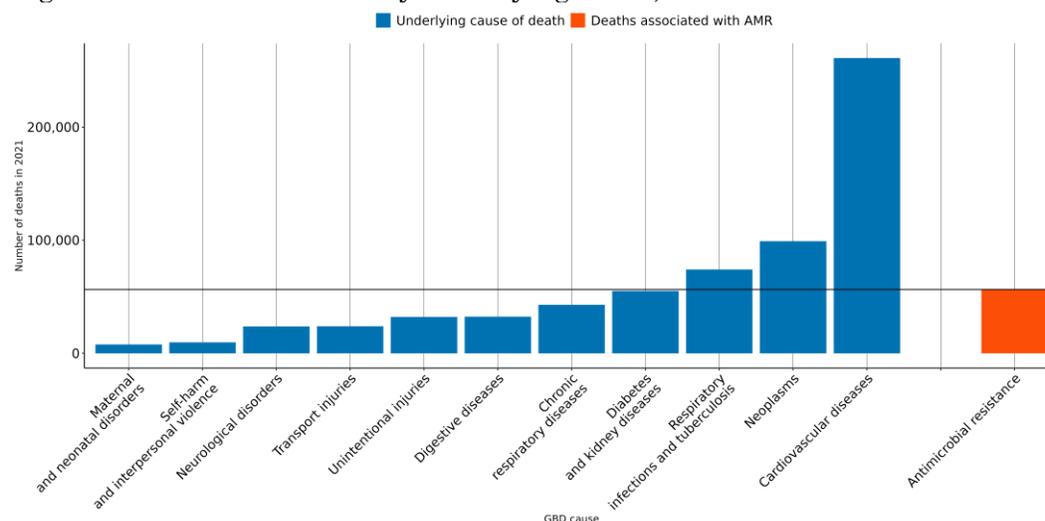


# The burden of antimicrobial resistance (AMR) in Viet Nam

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **10,000 lives** have been lost each year since 1990 in Viet Nam due to AMR.
- In 2021, there were an estimated **14,400 UI (11,800-17,000)** deaths attributable to AMR and **56,500 UI (46,900-66,000)** 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



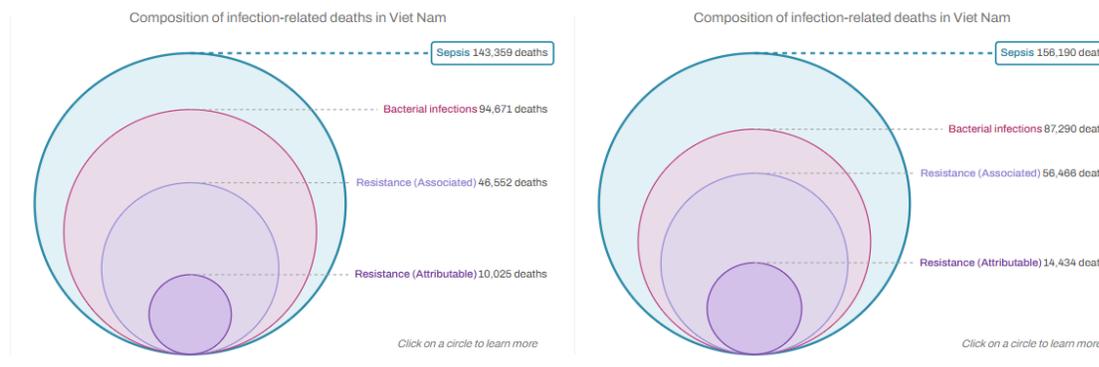
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Viet Nam, a 10% reduction means to decrease the number of deaths associated with AMR to **51,800**, but currently the trend for this country could reach up to **77,700 UI [60,500-94,700]** AMR-associated deaths in 2030.

## AMR in Viet Nam

### 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 Viet Nam between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In Viet Nam in 2021, there were an estimated **14,400 UI (11,800-17,000)** deaths attributable to AMR and **56,500 UI (46,900-66,000)** 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, Viet Nam has the **89th 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                                       |                                       |
|-------------|---|---------------------------------------|--|---------------------------------------|--|---------------------------------------|
|             | Bacteria  | Annualized rate of change (1990-2021) | Bacteria   | Annualized rate of change (1990-2021) | Bacteria   | Annualized rate of change (1990-2021) |
|             | Mycobacterium tuberculosis<br>19,500 UI (14,500-24,500) | ↓                                     | Streptococcus pneumoniae<br>10,100 UI (8,340-11,800) | ↓                                     | Acinetobacter baumannii<br>3,210 UI (2,680-3,730)  | ↑                                     |
|             | Staphylococcus aureus<br>12,700 UI (10,600-14,700)      | ↑                                     | Staphylococcus aureus<br>9,980 UI (8,350-11,600)     | ↑                                     | Staphylococcus aureus<br>2,420 UI (1,950-2,900)    | ↑                                     |
|             | Streptococcus pneumoniae<br>10,700 UI (8,900-12,500)    | ↓                                     | Acinetobacter baumannii<br>8,000 UI (6,650-9,340)    | ↑                                     | Streptococcus pneumoniae<br>2,020 UI (1,550-2,490) | ↓                                     |
|             | Acinetobacter baumannii<br>8,180 UI (6,810-9,560)       | ↑                                     | Escherichia coli<br>7,020 UI (5,870-8,180)           | ↑                                     | Klebsiella pneumoniae<br>1,560 UI (1,250-1,870)    | ↓                                     |
|             | Escherichia coli<br>7,300 UI (6,150-8,460)              | ↑                                     | Klebsiella pneumoniae<br>5,150 UI (4,150-6,160)      | ↓                                     | Escherichia coli<br>1,540 UI (1,260-1,830)         | ↑                                     |
|             | Pseudomonas aeruginosa<br>6,760 UI (5,630-7,890)        | ↑                                     | Pseudomonas aeruginosa<br>4,870 UI (3,910-5,840)     | ↑                                     | Pseudomonas aeruginosa<br>1,260 UI (929-1,590)     | ↑                                     |
|             | Klebsiella pneumoniae<br>6,710 UI (5,590-7,830)         | ↓                                     | Mycobacterium tuberculosis<br>1,750 UI (452-4,010)   | ↑                                     | Mycobacterium tuberculosis<br>563 UI (0-1,690)     | ↑                                     |
|             | Enterococcus faecalis<br>2,210 UI (1,840-2,570)         | ↑                                     | Enterobacter spp.<br>1,520 UI (1,250-1,790)          | ↑                                     | Enterobacter spp.<br>466 UI (378-555)              | ↑                                     |
|             | Enterobacter spp.<br>2,180 UI (1,820-2,530)             | ↑                                     | Enterococcus faecalis<br>1,320 UI (1,010-1,640)      | ↑                                     | Serratia spp.<br>275 UI (215-335)                  | ↑                                     |
|             | Group A Streptococcus<br>1,810 UI (1,460-2,160)         | ↑                                     | Proteus spp.<br>1,190 UI (989-1,390)                 | ↑                                     | Enterococcus faecalis<br>233 UI (142-324)          | ↑                                     |

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% (black)

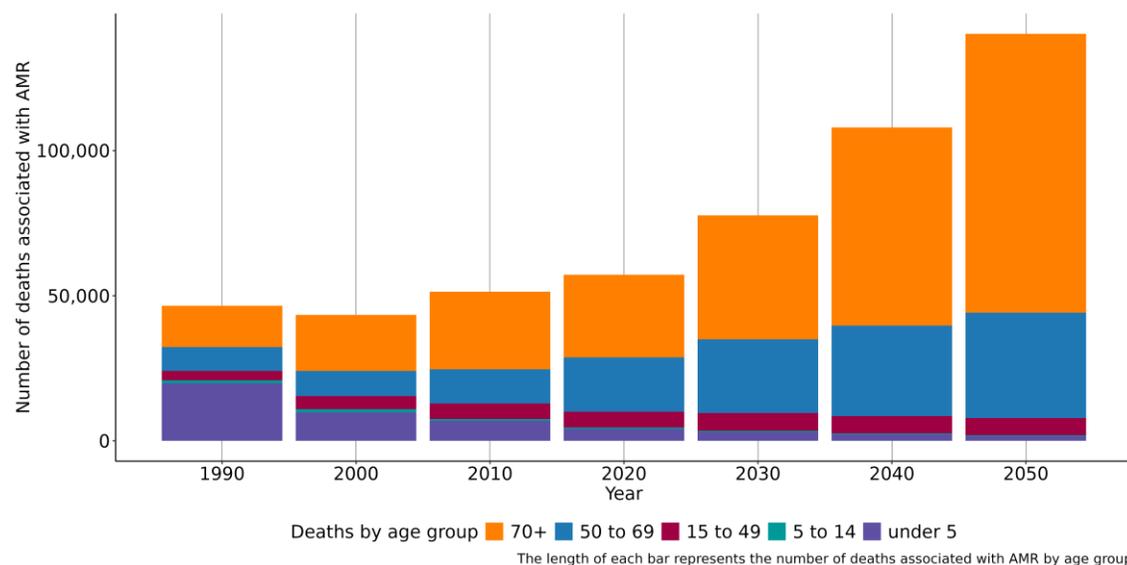
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

| Burden Rank | Associated  |                                       | Attributable  |                                       |
|-------------|---|---------------------------------------|---|---------------------------------------|
|             | Combination   | Annualized rate of change (1990-2021) | Combination   | Annualized rate of change (1990-2021) |
|             | Staphylococcus aureus<br>Macrolides<br>8,820 UI (7,280-10,300)                    | ↑                                     | Acinetobacter baumannii<br>Carbapenems<br>1,640 UI (1,250-2,030)    | ↑                                     |
|             | Streptococcus pneumoniae<br>Macrolides<br>8,800 UI (7,190-10,400)                 | ↓                                     | Staphylococcus aureus<br>Methicillin<br>1,630 UI (1,120-2,140)      | ↑                                     |
|             | Streptococcus pneumoniae<br>TMP-SMX<br>8,780 UI (7,070-10,500)                    | ↓                                     | Acinetobacter baumannii<br>Fluoroquinolones<br>878 UI (704-1,050)   | ↑                                     |
|             | Acinetobacter baumannii<br>Beta-Lactam/Lactamase Inhib.<br>7,680 UI (6,380-8,980) | ↑                                     | Streptococcus pneumoniae<br>3GC<br>619 UI (417-820)                 | ↑                                     |
|             | Acinetobacter baumannii<br>3GC<br>7,580 UI (6,300-8,860)                          | ↑                                     | Klebsiella pneumoniae<br>Carbapenems<br>572 UI (421-724)            | ↑                                     |
|             | Acinetobacter baumannii<br>Anti-pseudomonal<br>7,580 UI (6,300-8,860)             | ↑                                     | Streptococcus pneumoniae<br>Carbapenems<br>551 UI (280-822)         | ↑                                     |
|             | Acinetobacter baumannii<br>Carbapenems<br>7,480 UI (6,200-8,750)                  | ↑                                     | Pseudomonas aeruginosa<br>Carbapenems<br>496 UI (287-705)           | ↑                                     |
|             | Acinetobacter baumannii<br>4GC<br>7,440 UI (6,170-8,720)                          | ↑                                     | Acinetobacter baumannii<br>Aminoglycosides<br>479 UI (348-610)      | ↑                                     |
|             | Acinetobacter baumannii<br>Fluoroquinolones<br>7,170 UI (5,930-8,400)             | ↑                                     | Mycobacterium tuberculosis<br>MDR excluding XDR<br>462 UI (0-1,430) | ↑                                     |
|             | Escherichia coli<br>Aminopenicillin<br>6,940 UI (5,760-8,130)                     | ↑                                     | Klebsiella pneumoniae<br>Fluoroquinolones<br>395 UI (271-520)       | ↑                                     |

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% (black)

- 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 (37,100 UI (31,300-43,000)), lower respiratory infection (excl. COVID) (34,300 UI (28,000-40,600)), tuberculosis (19,500 UI (14,500-24,500)), peritoneal and intra-abdominal infections (6,250 UI (4,950-7,550)) and infections of the skin and subcutaneous systems (4,720 UI (3,580-5,860)).

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



- In Viet Nam, 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 28,200 UI (23,800-32,600), whereas the mortality rate per 100,000 was 631 UI (534-729).

### Data sources for Viet Nam

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 Viet Nam by source type

| Source type                                  | Years     | Sample size | Sample size units                   |
|--|-----------|-------------|-------------------------------------|
| Antibiotic use                               | 1990-2021 | 1,528       | Study-year datapoints               |
| Microbial or laboratory data without outcome | 1990-2021 | 24,978      | Isolates                            |
| Microbial or laboratory data with outcome    | 1990-2021 | 77,886      | Isolates                            |
| Literature studies                           | 1990-2021 | 14,511      | Cases/isolates/susceptibility tests |
| Single drug resistance profile data          | 1990-2021 | 139,782     | 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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