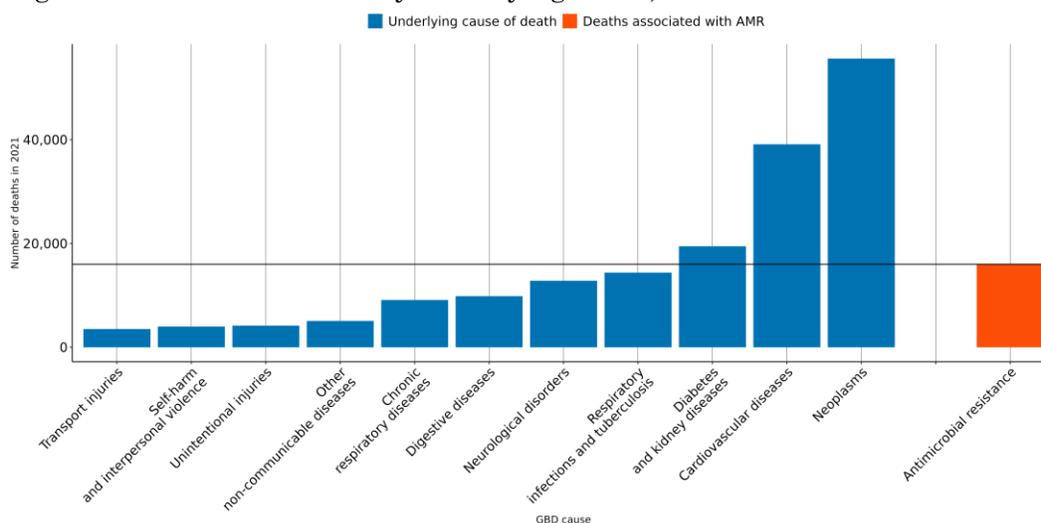


The burden of antimicrobial resistance (AMR) in Taiwan (Province of China)

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **4,000 lives** have been lost each year since 1990 in Taiwan (Province of China) due to AMR.
- In 2021, there were an estimated **3,900 UI (3,410-4,390)** deaths attributable to AMR and **16,000 UI (14,100-17,900)** 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, *Escherichia coli* resistant to third-generation cephalosporins 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 Taiwan (Province of China), a 10% reduction means to decrease the number of deaths associated with AMR to **15,000**, but currently the trend for this country could reach up to **20,700 UI [16,900-24,300]** AMR-associated deaths in 2030.

AMR in Taiwan (Province of China)

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 Taiwan (Province of China) between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Taiwan (Province of China)** in 2021, there were an estimated **3,900 UI (3,410-4,390)** deaths attributable to AMR and **16,000 UI (14,100-17,900)** 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, **Taiwan (Province of China)** has the **60th lowest** 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)

	Overall susceptible and resistant	Associated	Attributable
Burden rank	Staphylococcus aureus 6,100 UI (5,450-6,750) ↑	Staphylococcus aureus 4,410 UI (3,770-5,050) ↑	Staphylococcus aureus 1,210 UI (985-1,440) ↑
	Escherichia coli 3,950 UI (3,490-4,410) ↑	Escherichia coli 3,380 UI (2,960-3,800) ↑	Escherichia coli 655 UI (543-767) ↑
	Pseudomonas aeruginosa 2,420 UI (2,160-2,670) ↑	Streptococcus pneumoniae 1,950 UI (1,740-2,170) ↓	Streptococcus pneumoniae 539 UI (451-628) ↓
	Klebsiella pneumoniae 2,140 UI (1,900-2,370) ↑	Klebsiella pneumoniae 1,300 UI (1,080-1,520) ↑	Klebsiella pneumoniae 348 UI (291-406) ↑
	Streptococcus pneumoniae 2,070 UI (1,850-2,290) ↓	Pseudomonas aeruginosa 1,220 UI (1,060-1,380) ↑	Pseudomonas aeruginosa 310 UI (257-364) ↑
	Group A Streptococcus 903 UI (793-1,010) ↑	Acinetobacter baumannii 744 UI (667-822) ↓	Acinetobacter baumannii 293 UI (264-322) ↑
	Acinetobacter baumannii 824 UI (743-906) ↓	Enterococcus faecium 574 UI (514-633) ↑	Enterococcus faecium 148 UI (125-170) ↑
	Proteus spp. 769 UI (676-863) ↑	Proteus spp. 503 UI (419-587) ↑	Enterobacter spp. 90 UI (79-102) ↑
	Mycobacterium tuberculosis 703 UI (630-776) ↓	Enterobacter spp. 362 UI (314-411) ↑	Proteus spp. 74 UI (60-88) ↑
	Enterococcus faecalis 700 UI (622-777) ↑	Group A Streptococcus 348 UI (305-391) ↑	Serratia spp. 46 UI (39-53) ↑

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

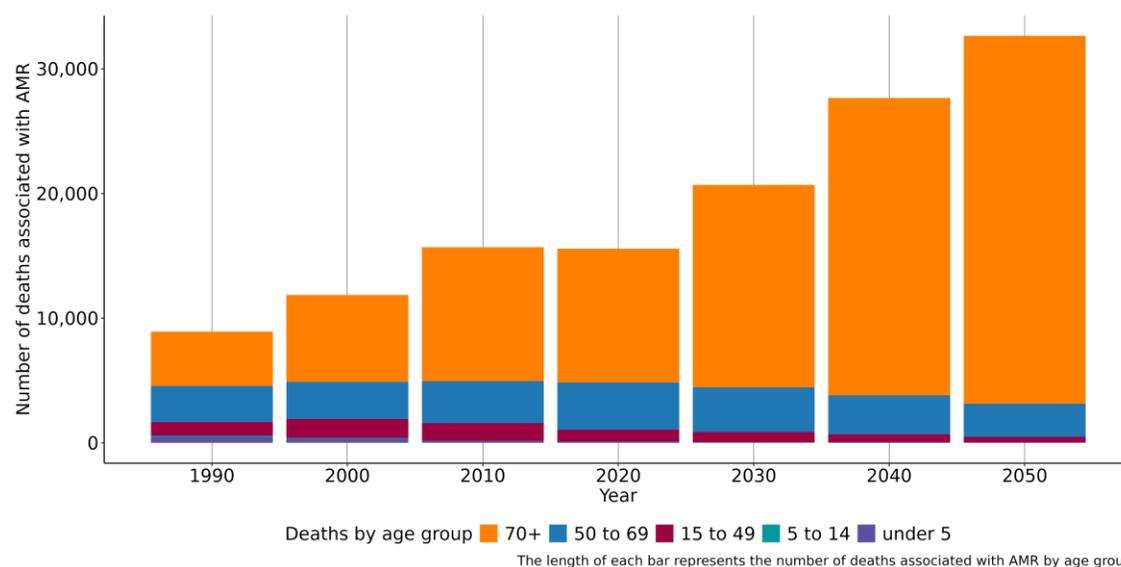
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

	Associated	Attributable
Burden Rank	Staphylococcus aureus Methicillin 3,620 UI (2,790-4,450) ↑	Staphylococcus aureus Methicillin 890 UI (691-1,090) ↑
	Staphylococcus aureus Macrolides 3,190 UI (2,740-3,640) ↑	Streptococcus pneumoniae Carbapenems 421 UI (335-506) ↓
	Escherichia coli Aminopenicillin 3,170 UI (2,670-3,670) ↑	Escherichia coli 3GC 159 UI (100-218) ↑
	Escherichia coli Fluoroquinolones 2,290 UI (1,860-2,710) ↑	Escherichia coli Fluoroquinolones 157 UI (90-223) ↑
	Escherichia coli TMP-SMX 2,070 UI (1,630-2,510) ↑	Acinetobacter baumannii Carbapenems 140 UI (111-169) ↑
	Streptococcus pneumoniae Macrolides 1,890 UI (1,680-2,100) ↓	Pseudomonas aeruginosa Carbapenems 136 UI (97-175) ↑
	Staphylococcus aureus Fluoroquinolones 1,870 UI (1,530-2,210) ↑	Staphylococcus aureus Macrolides 125 UI (83-167) ↑
	Streptococcus pneumoniae Carbapenems 1,520 UI (1,290-1,740) ↓	Staphylococcus aureus Fluoroquinolones 110 UI (46-173) ↑
	Escherichia coli 3GC 1,510 UI (1,200-1,820) ↑	Escherichia coli Aminopenicillin 106 UI (74-137) ↑
	Escherichia coli Beta-Lactam/Lactamase Inhib. 1,410 UI (1,180-1,650) ↑	Escherichia coli TMP-SMX 100 UI (55-145) ↑

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% (orange), 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) lower respiratory infection (excl. COVID) (15,600 UI (13,800-17,500)), bloodstream infections (9,240 UI (8,310-10,200)), urinary tract infections and pyelonephritis (4,200 UI (3,590-4,810)), peritoneal and intra-abdominal infections (3,060 UI (2,720-3,410)) and infections of the skin and subcutaneous systems (1,590 UI (1,370-1,810)).

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



- In Taiwan (Province of China), people aged 70+ saw the largest number of deaths associated with AMR both in 1990 and 2021, which indicates that 70+ continues to be particularly vulnerable to infections which are resistant to antibiotics. In 2021, the number of deaths associated with AMR among the 70+ was 11,200 UI (9,610-12,800), whereas the mortality rate per 100,000 was 443 UI (380-506).

Data sources for Taiwan (Province of China)

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 Taiwan (Province of China) by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	543,938	Isolates
Microbial or laboratory data with outcome	1990-2021	180,139	Isolates
Literature studies	1990-2021	112,980	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	294,289	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>