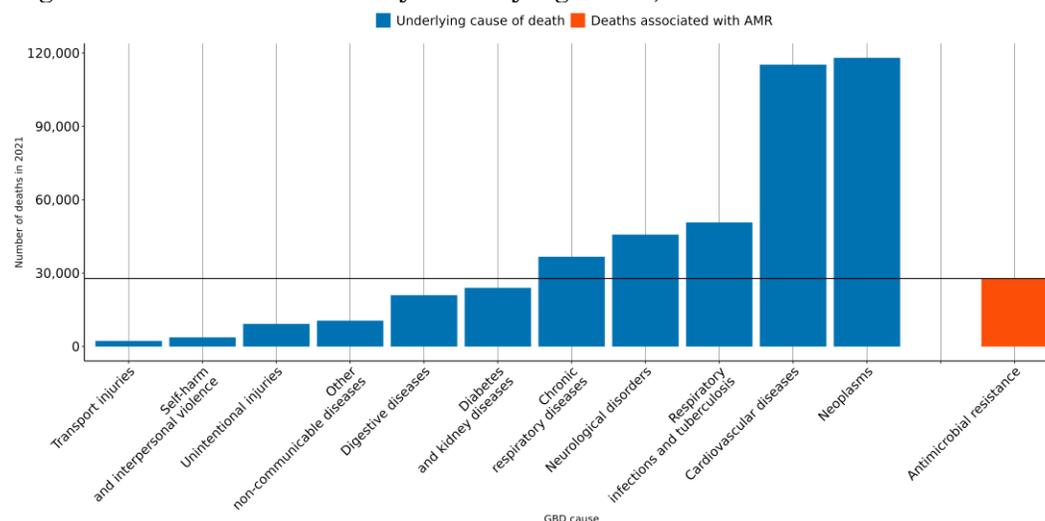


# The burden of antimicrobial resistance (AMR) in Spain

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **6,000 lives** have been lost each year since 1990 in Spain due to AMR.
- In 2021, there were an estimated **6,350 UI (5,450-7,260)** deaths attributable to AMR and **27,800 UI (23,900-31,700)** 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, *Pseudomonas aeruginosa* resistant to carbapenems and *Streptococcus pneumoniae* resistant to carbapenems.

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



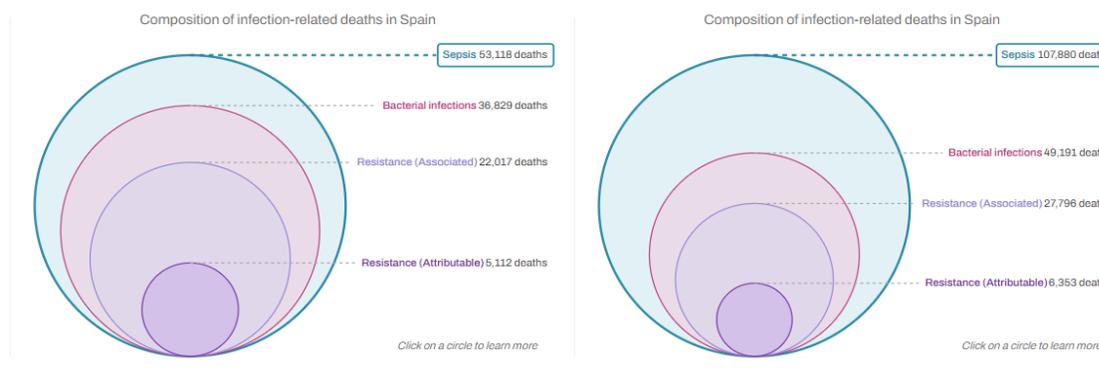
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Spain, a 10% reduction means to decrease the number of deaths associated with AMR to **27,000**, but currently the trend for this country could reach up to **34,100 UI [25,700-40,500]** AMR-associated deaths in 2030.

## AMR in Spain

### 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 Spain between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Spain** in 2021, there were an estimated **6,350 UI (5,450-7,260)** deaths attributable to AMR and **27,800 UI (23,900-31,700)** 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, **Spain has the 25th 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 14,500 UI (12,500-16,400) ↑	Staphylococcus aureus 8,620 UI (7,400-9,840) ↑	Staphylococcus aureus 2,260 UI (1,790-2,730) ↑
	Escherichia coli 7,630 UI (6,540-8,720) ↑	Escherichia coli 5,730 UI (4,910-6,560) ↑	Escherichia coli 1,020 UI (804-1,230) ↑
	Streptococcus pneumoniae 5,240 UI (4,550-5,930) ↓	Streptococcus pneumoniae 2,650 UI (2,270-3,030) ↓	Pseudomonas aeruginosa 653 UI (513-793) ↑
	Pseudomonas aeruginosa 4,520 UI (3,930-5,120) ↑	Pseudomonas aeruginosa 2,510 UI (2,120-2,910) ↑	Acinetobacter baumannii 609 UI (526-693) ↓
	Klebsiella pneumoniae 3,400 UI (2,940-3,870) ↑	Klebsiella pneumoniae 1,870 UI (1,590-2,150) ↑	Streptococcus pneumoniae 562 UI (453-670) ↓
	Acinetobacter baumannii 1,870 UI (1,640-2,100) ↓	Acinetobacter baumannii 1,570 UI (1,350-1,790) ↓	Klebsiella pneumoniae 466 UI (388-543) ↑
	Enterococcus faecalis 1,820 UI (1,580-2,070) ↑	Enterococcus faecium 1,440 UI (1,230-1,640) ↑	Enterococcus faecium 198 UI (129-266) ↑
	Group A Streptococcus 1,760 UI (1,470-2,040) ↑	Proteus spp. 890 UI (688-1,090) ↑	Enterobacter spp. 165 UI (138-192) ↓
	Enterococcus faecium 1,600 UI (1,370-1,820) ↑	Enterobacter spp. 643 UI (528-758) ↓	Proteus spp. 118 UI (84-151) ↑
	Proteus spp. 1,470 UI (1,250-1,690) ↑	Enterococcus faecalis 606 UI (514-698) ↑	Enterococcus faecalis 105 UI (75-134) ↑

Annualized rate of change (1990-2021): <-3% (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)

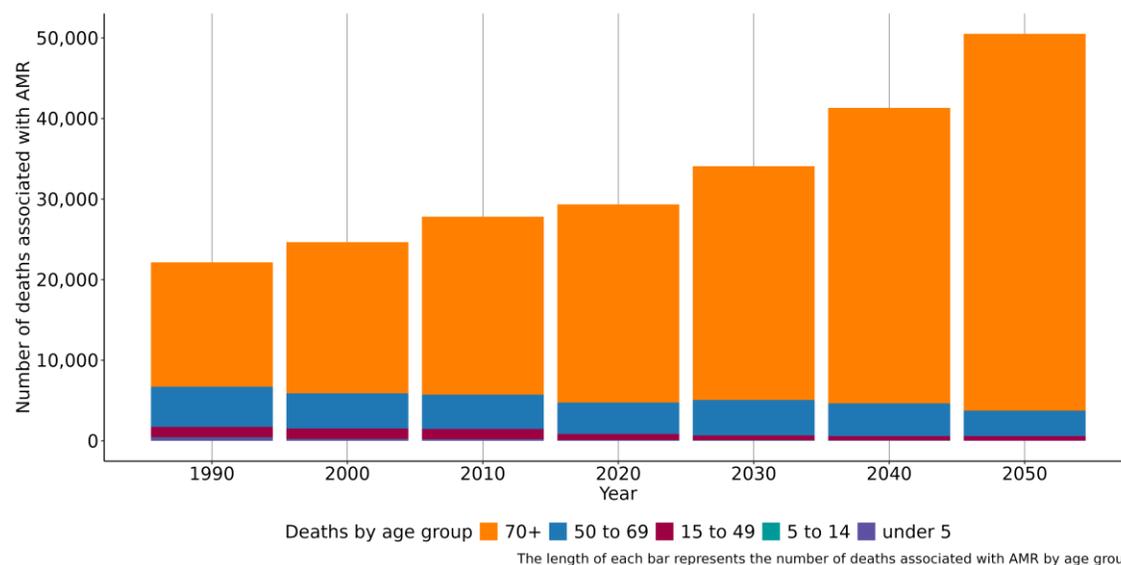
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

	Associated	Attributable
Burden Rank	Staphylococcus aureus Methicillin 6,580 UI (4,730-8,430) ↑	Staphylococcus aureus Methicillin 1,640 UI (1,130-2,140) ↑
	Staphylococcus aureus Macrolides 5,840 UI (4,700-6,990) ↑	Streptococcus pneumoniae Carbapenems 360 UI (263-456) ↓
	Escherichia coli Aminopenicillin 5,270 UI (4,420-6,110) ↑	Pseudomonas aeruginosa Carbapenems 349 UI (244-453) ↑
	Staphylococcus aureus Fluoroquinolones 4,450 UI (3,520-5,380) ↑	Staphylococcus aureus Fluoroquinolones 287 UI (98-475) ↑
	Escherichia coli Fluoroquinolones 3,430 UI (2,750-4,120) ↑	Acinetobacter baumannii Carbapenems 262 UI (200-324) ↓
	Escherichia coli TMP-SMX 2,800 UI (2,220-3,390) ↑	Escherichia coli Fluoroquinolones 251 UI (121-381) ↑
	Escherichia coli Beta-Lactam/Lactamase Inhib. 2,450 UI (2,030-2,880) ↑	Staphylococcus aureus Macrolides 243 UI (158-327) ↑
	Pseudomonas aeruginosa Carbapenems 1,790 UI (1,490-2,090) ↑	Escherichia coli Aminopenicillin 239 UI (178-299) ↑
	Streptococcus pneumoniae TMP-SMX 1,670 UI (1,200-2,150) ↓	Acinetobacter baumannii Fluoroquinolones 174 UI (140-207) ↓
	Pseudomonas aeruginosa Fluoroquinolones 1,570 UI (1,290-1,850) ↑	Escherichia coli Beta-Lactam/Lactamase Inhib. 165 UI (48-282) ↑

Annualized rate of change (1990-2021): <-3% (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 (20,200 UI (17,600-22,900)), lower respiratory infection (excl. COVID) (20,100 UI (17,200-23,000)), peritoneal and intra-abdominal infections (10,000 UI (8,640-11,500)), urinary tract infections and pyelonephritis (8,250 UI (6,810-9,700)) and infections of the skin and subcutaneous systems (3,200 UI (2,660-3,750)).

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



- In Spain, 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 22,900 UI (19,200-26,500), whereas the mortality rate per 100,000 was 338 UI (284-392).

### Data sources for Spain

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 Spain by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	4,242,968	Isolates
Microbial or laboratory data with outcome	1990-2021	66,610	Isolates
Literature studies	1990-2021	59,707	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	303,237	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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- **LinkedIn:** <https://www.linkedin.com/company/institute-for-health-metrics-and-evaluation>