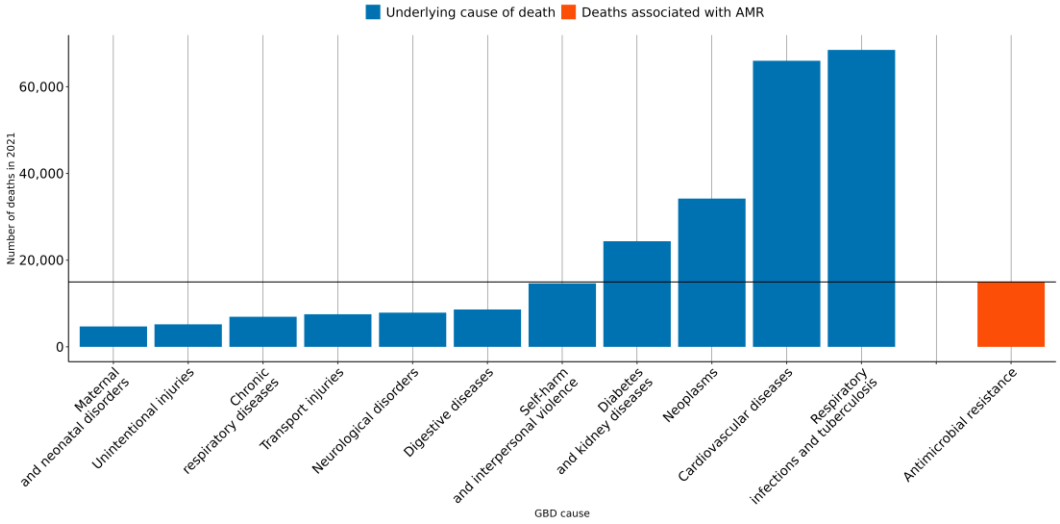
The burden of antimicrobial resistance (AMR) in Venezuela (Bolivarian Republic of)

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **3,000 lives** have been lost each year since 1990 in Venezuela (Bolivarian Republic of) due to AMR.
- In 2021, there were an estimated **3,790 UI (2,860-4,720)** deaths attributable to AMR and **15,000 UI (11,100-18,900)** 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, *Acinetobacter baumannii* resistant to carbapenems and *Streptococcus pneumoniae* resistant to carbapenems.

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



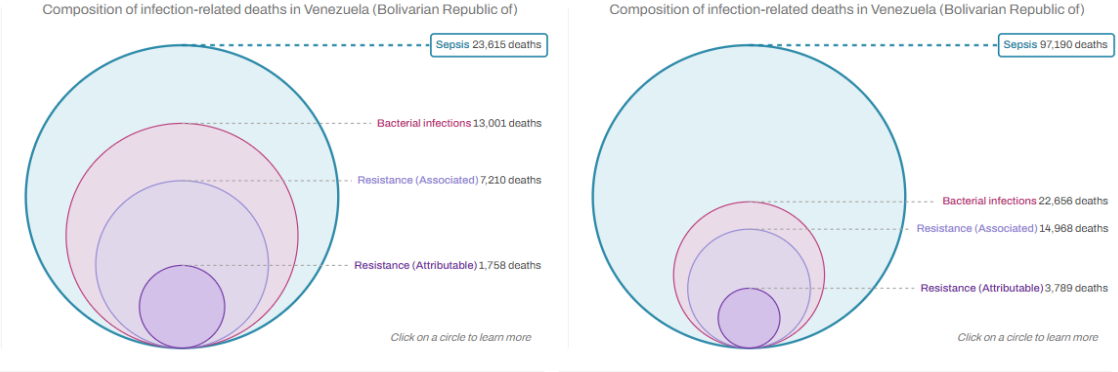
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Venezuela, a 10% reduction means to decrease the number of deaths associated with AMR to **13,600**, but currently the trend for this country could reach up to **20,700 UI [12,600-31,900]** AMR-associated deaths in 2030.

AMR in Venezuela (Bolivarian Republic of)

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 Venezuela (Bolivarian Republic of) between 1990 and 2019.



- To look at these and more visualization interactively visit Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE)
- In **Venezuela (Bolivarian Republic of)** in 2021, there were an estimated **3,790 UI (2,860-4,720)** deaths attributable to AMR and **15,000 UI (11,100-18,900)** 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, **Venezuela (Bolivarian Republic of) has the 97th 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)

Burden rank	Overall susceptible and resistant	Associated	Attributable
1	Staphylococcus aureus 3,800 UI (2,830-4,760) ↑	Staphylococcus aureus 2,740 UI (2,050-3,430) ↑	Acinetobacter baumannii 896 UI (699-1,090) ↑
2	Streptococcus pneumoniae 3,660 UI (2,740-4,580) ↑	Streptococcus pneumoniae 2,700 UI (1,920-3,480) ↑	Staphylococcus aureus 790 UI (589-991) ↑
3	Acinetobacter baumannii 2,530 UI (1,870-3,190) ↑	Acinetobacter baumannii 2,260 UI (1,670-2,850) ↑	Streptococcus pneumoniae 517 UI (331-703) ↑
4	Klebsiella pneumoniae 2,440 UI (1,800-3,070) ↑	Escherichia coli 2,100 UI (1,560-2,640) ↑	Klebsiella pneumoniae 415 UI (314-516) ↑
5	Escherichia coli 2,370 UI (1,760-2,980) ↑	Klebsiella pneumoniae 1,650 UI (1,210-2,090) ↑	Pseudomonas aeruginosa 411 UI (283-540) ↑
6	Pseudomonas aeruginosa 2,310 UI (1,710-2,900) ↑	Pseudomonas aeruginosa 1,590 UI (1,170-2,010) ↑	Escherichia coli 399 UI (283-516) ↑
7	Mycobacterium tuberculosis 910 UI (643-1,180) ↓	Enterobacter spp. 440 UI (307-574) ↑	Enterobacter spp. 97 UI (71-123) ↑
8	Enterobacter spp. 697 UI (514-879) ↑	Proteus spp. 290 UI (203-377) ↑	Enterococcus faecium 54 UI (34-73) ↑
9	Enterococcus faecalis 677 UI (497-857) ↑	Enterococcus faecium 270 UI (189-351) ↑	Serratia spp. 53 UI (36-69) ↑
10	Enterococcus faecium 492 UI (360-625) ↑	Serratia spp. 220 UI (150-290) ↑	Proteus spp. 39 UI (25-53) ↑

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	
1	Staphylococcus aureus Methicillin	2,400 UI (1,720-3,080) ↑	Staphylococcus aureus Methicillin	629 UI (454-804) ↑
2	Streptococcus pneumoniae Macrolides	2,090 UI (1,500-2,680) ↑	Acinetobacter baumannii Carbapenems	430 UI (306-555) ↑
3	Acinetobacter baumannii Carbapenems	2,000 UI (1,480-2,530) ↑	Streptococcus pneumoniae Carbapenems	302 UI (177-427) ↑
4	Acinetobacter baumannii 4GC	1,970 UI (1,430-2,510) ↑	Acinetobacter baumannii Fluoroquinolones	247 UI (191-304) ↑
5	Acinetobacter baumannii Fluoroquinolones	1,970 UI (1,450-2,480) ↑	Pseudomonas aeruginosa Carbapenems	174 UI (97-251) ↑
6	Acinetobacter baumannii 3GC	1,960 UI (1,440-2,480) ↑	Acinetobacter baumannii Aminoglycosides	136 UI (92-180) ↑
7	Acinetobacter baumannii Anti-pseudomonal	1,960 UI (1,450-2,470) ↑	Klebsiella pneumoniae Fluoroquinolones	126 UI (80-172) ↑
8	Escherichia coli Aminopenicillin	1,870 UI (1,380-2,360) ↑	Escherichia coli Fluoroquinolones	112 UI (53-170) ↑
9	Staphylococcus aureus Macrolides	1,850 UI (1,340-2,360) ↑	Pseudomonas aeruginosa Fluoroquinolones	103 UI (64-143) ↑
10	Acinetobacter baumannii Aminoglycosides	1,760 UI (1,280-2,230) ↑	Klebsiella pneumoniae Aminoglycosides	88 UI (51-125) ↑

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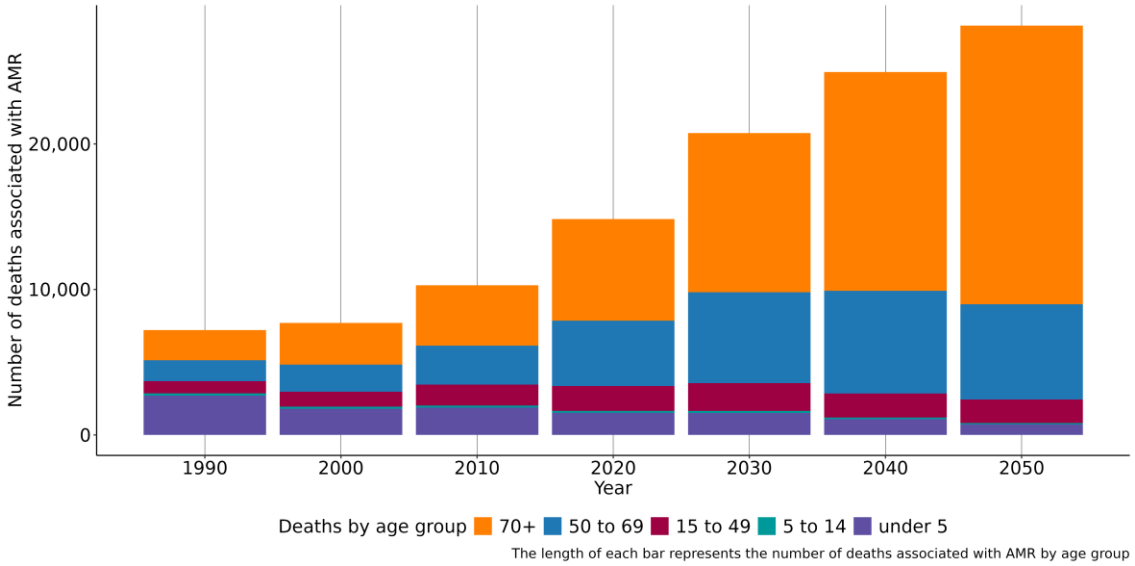
- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) bloodstream infections (11,700 UI (8,660-14,800)), lower respiratory infection (excl. COVID) (10,700 UI (8,000-13,400)), peritoneal and intra-abdominal infections (2,930 UI (2,100-3,760)), urinary tract infections and pyelonephritis (1,880 UI (1,380-2,380)) and diarrhea (1,580 UI (1,130-2,020)).

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



- In Venezuela (Bolivarian Republic of), 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 7,090 UI (5,440-8,740), whereas the mortality rate per 100,000 was 442 UI (339-545).

Data sources for Venezuela (Bolivarian Republic of)

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 Venezuela (Bolivarian Republic of) by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	435,379	Isolates
Microbial or laboratory data with outcome	2010-2021	1,193	Isolates
Literature studies	1990-2021	3,076	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	231,475	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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