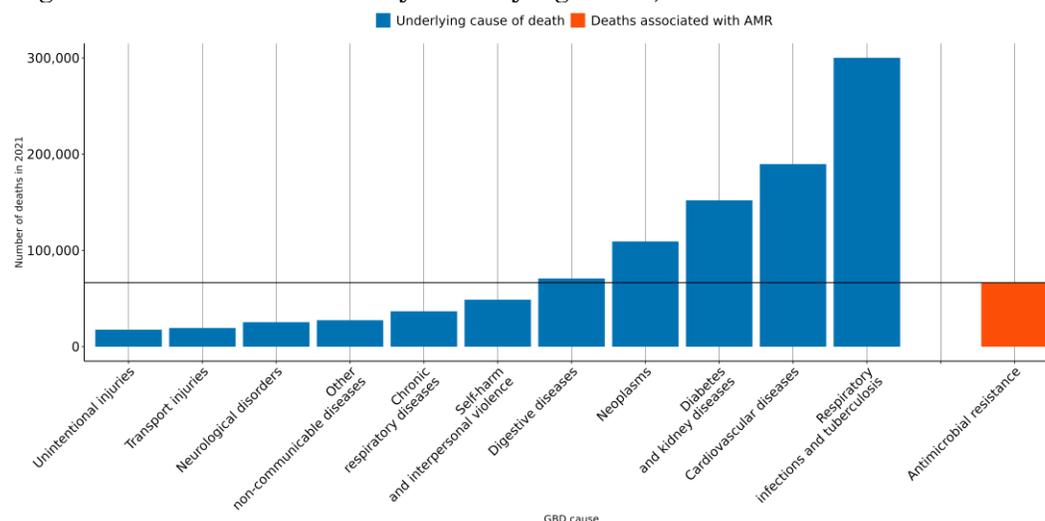


The burden of antimicrobial resistance (AMR) in Mexico

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **10,000 lives** have been lost each year since 1990 in Mexico due to AMR.
- In 2021, there were an estimated **16,100 UI (13,500-18,700)** deaths attributable to AMR and **66,500 UI (57,700-75,400)** 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



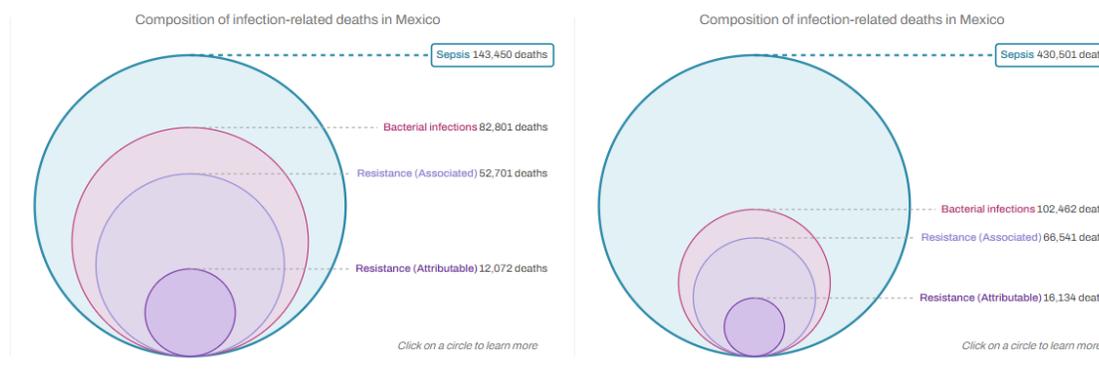
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Mexico, a 10% reduction means to decrease the number of deaths associated with AMR to **60,600**, but currently the trend for this country could reach up to **85,400 UI [69,800-99,700]** AMR-associated deaths in 2030.

AMR in Mexico

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 Mexico between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Mexico** in 2021, there were an estimated **16,100 UI (13,500-18,700)** deaths attributable to AMR and **66,500 UI (57,700-75,400)** 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, **Mexico has the 101st 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	
	Bacteria	UI (range)	Bacteria	UI (range)	Bacteria	UI (range)
	Staphylococcus aureus	17,800 UI (15,800-19,700)	Escherichia coli	13,100 UI (11,600-14,700)	Escherichia coli	2,730 UI (2,270-3,180)
	Escherichia coli	14,400 UI (12,700-16,000)	Staphylococcus aureus	10,600 UI (8,780-12,500)	Staphylococcus aureus	2,550 UI (1,920-3,180)
	Klebsiella pneumoniae	12,800 UI (11,400-14,300)	Klebsiella pneumoniae	9,300 UI (7,970-10,600)	Acinetobacter baumannii	2,420 UI (2,090-2,740)
	Pseudomonas aeruginosa	12,100 UI (10,700-13,500)	Streptococcus pneumoniae	8,830 UI (7,450-10,200)	Klebsiella pneumoniae	2,290 UI (1,880-2,700)
	Streptococcus pneumoniae	11,500 UI (10,200-12,800)	Pseudomonas aeruginosa	8,140 UI (7,090-9,190)	Pseudomonas aeruginosa	2,160 UI (1,700-2,630)
	Acinetobacter baumannii	6,240 UI (5,530-6,940)	Acinetobacter baumannii	6,000 UI (5,320-6,680)	Streptococcus pneumoniae	2,010 UI (1,510-2,510)
	Enterococcus faecalis	3,240 UI (2,850-3,630)	Enterococcus faecium	2,090 UI (1,830-2,340)	Enterococcus faecium	490 UI (404-576)
	Group A Streptococcus	2,980 UI (2,570-3,390)	Proteus spp.	1,680 UI (1,440-1,910)	Enterobacter spp.	382 UI (325-438)
	Enterobacter spp.	2,940 UI (2,600-3,290)	Enterobacter spp.	1,510 UI (1,280-1,730)	Proteus spp.	242 UI (185-299)
	Proteus spp.	2,920 UI (2,590-3,260)	Enterococcus faecalis	1,190 UI (1,020-1,350)	Enterococcus faecalis	206 UI (151-261)

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

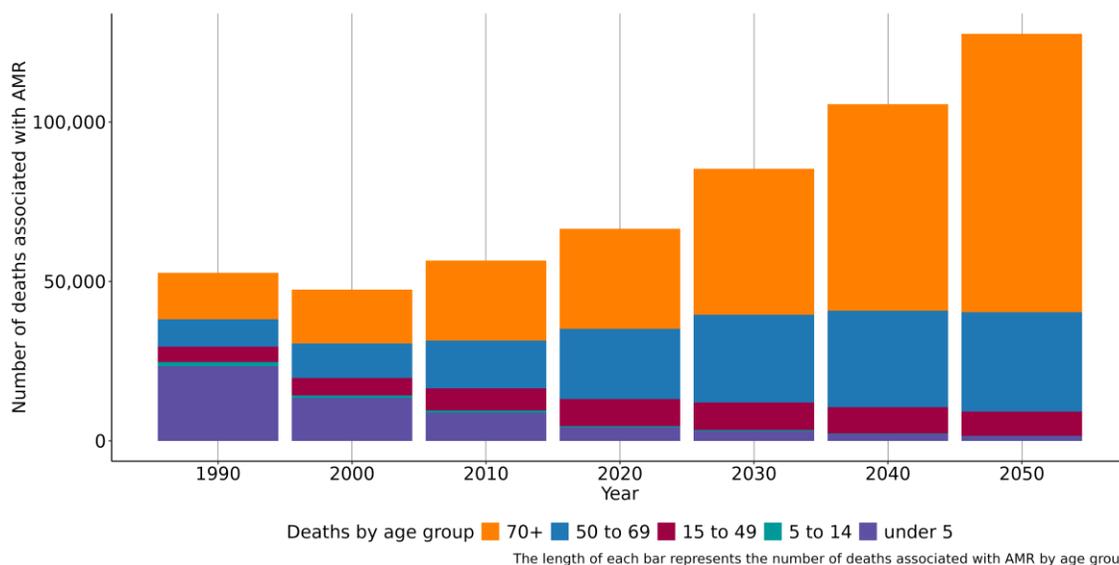
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	Combination	UI (range)	Combination	UI (range)
	Escherichia coli Aminopenicillin	12,500 UI (10,900-14,100)	Staphylococcus aureus Methicillin	1,680 UI (1,110-2,250)
	Escherichia coli Fluoroquinolones	10,200 UI (8,830-11,600)	Streptococcus pneumoniae Carbapenems	1,530 UI (1,070-1,980)
	Escherichia coli TMP-SMX	8,890 UI (7,810-9,970)	Acinetobacter baumannii Carbapenems	1,230 UI (956-1,510)
	Staphylococcus aureus Macrolides	7,900 UI (6,620-9,180)	Pseudomonas aeruginosa Carbapenems	1,140 UI (749-1,530)
	Streptococcus pneumoniae TMP-SMX	7,380 UI (5,830-8,940)	Escherichia coli 3GC	713 UI (448-977)
	Escherichia coli 3GC	7,330 UI (6,230-8,420)	Acinetobacter baumannii Fluoroquinolones	687 UI (550-823)
	Klebsiella pneumoniae Fluoroquinolones	7,130 UI (6,030-8,240)	Escherichia coli Fluoroquinolones	686 UI (395-977)
	Staphylococcus aureus Methicillin	7,040 UI (4,540-9,540)	Klebsiella pneumoniae Fluoroquinolones	583 UI (392-773)
	Klebsiella pneumoniae Aminoglycosides	7,030 UI (5,830-8,230)	Klebsiella pneumoniae Aminoglycosides	519 UI (375-662)
	Klebsiella pneumoniae TMP-SMX	6,700 UI (5,580-7,810)	Klebsiella pneumoniae 3GC	444 UI (272-617)

Annualized rate of change (1990-2021): <-3% (blue), -3% to -1.5% (light blue), -1.5% to 0% (light red), 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) lower respiratory infection (excl. COVID) (51,000 UI (44,800-57,200)), bloodstream infections (50,900 UI (45,600-56,100)), peritoneal and intra-abdominal infections (15,700 UI (13,600-17,700)), urinary tract infections and pyelonephritis (15,000 UI (12,900-17,100)) and infections of the skin and subcutaneous systems (7,560 UI (6,040-9,090)).

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



- In Mexico, 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 31,500 UI (27,300-35,800), whereas the mortality rate per 100,000 was 467 UI (404-529).

Data sources for Mexico

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 Mexico by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	1,062,334	Isolates
Microbial or laboratory data with outcome	2010-2021	16	Isolates
Literature studies	1990-2021	2,345	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	202,181	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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