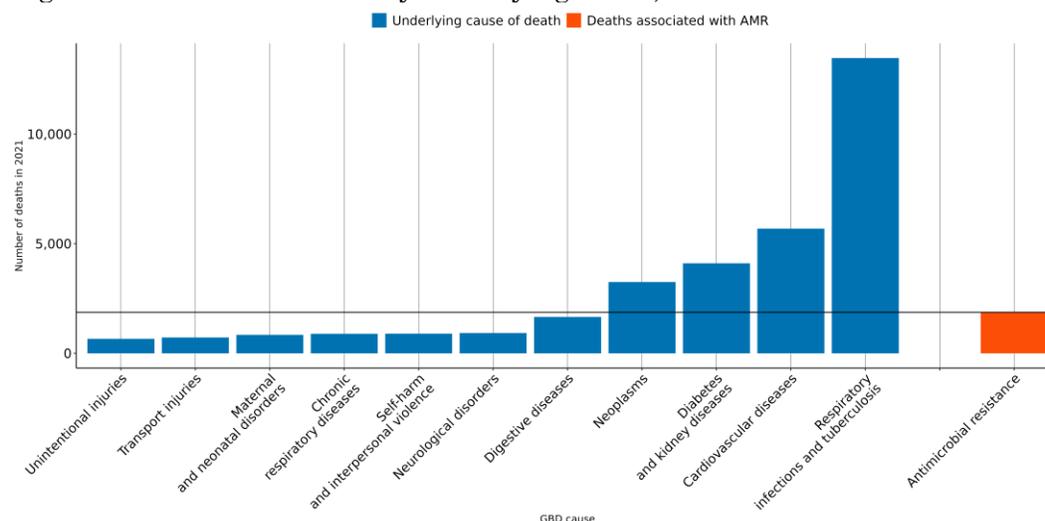


# The burden of antimicrobial resistance (AMR) in Nicaragua

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **500 lives** have been lost each year since 1990 in Nicaragua due to AMR.
- In 2021, there were an estimated **448 UI (358-538)** deaths attributable to AMR and **1,870 UI (1,550-2,190)** 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, *Klebsiella pneumoniae* resistant to third-generation cephalosporins and *Acinetobacter baumannii* resistant to fluoroquinolones.

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



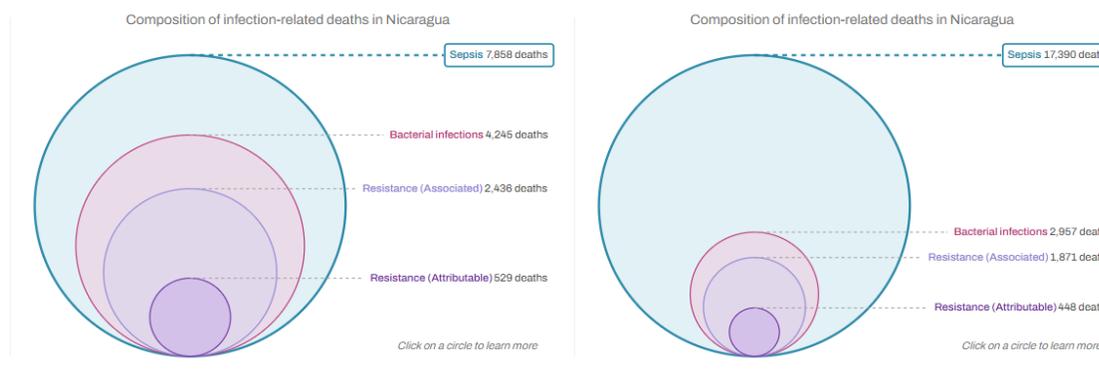
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Nicaragua, a 10% reduction means to decrease the number of deaths associated with AMR to **1,920**, but currently the trend for this country could reach up to **2,720 UI [2,010-3,580]** AMR-associated deaths in 2030.

## AMR in Nicaragua

### 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 Nicaragua between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Nicaragua** in 2021, there were an estimated **448 UI (358-538)** deaths attributable to AMR and **1,870 UI (1,550-2,190)** 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, **Nicaragua has the 61st 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)	Change	Bacteria (UI)	Change	Bacteria (UI)	Change
	Staphylococcus aureus 490 UI (416-564)	↑	Staphylococcus aureus 357 UI (288-426)	↑	Staphylococcus aureus 92 UI (64-121)	↑
	Klebsiella pneumoniae 354 UI (301-407)	↓	Escherichia coli 298 UI (247-349)	↓	Acinetobacter baumannii 72 UI (61-83)	↓
	Pseudomonas aeruginosa 335 UI (284-385)	↑	Klebsiella pneumoniae 281 UI (236-326)	↓	Klebsiella pneumoniae 72 UI (58-87)	↑
	Escherichia coli 328 UI (279-377)	↓	Pseudomonas aeruginosa 220 UI (183-258)	↑	Escherichia coli 56 UI (40-72)	↓
	Streptococcus pneumoniae 321 UI (275-366)	↓	Acinetobacter baumannii 196 UI (163-228)	↓	Pseudomonas aeruginosa 55 UI (43-67)	↑
	Mycobacterium tuberculosis 230 UI (176-284)	↓	Streptococcus pneumoniae 192 UI (135-259)	↓	Streptococcus pneumoniae 38 UI (23-53)	↓
	Acinetobacter baumannii 214 UI (181-248)	↓	Enterococcus faecium 45 UI (36-54)	↑	Serratia spp. 10 UI (8-12)	↓
	Group B Streptococcus 83 UI (69-98)	↓	Enterobacter spp. 44 UI (34-55)	↓	Enterobacter spp. 10 UI (8-12)	↓
	Enterobacter spp. 77 UI (65-89)	↑	Proteus spp. 43 UI (30-55)	↑	Enterococcus faecium 8 UI (6-11)	↑
	Group A Streptococcus 77 UI (65-88)	↓	Enterococcus faecalis 39 UI (32-47)	↑	Enterococcus faecalis 7 UI (5-9)	↑

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

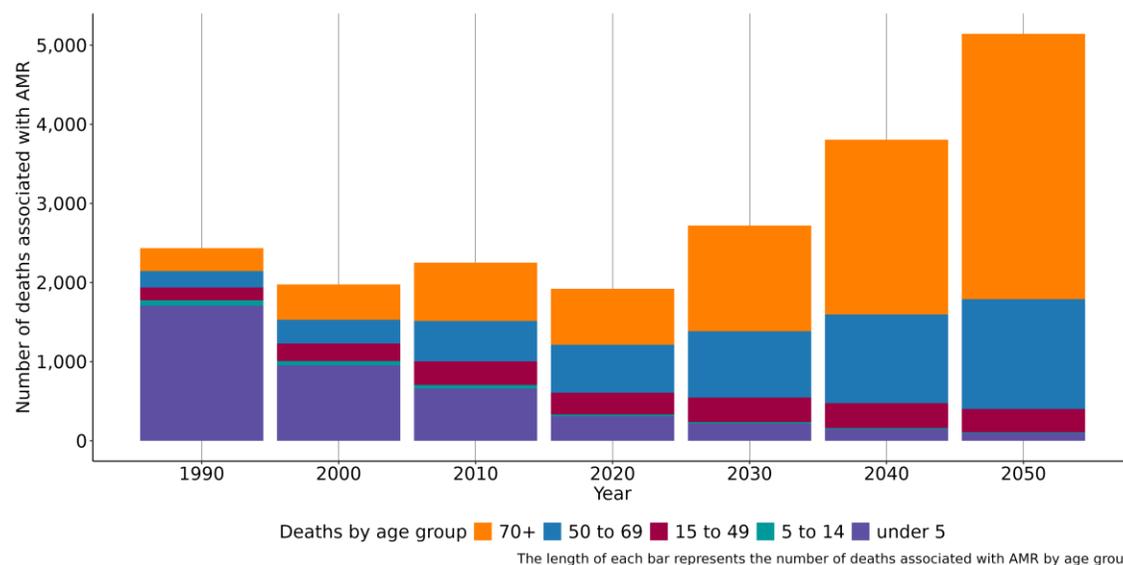
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated			Attributable		
	Bacteria (UI)	Change	Change	Bacteria (UI)	Change	Change
	Klebsiella pneumoniae 3GC	279 UI (234-323)	↑	Staphylococcus aureus Methicillin	60 UI (34-86)	↑
	Escherichia coli Aminopenicillin	273 UI (194-353)	↓	Klebsiella pneumoniae 3GC	33 UI (22-44)	↑
	Staphylococcus aureus Methicillin	260 UI (148-372)	↑	Acinetobacter baumannii Fluoroquinolones	22 UI (18-26)	↑
	Escherichia coli Fluoroquinolones	225 UI (152-298)	↑	Streptococcus pneumoniae Carbapenems	17 UI (9-26)	↓
	Escherichia coli TMP-SMX	220 UI (173-267)	↓	Acinetobacter baumannii Carbapenems	17 UI (10-24)	↑
	Staphylococcus aureus Macrolides	214 UI (166-263)	↑	Pseudomonas aeruginosa Anti-pseudomonal	16 UI (12-21)	↓
	Klebsiella pneumoniae TMP-SMX	189 UI (141-237)	↓	Pseudomonas aeruginosa Carbapenems	16 UI (8-24)	↑
	Acinetobacter baumannii 4GC	188 UI (155-221)	↓	Escherichia coli Fluoroquinolones	15 UI (7-22)	↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib.	184 UI (126-241)	↓	Klebsiella pneumoniae Fluoroquinolones	14 UI (10-19)	↑
	Acinetobacter baumannii 3GC	178 UI (143-213)	↓	Pseudomonas aeruginosa Fluoroquinolones	13 UI (8-18)	↓

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

- 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 (1,620 UI (1,380-1,870)), lower respiratory infection (excl. COVID) (1,350 UI (1,140-1,550)), peritoneal and intra-abdominal infections (379 UI (312-445)), urinary tract infections and pyelonephritis (264 UI (214-315)) and diarrhea (247 UI (174-320)).

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



- In Nicaragua, 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 683 UI (556-810), whereas the mortality rate per 100,000 was 273 UI (223-324).

### Data sources for Nicaragua

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 Nicaragua by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	1,082	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	2,053	Isolates
Literature studies	1990-2021	375	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	15,637	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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- **Facebook:** <https://www.facebook.com/IHMEUW>
- **LinkedIn:** <https://www.linkedin.com/company/institute-for-health-metrics-and-evaluation>