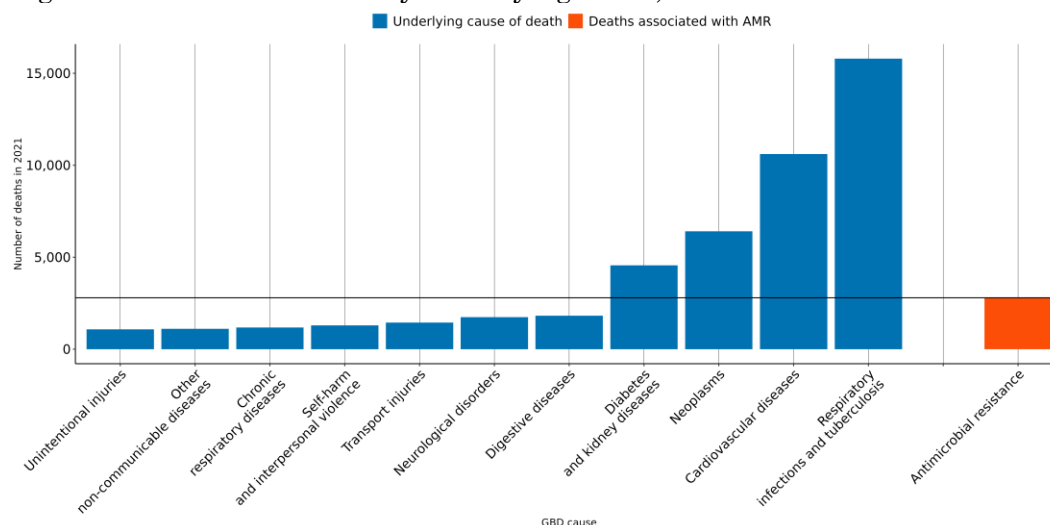


The burden of antimicrobial resistance (AMR) in Paraguay

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **600 lives** have been lost each year since 1990 in Paraguay due to AMR.
- In 2021, there were an estimated **703 UI (548-857)** deaths attributable to AMR and **2,800 UI (2,170-3,420)** 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 *Acinetobacter baumannii* resistant to Fluoroquinolones.

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



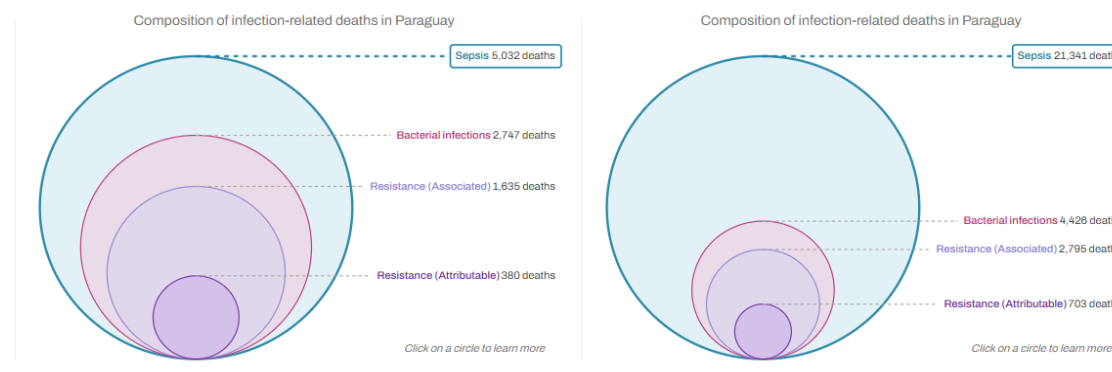
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Paraguay, a 10% reduction means to decrease the number of deaths associated with AMR to **2,830**, but currently the trend for this country could reach up to **3,710 UI [2,520-4,940]** AMR-associated deaths in 2030.

AMR in Paraguay

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 Paraguay between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Paraguay** in 2021, there were an estimated **703 UI (548-857)** deaths attributable to AMR and **2,800 UI (2,170-3,420)** 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, **Paraguay has the 89th 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	
	Staphylococcus aureus 784 UI (608-960)	↑	Staphylococcus aureus 550 UI (408-693)	↑	Staphylococcus aureus 159 UI (114-204)	↑
	Escherichia coli 543 UI (419-667)	↑	Escherichia coli 422 UI (297-547)	↑	Acinetobacter baumannii 114 UI (92-137)	↑
	Klebsiella pneumoniae 525 UI (405-644)	↑	Klebsiella pneumoniae 395 UI (299-491)	↑	Klebsiella pneumoniae 105 UI (79-131)	↑
	Pseudomonas aeruginosa 496 UI (383-609)	↑	Pseudomonas aeruginosa 371 UI (283-459)	↑	Pseudomonas aeruginosa 94 UI (67-121)	↑
	Streptococcus pneumoniae 486 UI (378-594)	↓	Acinetobacter baumannii 290 UI (224-355)	↑	Escherichia coli 75 UI (48-102)	↑
	Acinetobacter baumannii 310 UI (239-381)	↑	Streptococcus pneumoniae 235 UI (179-290)	↓	Streptococcus pneumoniae 42 UI (24-59)	↓
	Mycobacterium tuberculosis 251 UI (182-320)	↓	Enterococcus faecalis 82 UI (61-102)	↑	Enterococcus faecium 24 UI (18-30)	↑
	Enterobacter spp. 127 UI (97-157)	↑	Enterococcus faecium 82 UI (63-100)	↑	Enterobacter spp. 19 UI (14-23)	↑
	Enterococcus faecalis 125 UI (95-154)	↑	Proteus spp. 76 UI (53-98)	↑	Serratia spp. 17 UI (13-22)	↑
	Group A Streptococcus 116 UI (88-143)	↑	Enterobacter spp. 75 UI (56-95)	↑	Enterococcus faecalis 16 UI (10-23)	↑

Annualized rate of change (1990-2021)

<-3% -1.5% to 0% 1.5% to 3% >5.0%
 -3% to -1.5% 0% to 1.5% 3% to 5%

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

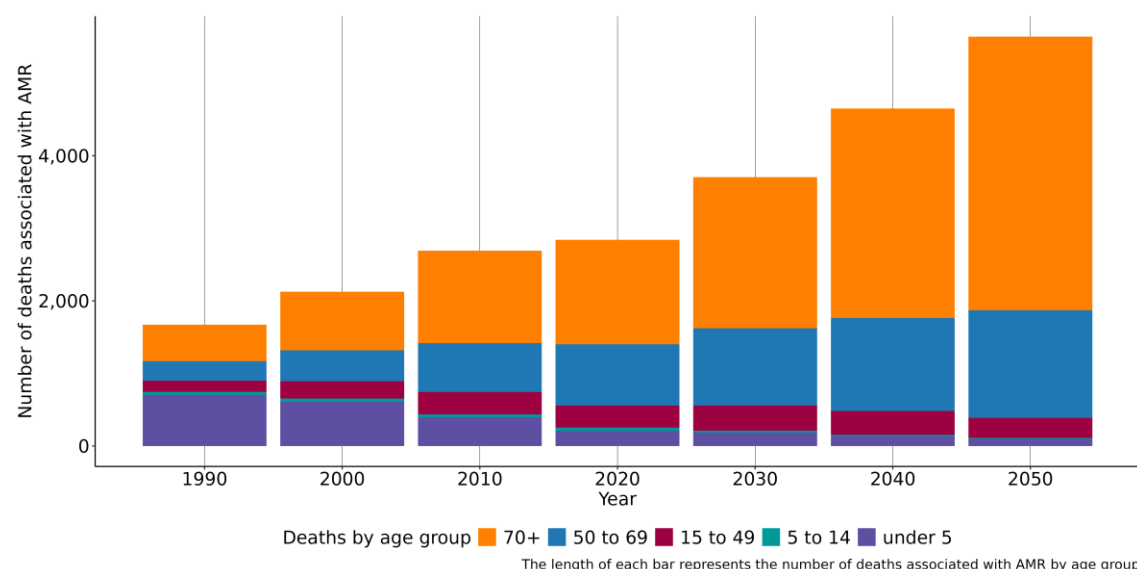
Burden Rank	Associated		Attributable	
	Staphylococcus aureus Methicillin 485 UI (324-646)	↑	Staphylococcus aureus Methicillin 124 UI (82-166)	↑
	Escherichia coli Aminopenicillin 394 UI (223-565)	↑	Acinetobacter baumannii Carbapenems 50 UI (34-67)	↑
	Staphylococcus aureus Macrolides 363 UI (268-459)	↑	Acinetobacter baumannii Fluoroquinolones 31 UI (24-38)	↑
	Klebsiella pneumoniae 3GC 357 UI (277-437)	↑	Pseudomonas aeruginosa Carbapenems 31 UI (15-47)	↑
	Klebsiella pneumoniae Aminoglycosides 324 UI (239-408)	↑	Klebsiella pneumoniae 3GC 27 UI (15-39)	↑
	Pseudomonas aeruginosa Anti-pseudomonal 309 UI (225-393)	↑	Pseudomonas aeruginosa Anti-pseudomonal 27 UI (19-35)	↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 297 UI (202-393)	↑	Pseudomonas aeruginosa Fluoroquinolones 25 UI (16-34)	↑
	Klebsiella pneumoniae Fluoroquinolones 288 UI (207-370)	↑	Klebsiella pneumoniae Aminoglycosides 24 UI (16-32)	↑
	Acinetobacter baumannii Anti-pseudomonal 275 UI (213-338)	↑	Klebsiella pneumoniae Fluoroquinolones 22 UI (14-30)	↑
	Acinetobacter baumannii 3GC 272 UI (209-334)	↑	Klebsiella pneumoniae Carbapenems 20 UI (14-26)	↑

Annualized rate of change (1990-2021)

<-3% -1.5% to 0% 1.5% to 3% >5.0%
 -3% to -1.5% 0% to 1.5% 3% to 5%

- 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 (2,360 UI (1,830-2,890)), lower respiratory infection (excl. COVID) (2,280 UI (1,760-2,800)), peritoneal and intra-abdominal infections (639 UI (481-797)), urinary tract infections and pyelonephritis (289 UI (213-365)) and tuberculosis (251 UI (182-320)).

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



- In Paraguay, 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 1,410 UI (1,110-1,720), whereas the mortality rate per 100,000 was 468 UI (367-570).

Data sources for Paraguay

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 Paraguay by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	1,840	Study-year datapoints
Microbial or laboratory data without outcome	2010-2021	63	Isolates
Literature studies	2010-2021	232	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	62,658	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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