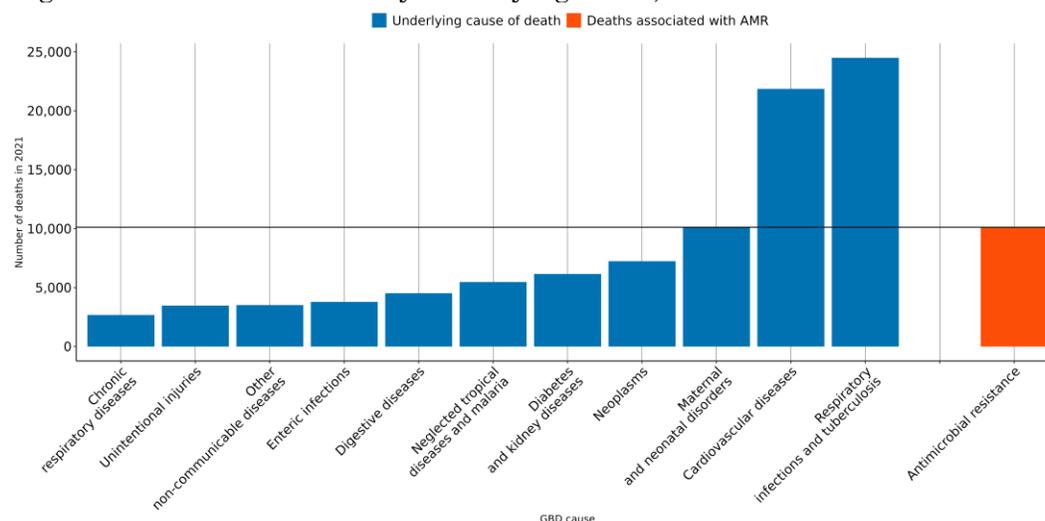


# The burden of antimicrobial resistance (AMR) in Senegal

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **3,000 lives** have been lost each year since 1990 in Senegal due to AMR.
- In 2021, there were an estimated **2,340 UI (1,770-2,920)** deaths attributable to AMR and **10,100 UI (8,010-12,200)** deaths associated with AMR in this location.
- The largest number of deaths associated with AMR in 2021 occurred among those aged **under 5** in the country.
- Among the most deadly pathogen-drug combinations in 2021 were *Staphylococcus aureus* resistant to methicillin, *Klebsiella pneumoniae* resistant to fluoroquinolones and *Streptococcus pneumoniae* resistant to third-generation cephalosporins.

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



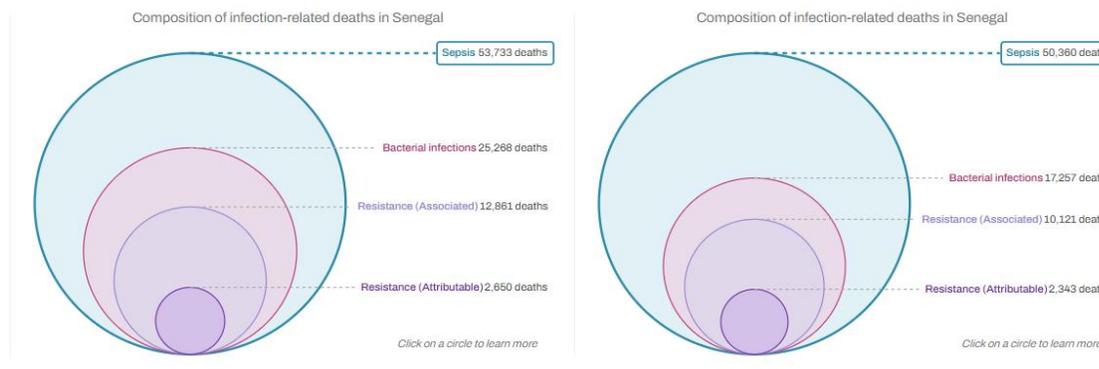
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Senegal, a 10% reduction means to decrease the number of deaths associated with AMR to **10,200**, but currently the trend for this country could reach up to **11,600 UI [8,560-15,500]** AMR-associated deaths in 2030.

## AMR in Senegal

### 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 Senegal between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Senegal** in 2021, there were an estimated **2,340 UI (1,770-2,920)** deaths attributable to AMR and **10,100 UI (8,010-12,200)** 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, **Senegal has the 46th highest** 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	
	Drug Class	UI (95% CI)	Drug Class	UI (95% CI)	Drug Class	UI (95% CI)
	Mycobacterium tuberculosis	2,890 UI (1,990-3,780)	Klebsiella pneumoniae	1,950 UI (1,610-2,280)	Klebsiella pneumoniae	476 UI (371-581)
	Klebsiella pneumoniae	2,130 UI (1,780-2,480)	Streptococcus pneumoniae	1,580 UI (1,220-1,950)	Acinetobacter baumannii	359 UI (294-424)
	Streptococcus pneumoniae	1,960 UI (1,590-2,320)	Escherichia coli	1,460 UI (1,170-1,740)	Escherichia coli	336 UI (250-422)
	Staphylococcus aureus	1,640 UI (1,340-1,930)	Staphylococcus aureus	1,140 UI (795-1,490)	Streptococcus pneumoniae	263 UI (182-344)
	Escherichia coli	1,540 UI (1,240-1,830)	Acinetobacter baumannii	978 UI (782-1,180)	Staphylococcus aureus	252 UI (147-356)
	Pseudomonas aeruginosa	1,470 UI (1,220-1,720)	Pseudomonas aeruginosa	976 UI (742-1,210)	Pseudomonas aeruginosa	245 UI (174-316)
	Acinetobacter baumannii	1,130 UI (921-1,330)	Group B Streptococcus	303 UI (218-389)	Enterobacter spp.	81 UI (66-96)
	Group B Streptococcus	637 UI (508-766)	Serratia spp.	263 UI (197-328)	Serratia spp.	72 UI (54-89)
	Shigella spp.	637 UI (347-927)	Enterobacter spp.	254 UI (206-301)	Mycobacterium tuberculosis	46 UI (0-145)
	Non-typhoidal Salmonella	546 UI (237-854)	Proteus spp.	167 UI (127-207)	Group B Streptococcus	39 UI (21-57)

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% (pink), 3% to 5% (orange)

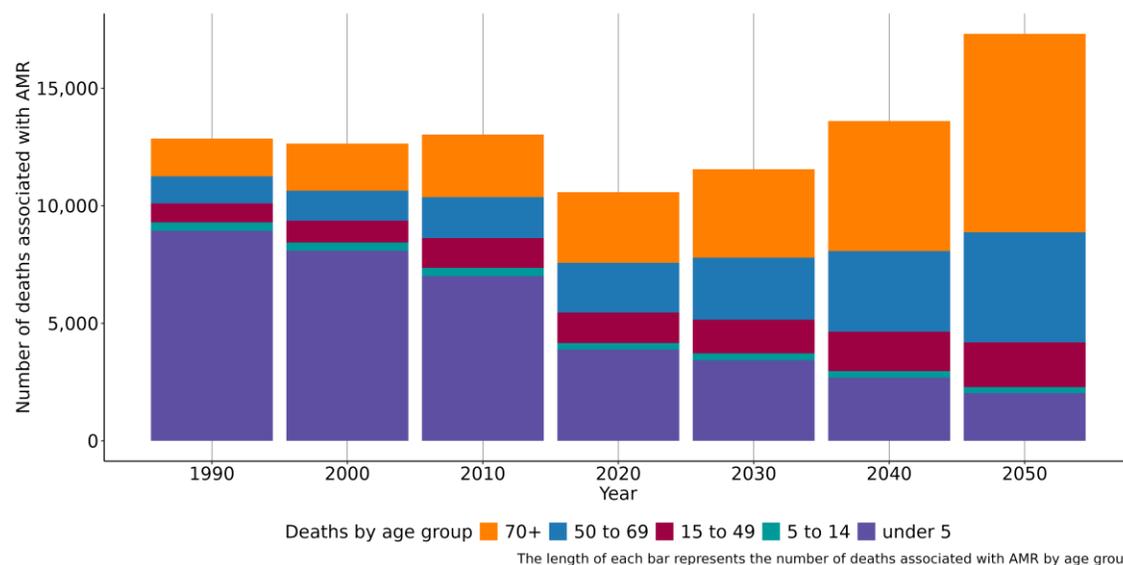
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	Drug Class	UI (95% CI)	Drug Class	UI (95% CI)
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib.	1,840 UI (1,500-2,180)	Staphylococcus aureus Methicillin	130 UI (48-211)
	Klebsiella pneumoniae TMP-SMX	1,750 UI (1,430-2,070)	Streptococcus pneumoniae 3GC	107 UI (71-143)
	Klebsiella pneumoniae Aminoglycosides	1,450 UI (1,160-1,740)	Klebsiella pneumoniae Fluoroquinolones	96 UI (62-131)
	Escherichia coli Aminopenicillin	1,400 UI (1,050-1,740)	Klebsiella pneumoniae Aminoglycosides	92 UI (66-119)
	Klebsiella pneumoniae Fluoroquinolones	1,380 UI (1,060-1,710)	Pseudomonas aeruginosa Carbapenems	87 UI (50-124)
	Escherichia coli TMP-SMX	1,210 UI (963-1,450)	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib.	83 UI (34-133)
	Streptococcus pneumoniae TMP-SMX	1,180 UI (782-1,580)	Acinetobacter baumannii Anti-pseudomonal	80 UI (66-93)
	Escherichia coli Beta-Lactam/Lactamase Inhib.	1,150 UI (926-1,380)	Escherichia coli Carbapenems	78 UI (9-147)
	Streptococcus pneumoniae Macrolides	1,150 UI (838-1,450)	Klebsiella pneumoniae Carbapenems	78 UI (56-100)
	Klebsiella pneumoniae 3GC	1,030 UI (804-1,250)	Acinetobacter baumannii Carbapenems	72 UI (38-105)

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% (pink), 3% to 5% (orange)

- 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 (8,240 UI (6,700-9,780)), lower respiratory infection (excl. COVID) (7,770 UI (6,290-9,250)), diarrhea (3,100 UI (1,800-4,390)), tuberculosis (2,890 UI (1,990-3,780)) and meningitis (1,420 UI (972-1,870)).

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



- In Senegal, people aged under 5 saw the largest number of deaths associated with AMR both in 1990 and 2021, which indicates that under 5 continues to be particularly vulnerable to infections which are resistant to antibiotics. In 2021, the number of deaths associated with AMR among the under 5 was 3,510 UI (2,600-4,430), whereas the mortality rate per 100,000 was 830 UI (638-1,020).

### Data sources for Senegal

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 Senegal by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	2,999	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	530	Isolates
Microbial or laboratory data with outcome	2010-2021	295	Isolates
Literature studies	1990-2021	10,666	Cases/isolates/susceptibility tests

## 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>
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