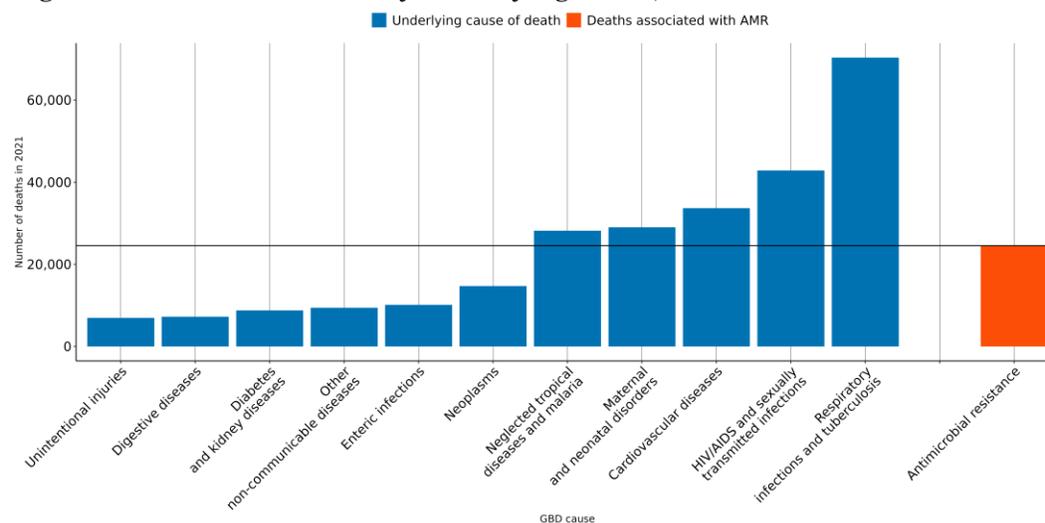


# The burden of antimicrobial resistance (AMR) in Mozambique

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **7,000 lives** have been lost each year since 1990 in Mozambique due to AMR.
- In 2021, there were an estimated **5,760 UI (3,630-7,890)** deaths attributable to AMR and **24,500 UI (18,100-31,000)** 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 multi-drug resistant *Mycobacterium tuberculosis* (excluding extensive drug-resistance), *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



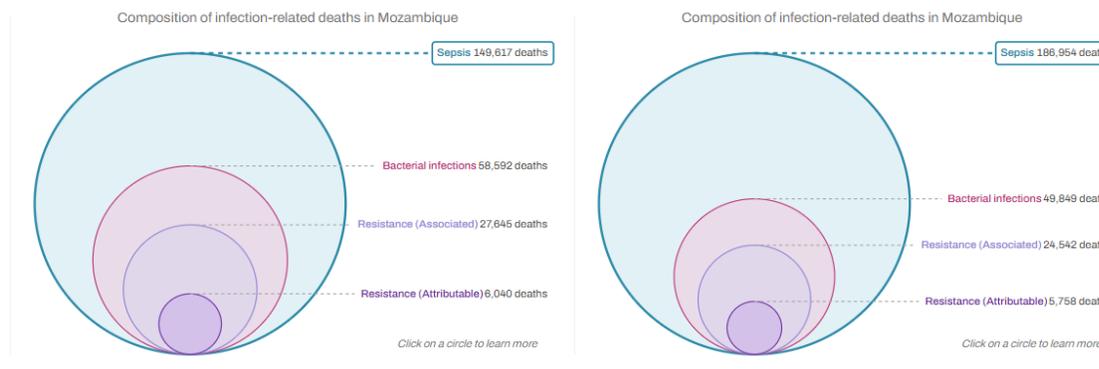
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Mozambique, a 10% reduction means to decrease the number of deaths associated with AMR to **24,200**, but currently the trend for this country could reach up to **25,100 UI [18,300-35,100]** AMR-associated deaths in 2030.

## AMR in Mozambique

### 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 Mozambique between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Mozambique** in 2021, there were an estimated **5,760 UI (3,630-7,890)** deaths attributable to AMR and **24,500 UI (18,100-31,000)** 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, **Mozambique was among the highest 10 countries** in 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)

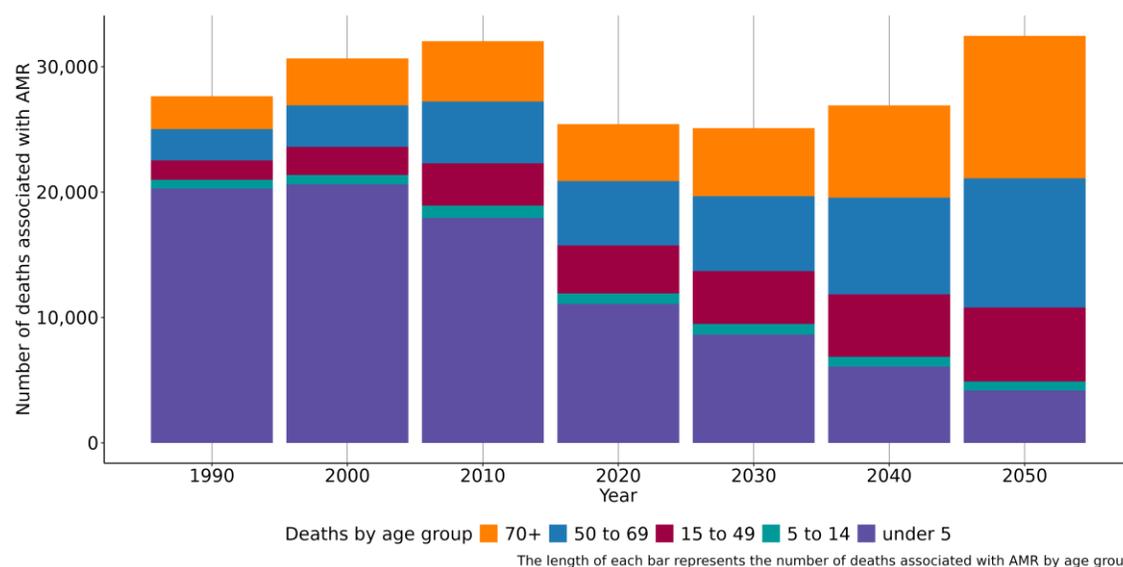
Burden rank	Overall susceptible and resistant		Associated		Attributable	
	Bacteria	Annualized rate of change (1990-2021)	Bacteria	Annualized rate of change (1990-2021)	Bacteria	Annualized rate of change (1990-2021)
	Mycobacterium tuberculosis 18,100 UI (12,200-24,100)	↓	Klebsiella pneumoniae 4,850 UI (3,770-5,940)	↑	Klebsiella pneumoniae 1,130 UI (836-1,420)	↑
	Klebsiella pneumoniae 5,360 UI (4,200-6,520)	↑	Streptococcus pneumoniae 3,660 UI (2,670-4,650)	↓	Acinetobacter baumannii 782 UI (623-941)	↑
	Streptococcus pneumoniae 4,460 UI (3,490-5,430)	↓	Escherichia coli 3,530 UI (2,520-4,540)	↓	Streptococcus pneumoniae 780 UI (476-1,080)	↓
	Escherichia coli 3,890 UI (2,830-4,950)	↓	Staphylococcus aureus 2,260 UI (1,570-2,950)	↑	Escherichia coli 664 UI (415-914)	↓
	Pseudomonas aeruginosa 3,280 UI (2,600-3,970)	↑	Mycobacterium tuberculosis 2,060 UI (575-4,650)	↑	Mycobacterium tuberculosis 658 UI (0-2,250)	↑
	Staphylococcus aureus 3,010 UI (2,380-3,650)	↑	Acinetobacter baumannii 1,990 UI (1,550-2,440)	↓	Staphylococcus aureus 489 UI (330-647)	↑
	Acinetobacter baumannii 2,090 UI (1,630-2,550)	↓	Pseudomonas aeruginosa 1,810 UI (1,230-2,390)	↑	Pseudomonas aeruginosa 435 UI (273-596)	↑
	Group B Streptococcus 1,720 UI (1,230-2,210)	↑	Serratia spp. 841 UI (608-1,070)	↓	Serratia spp. 244 UI (174-315)	↓
	Serratia spp. 1,090 UI (795-1,390)	↑	Group B Streptococcus 627 UI (433-821)	↑	Enterobacter spp. 170 UI (123-216)	↑
	Haemophilus influenzae 967 UI (711-1,220)	↓	Enterobacter spp. 557 UI (429-684)	↑	Haemophilus influenzae 79 UI (35-123)	↓

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

Burden Rank	Associated		Attributable	
	Combination	Annualized rate of change (1990-2021)	Combination	Annualized rate of change (1990-2021)
	Klebsiella pneumoniae TMP-SMX 4,720 UI (3,670-5,780)	↑	Mycobacterium tuberculosis MDR excluding XDR 645 UI (0-2,220)	↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 4,080 UI (2,990-5,160)	↑	Acinetobacter baumannii Carbapenems 442 UI (319-565)	↑
	Klebsiella pneumoniae 3GC 4,060 UI (3,120-5,000)	↑	Streptococcus pneumoniae Carbapenems 419 UI (230-608)	↓
	Klebsiella pneumoniae Fluoroquinolones 3,460 UI (2,510-4,410)	↑	Klebsiella pneumoniae 3GC 358 UI (197-519)	↑
	Streptococcus pneumoniae TMP-SMX 3,340 UI (2,370-4,300)	↓	Klebsiella pneumoniae Fluoroquinolones 260 UI (157-362)	↑
	Escherichia coli TMP-SMX 3,120 UI (2,250-3,980)	↓	Staphylococcus aureus Methicillin 244 UI (133-355)	↑
	Escherichia coli Aminopenicillin 3,110 UI (1,900-4,320)	↓	Klebsiella pneumoniae TMP-SMX 219 UI (106-332)	↑
	Escherichia coli Beta-Lactam/Lactamase Inhib. 2,420 UI (1,710-3,120)	↓	Escherichia coli TMP-SMX 185 UI (124-247)	↓
	Klebsiella pneumoniae Aminoglycosides 2,330 UI (1,620-3,030)	↑	Klebsiella pneumoniae Aminoglycosides 148 UI (92-203)	↑
	Mycobacterium tuberculosis MDR excluding XDR 2,030 UI (567-4,590)	↑	Pseudomonas aeruginosa Anti-pseudomonal 145 UI (92-199)	↑

- 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 (21,000 UI (15,100-26,800)), tuberculosis (18,100 UI (12,200-24,100)), lower respiratory infection (excl. COVID) (17,000 UI (13,400-20,600)), diarrhea (9,050 UI (4,370-13,700)) and meningitis (2,450 UI (1,650-3,260)).

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



- In Mozambique, 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 10,500 UI (6,850-14,100), whereas the mortality rate per 100,000 was 1,030 UI (774-1,290).

### Data sources for Mozambique

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 Mozambique by source type

Source type	Years	Sample size	Sample size units
Mortality surveillance (Minimally invasive tissue sampling [MITS])	2010-2021	355	Deaths
Antibiotic use	1990-2021	649	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	4,636	Isolates
Literature studies	1990-2021	5,856	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	431	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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