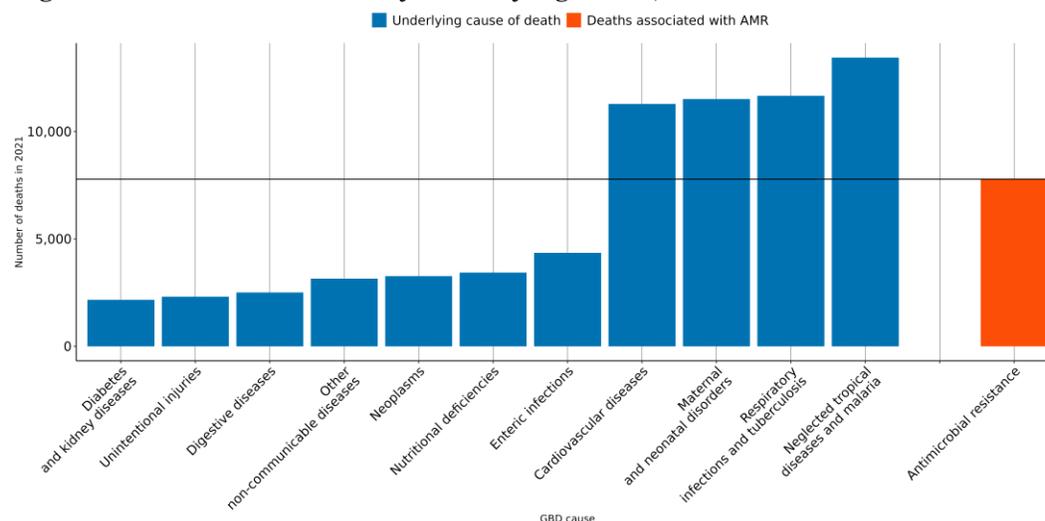


The burden of antimicrobial resistance (AMR) in Sierra Leone

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **2,000 lives** have been lost each year since 1990 in Sierra Leone due to AMR.
- In 2021, there were an estimated **1,630 UI (1,050-2,200)** deaths attributable to AMR and **7,780 UI (5,240-10,300)** 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, *Escherichia coli* resistant to third-generation cephalosporins and *Klebsiella pneumoniae* resistant to third-generation cephalosporins.

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



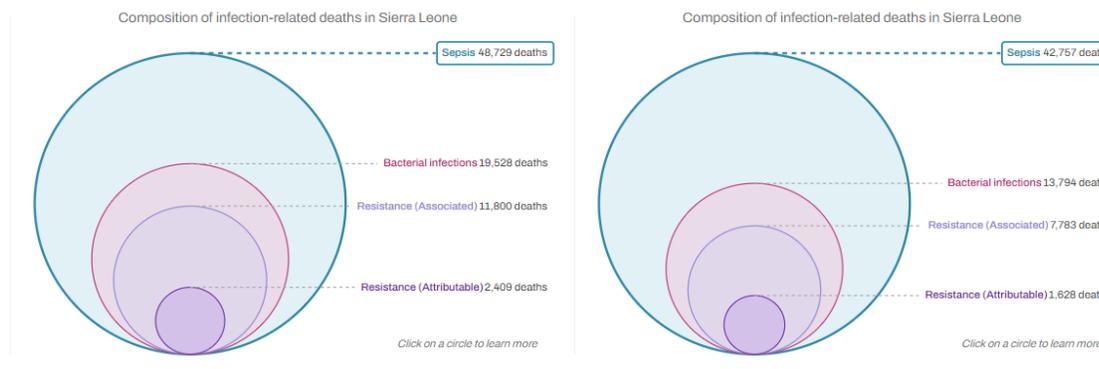
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Sierra Leone, a 10% reduction means to decrease the number of deaths associated with AMR to **7,660**, but currently the trend for this country could reach up to **8,020 UI [5,120-11,700]** AMR-associated deaths in 2030.

AMR in Sierra Leone

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 Sierra Leone between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Sierra Leone** in 2021, there were an estimated **1,630 UI (1,050-2,200)** deaths attributable to AMR and **7,780 UI (5,240-10,300)** 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, **Sierra Leone has the 24th 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	
	UI (range)	Change	UI (range)	Change	UI (range)	Change
	Mycobacterium tuberculosis 2,460 UI (1,600-3,320)	↓	Klebsiella pneumoniae 1,520 UI (1,090-1,960)	↓	Klebsiella pneumoniae 363 UI (247-480)	↓
	Klebsiella pneumoniae 1,660 UI (1,200-2,120)	↓	Streptococcus pneumoniae 1,220 UI (788-1,660)	↓	Escherichia coli 260 UI (155-365)	↓
	Streptococcus pneumoniae 1,530 UI (1,070-1,990)	↓	Escherichia coli 1,190 UI (784-1,600)	↓	Acinetobacter baumannii 219 UI (159-280)	↓
	Escherichia coli 1,300 UI (880-1,720)	↓	Staphylococcus aureus 648 UI (351-944)	↑	Streptococcus pneumoniae 175 UI (90-259)	↓
	Pseudomonas aeruginosa 1,070 UI (779-1,370)	↓	Acinetobacter baumannii 597 UI (415-780)	↓	Staphylococcus aureus 144 UI (72-217)	↑
	Staphylococcus aureus 1,060 UI (782-1,350)	↑	Pseudomonas aeruginosa 519 UI (310-729)	↓	Pseudomonas aeruginosa 121 UI (66-175)	↓
	Non-typhoidal Salmonella 937 UI (419-1,460)	↑	Shigella spp. 316 UI (107-525)	↓	Serratia spp. 73 UI (48-98)	↓
	Acinetobacter baumannii 729 UI (531-928)	↓	Group B Streptococcus 267 UI (173-362)	↑	Enterobacter spp. 41 UI (29-53)	↓
	Group B Streptococcus 594 UI (418-770)	↑	Serratia spp. 265 UI (178-353)	↓	Mycobacterium tuberculosis 36 UI (0-112)	↑
	Shigella spp. 405 UI (160-649)	↓	Enterobacter spp. 178 UI (127-229)	↓	Shigella spp. 33 UI (0-67)	↓

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% (brown)

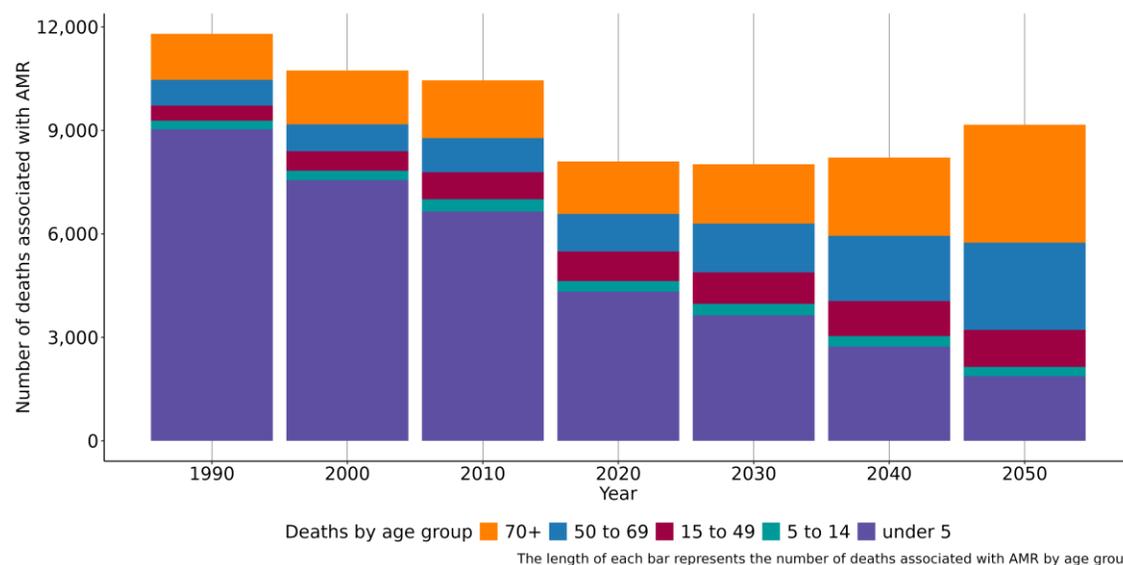
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	UI (range)	Change	UI (range)	Change
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 1,460 UI (1,040-1,890)	↓	Klebsiella pneumoniae 3GC 82 UI (40-123)	↑
	Klebsiella pneumoniae TMP-SMX 1,360 UI (964-1,750)	↓	Escherichia coli 3GC 77 UI (36-119)	↑
	Escherichia coli Aminopenicillin 1,150 UI (711-1,580)	↓	Staphylococcus aureus Methicillin 77 UI (22-131)	↑
	Streptococcus pneumoniae TMP-SMX 1,100 UI (688-1,520)	↓	Klebsiella pneumoniae Aminoglycosides 72 UI (43-101)	↓
	Klebsiella pneumoniae Aminoglycosides 1,030 UI (702-1,360)	↓	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 65 UI (27-104)	↓
	Klebsiella pneumoniae 3GC 1,010 UI (701-1,320)	↑	Klebsiella pneumoniae TMP-SMX 61 UI (30-92)	↓
	Escherichia coli Beta-Lactam/Lactamase Inhib. 900 UI (597-1,200)	↓	Acinetobacter baumannii Fluoroquinolones 57 UI (42-72)	↑
	Escherichia coli 3GC 829 UI (489-1,170)	↑	Acinetobacter baumannii Carbapenems 48 UI (23-74)	↑
	Escherichia coli TMP-SMX 780 UI (516-1,040)	↓	Streptococcus pneumoniae Fluoroquinolones 47 UI (11-83)	↓
	Escherichia coli Fluoroquinolones 662 UI (296-1,030)	↑	Klebsiella pneumoniae Carbapenems 43 UI (27-59)	↑

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% (brown)

- 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 (7,270 UI (5,190-9,350)), lower respiratory infection (excl. COVID) (6,130 UI (4,360-7,900)), diarrhea (3,460 UI (1,740-5,180)), tuberculosis (2,460 UI (1,600-3,320)) and typhoid fever, paratyphoid fever, and invasive non-typhoidal salmonella (1,020 UI (509-1,540)).

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



- In Sierra Leone, 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 4,050 UI (2,580-5,520), whereas the mortality rate per 100,000 was 867 UI (657-1,080).

Data sources for Sierra Leone

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 Sierra Leone by source type

Source type	Years	Sample size	Sample size units
Mortality surveillance (Minimally invasive tissue sampling [MITS])	2010-2021	491	Deaths
Antibiotic use	1990-2021	3,937	Study-year datapoints
Microbial or laboratory data without outcome	2010-2021	44	Isolates
Literature studies	1990-2021	3,305	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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