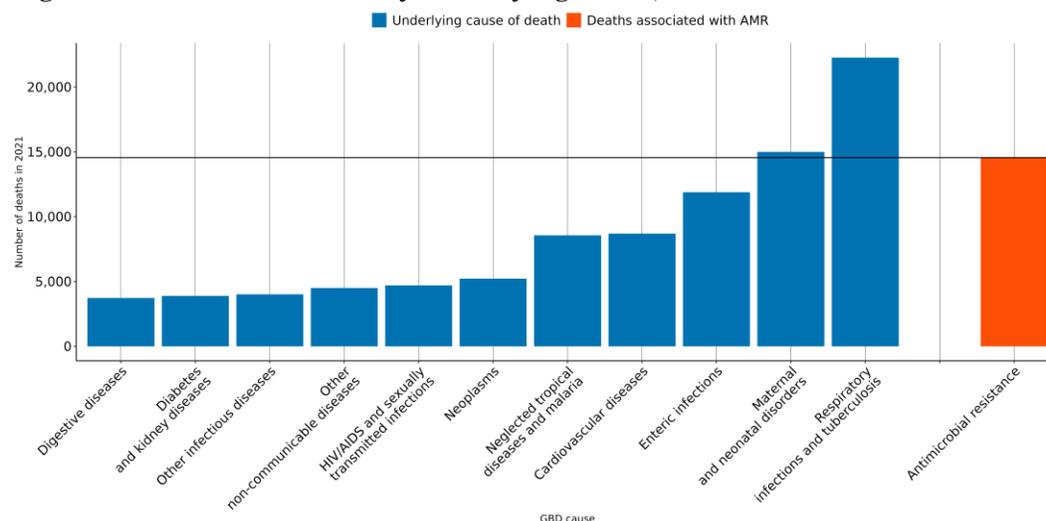


# The burden of antimicrobial resistance (AMR) in South Sudan

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **3,000 lives** have been lost each year since 1990 in South Sudan due to AMR.
- In 2021, there were an estimated **3,250 UI (2,190-4,310)** deaths attributable to AMR and **14,600 UI (10,400-18,800)** 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



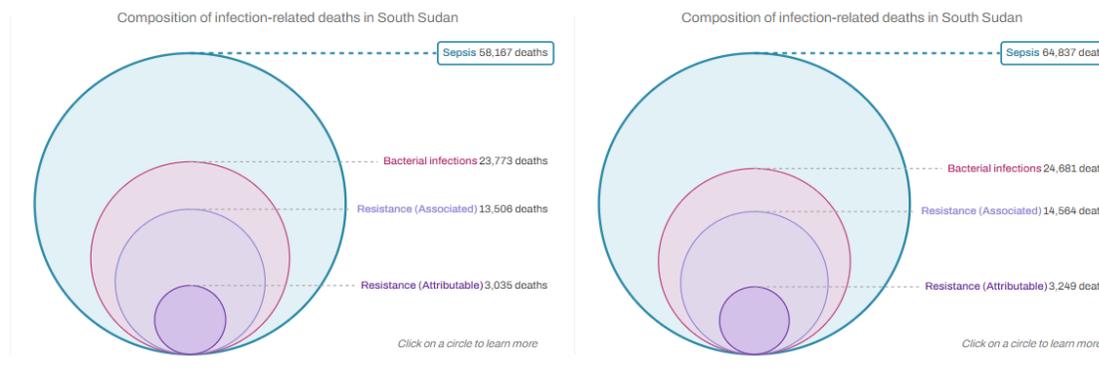
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 South Sudan, a 10% reduction means to decrease the number of deaths associated with AMR to **13,400**, but currently the trend for this country could reach up to **16,400 UI [10,500-23,900]** AMR-associated deaths in 2030.

## AMR in South Sudan

### 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 South Sudan between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **South Sudan** in 2021, there were an estimated **3,250 UI (2,190-4,310)** deaths attributable to AMR and **14,600 UI (10,400-18,800)** 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, **South Sudan 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	
	UI (range)	Change	UI (range)	Change	UI (range)	Change
	Mycobacterium tuberculosis 5,600 UI (3,260-7,950)	↑	Streptococcus pneumoniae 3,550 UI (2,300-4,800)	↓	Streptococcus pneumoniae 701 UI (391-1,010)	↓
	Streptococcus pneumoniae 4,540 UI (3,200-5,890)	↓	Escherichia coli 2,650 UI (1,780-3,510)	↑	Acinetobacter baumannii 581 UI (455-707)	↑
	Escherichia coli 2,880 UI (1,930-3,830)	↓	Klebsiella pneumoniae 2,100 UI (1,560-2,640)	↑	Escherichia coli 491 UI (283-698)	↑
	Klebsiella pneumoniae 2,320 UI (1,740-2,910)	↑	Acinetobacter baumannii 1,510 UI (1,130-1,900)	↑	Klebsiella pneumoniae 456 UI (317-595)	↑
	Acinetobacter baumannii 1,580 UI (1,180-1,990)	↑	Staphylococcus aureus 1,050 UI (696-1,410)	↑	Pseudomonas aeruginosa 236 UI (154-318)	↑
	Pseudomonas aeruginosa 1,480 UI (1,120-1,850)	↑	Pseudomonas aeruginosa 979 UI (677-1,280)	↑	Staphylococcus aureus 210 UI (116-304)	↑
	Shigella spp. 1,390 UI (631-2,140)	↓	Mycobacterium tuberculosis 512 UI (108-1,290)	↑	Mycobacterium tuberculosis 162 UI (0-555)	↑
	Staphylococcus aureus 1,340 UI (1,010-1,670)	↑	Shigella spp. 336 UI (61-612)	↓	Serratia spp. 89 UI (64-114)	↑
	Group B Streptococcus 649 UI (480-819)	↑	Haemophilus influenzae 325 UI (176-475)	↓	Enterobacter spp. 80 UI (48-113)	↑
	Haemophilus influenzae 443 UI (329-556)	↓	Enterobacter spp. 307 UI (226-389)	↑	Haemophilus influenzae 74 UI (34-114)	↓

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

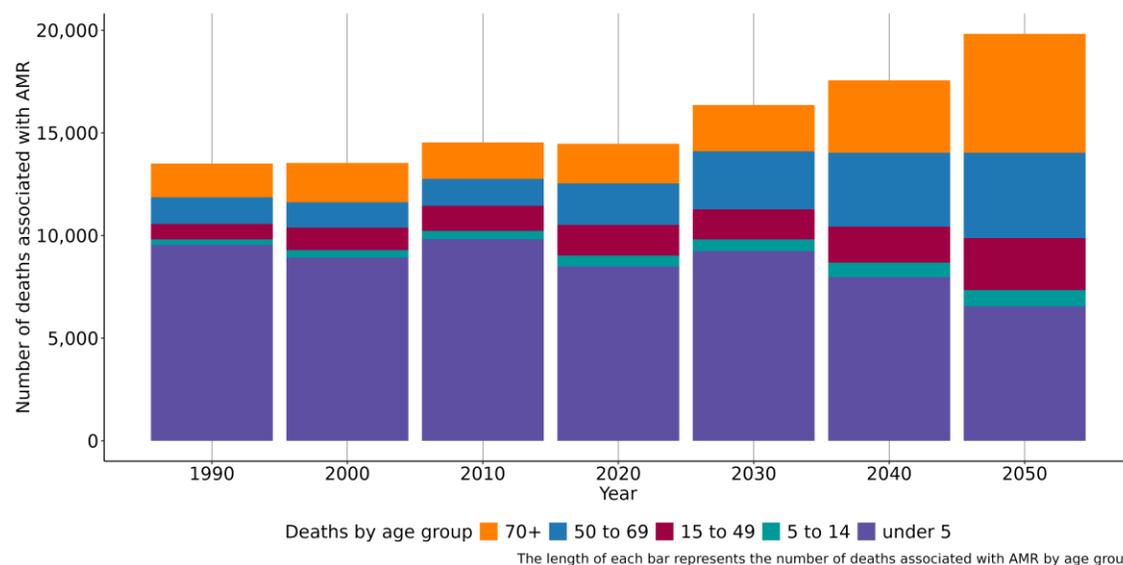
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	UI (range)	Change	UI (range)	Change
	Streptococcus pneumoniae TMP-SMX 3,260 UI (2,050-4,470)	↓	Streptococcus pneumoniae Carbapenems 356 UI (171-541)	↓
	Escherichia coli Aminopenicillin 2,730 UI (1,820-3,640)	↑	Acinetobacter baumannii Carbapenems 223 UI (141-305)	↑
	Escherichia coli TMP-SMX 2,340 UI (1,590-3,090)	↓	Mycobacterium tuberculosis MDR excluding XDR 159 UI (0-547)	↑
	Klebsiella pneumoniae TMP-SMX 1,990 UI (1,480-2,500)	↑	Escherichia coli Beta-Lactam/Lactamase Inhib. 125 UI (0-251)	↓
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 1,880 UI (1,360-2,400)	↑	Acinetobacter baumannii Fluoroquinolones 116 UI (86-145)	↑
	Escherichia coli Beta-Lactam/Lactamase Inhib. 1,850 UI (1,230-2,480)	↓	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 111 UI (41-181)	↓
	Acinetobacter baumannii Beta-Lactam/Lactamase Inhib. 1,440 UI (1,070-1,810)	↑	Streptococcus pneumoniae TMP-SMX 104 UI (0-226)	↓
	Acinetobacter baumannii 3GC 1,410 UI (1,030-1,780)	↑	Streptococcus pneumoniae Fluoroquinolones 98 UI (23-173)	↓
	Streptococcus pneumoniae Carbapenems 1,330 UI (649-2,000)	↓	Klebsiella pneumoniae TMP-SMX 97 UI (48-146)	↑
	Acinetobacter baumannii Anti-pseudomonal 1,320 UI (970-1,670)	↑	Escherichia coli Aminoglycosides 97 UI (37-158)	↓

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

- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) diarrhea (12,600 UI (8,010-17,100)), lower respiratory infection (excl. COVID) (9,470 UI (6,530-12,400)), bloodstream infections (9,020 UI (6,490-11,600)), tuberculosis (5,600 UI (3,260-7,950)) and meningitis (2,340 UI (1,640-3,040)).

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



- In South Sudan, 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 8,550 UI (5,940-11,200), whereas the mortality rate per 100,000 was 1,360 UI (1,040-1,690).

### Data sources for South Sudan

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 South Sudan by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	2010-2021	1,175	Study-year datapoints
Literature studies	2010-2021	15	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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