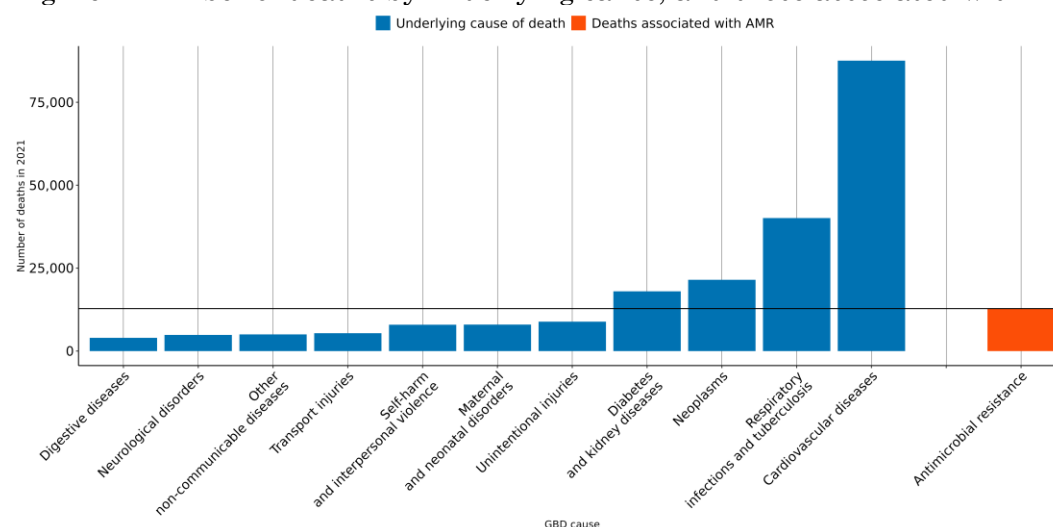


The burden of antimicrobial resistance (AMR) in Iraq

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **4,000 lives** have been lost each year since 1990 in Iraq due to AMR.
- In 2021, there were an estimated **3,450 UI (2,710-4,180)** deaths attributable to AMR and **12,800 UI (10,200-15,400)** 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 fluoroquinolones and *Streptococcus pneumoniae* resistant to carbapenems.

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



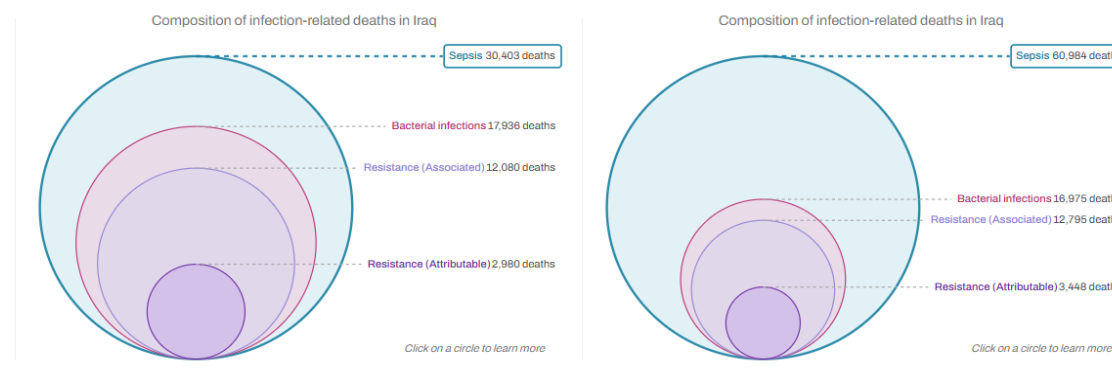
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Iraq, a 10% reduction means to decrease the number of deaths associated with AMR to **12,100**, but currently the trend for this country could reach up to **16,600 UI [10,700-23,400]** AMR-associated deaths in 2030.

AMR in Iraq

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 Iraq between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Iraq** in 2021, there were an estimated **3,450 UI (2,710-4,180)** deaths attributable to AMR and **12,800 UI (10,200-15,400)** 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, **Iraq has the 100th 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	
	Streptococcus pneumoniae 3,020 UI (2,470-3,560)	↓	Staphylococcus aureus 2,670 UI (2,120-3,210)	↑	Staphylococcus aureus 857 UI (684-1,030)	↑
	Staphylococcus aureus 2,880 UI (2,330-3,430)	↑	Streptococcus pneumoniae 2,450 UI (1,920-2,980)	↓	Acinetobacter baumannii 680 UI (565-795)	↑
	Acinetobacter baumannii 1,900 UI (1,530-2,270)	↑	Acinetobacter baumannii 1,870 UI (1,510-2,230)	↑	Streptococcus pneumoniae 589 UI (411-766)	↓
	Pseudomonas aeruginosa 1,690 UI (1,360-2,020)	↑	Escherichia coli 1,420 UI (1,150-1,680)	↑	Klebsiella pneumoniae 359 UI (280-438)	↓
	Klebsiella pneumoniae 1,610 UI (1,310-1,920)	↓	Klebsiella pneumoniae 1,380 UI (1,110-1,660)	↓	Escherichia coli 326 UI (251-401)	↑
	Escherichia coli 1,530 UI (1,240-1,810)	↑	Pseudomonas aeruginosa 1,150 UI (858-1,440)	↓	Pseudomonas aeruginosa 290 UI (202-377)	↓
	Mycobacterium tuberculosis 900 UI (636-1,160)	↓	Enterococcus faecalis 327 UI (256-398)	↑	Enterobacter spp. 76 UI (59-93)	↓
	Enterobacter spp. 480 UI (385-575)	↑	Enterobacter spp. 281 UI (217-345)	↓	Enterococcus faecalis 53 UI (33-72)	↑
	Enterococcus faecalis 446 UI (349-543)	↑	Enterococcus faecium 254 UI (196-311)	↑	Enterococcus faecium 52 UI (37-68)	↑
	Group A Streptococcus 391 UI (311-470)	↑	Serratia spp. 188 UI (146-230)	↓	Serratia spp. 48 UI (37-59)	↓

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

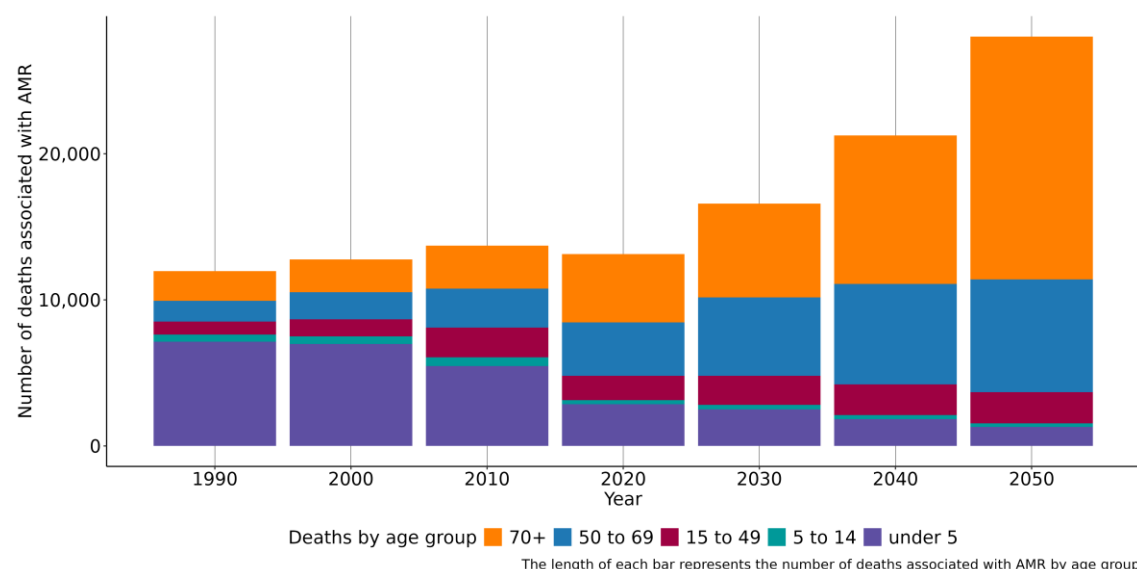
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated			Attributable		
	Staphylococcus aureus Methicillin	2,590 UI (2,050-3,130)	↑	Staphylococcus aureus Methicillin	605 UI (491-718)	↑
	Streptococcus pneumoniae Macrolides	1,910 UI (1,490-2,320)	↑	Streptococcus pneumoniae Carbapenems	361 UI (221-501)	↑
	Acinetobacter baumannii 4GC	1,860 UI (1,500-2,230)	↑	Acinetobacter baumannii Fluoroquinolones	228 UI (180-275)	↑
	Acinetobacter baumannii Fluoroquinolones	1,710 UI (1,370-2,050)	↑	Acinetobacter baumannii Carbapenems	159 UI (94-224)	↑
	Acinetobacter baumannii Beta-Lactam/Lactamase Inhib.	1,610 UI (1,280-1,940)	↑	Staphylococcus aureus Vancomycin	149 UI (85-213)	↑
	Acinetobacter baumannii 3GC	1,540 UI (1,200-1,880)	↑	Escherichia coli 3GC	118 UI (75-162)	↑
	Streptococcus pneumoniae TMP-SMX	1,510 UI (909-2,100)	↓	Acinetobacter baumannii 4GC	115 UI (73-157)	↑
	Streptococcus pneumoniae Carbapenems	1,350 UI (878-1,820)	↑	Klebsiella pneumoniae 3GC	109 UI (65-153)	↑
	Acinetobacter baumannii Anti-pseudomonal	1,320 UI (1,020-1,630)	↑	Acinetobacter baumannii Aminoglycosides	96 UI (65-127)	↓
	Klebsiella pneumoniae 3GC	1,300 UI (1,040-1,550)	↑	Acinetobacter baumannii Anti-pseudomonal	83 UI (61-105)	↑

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

- 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 (10,200 UI (8,330-12,100)), lower respiratory infection (excl. COVID) (7,290 UI (5,830-8,750)), peritoneal and intra-abdominal infections (1,250 UI (925-1,580)), tuberculosis (900 UI (636-1,160)) and urinary tract infections and pyelonephritis (878 UI (660-1,100)).

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



- In Iraq, 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 4,570 UI (3,660-5,470), whereas the mortality rate per 100,000 was 460 UI (369-552).

Data sources for Iraq

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 Iraq by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	9,440	Study-year datapoints
Microbial or laboratory data without outcome	1990-2021	36	Isolates
Literature studies	1990-2021	6,716	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	6,558	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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