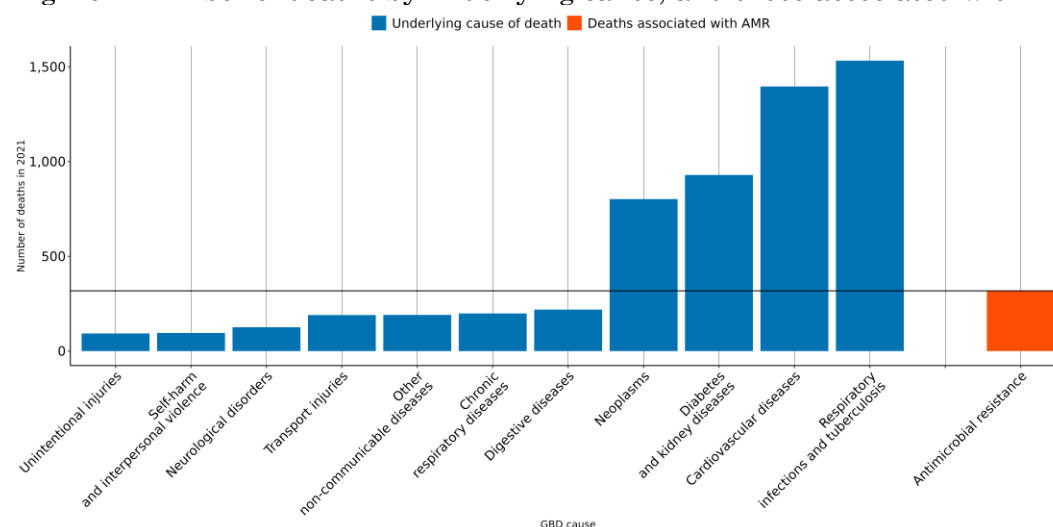


The burden of antimicrobial resistance (AMR) in Bahrain

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **60 lives** have been lost each year since 1990 in Bahrain due to AMR.
- In 2021, there were an estimated **83 UI (63-103)** deaths attributable to AMR and **318 UI (252-383)** 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 carbapenems and *Streptococcus pneumoniae* resistant to carbapenems.

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



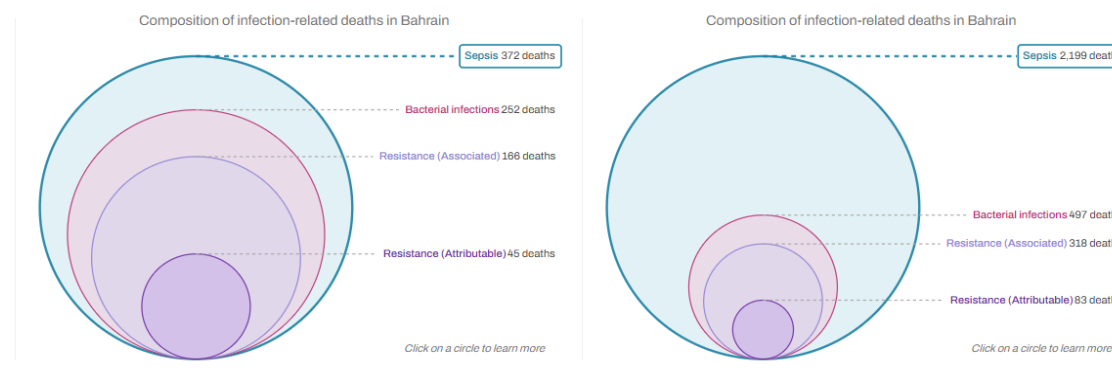
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Bahrain, a 10% reduction means to decrease the number of deaths associated with AMR to **271**, but currently the trend for this country could reach up to **523 UI [410-671]** AMR-associated deaths in 2030.

AMR in Bahrain

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 Bahrain between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Bahrain** in 2021, there were an estimated **83 UI (63-103)** deaths attributable to AMR and **318 UI (252-383)** 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, **Bahrain has the 101st 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	
	Staphylococcus aureus 106 UI (91-120)	↑	Staphylococcus aureus 63 UI (43-82)	↑	Staphylococcus aureus 17 UI (12-23)	↑
	Escherichia coli 56 UI (49-64)	↑	Escherichia coli 44 UI (36-53)	↑	Acinetobacter baumannii 16 UI (14-19)	↑
	Pseudomonas aeruginosa 55 UI (47-63)	↑	Acinetobacter baumannii 40 UI (34-46)	↑	Streptococcus pneumoniae 9 UI (7-12)	↓
	Streptococcus pneumoniae 47 UI (41-53)	↓	Streptococcus pneumoniae 37 UI (29-45)	↓	Klebsiella pneumoniae 9 UI (7-11)	↑
	Klebsiella pneumoniae 46 UI (39-52)	↑	Pseudomonas aeruginosa 34 UI (26-41)	↑	Escherichia coli 9 UI (7-12)	↑
	Acinetobacter baumannii 41 UI (35-47)	↑	Klebsiella pneumoniae 33 UI (27-39)	↑	Pseudomonas aeruginosa 9 UI (6-12)	↑
	Group A Streptococcus 32 UI (27-38)	↑	Enterococcus faecium 11 UI (9-13)	↑	Enterobacter spp. 3 UI (2-4)	↑
	Enterococcus faecium 15 UI (13-17)	↑	Enterococcus faecalis 10 UI (8-12)	↑	Enterococcus faecium 2 UI (2-3)	↑
	Enterococcus faecalis 15 UI (12-17)	↑	Enterobacter spp. 10 UI (8-12)	↑	Enterococcus faecalis 2 UI (1-2)	↑
	Enterobacter spp. 13 UI (12-15)	↑	Proteus spp. 9 UI (7-11)	↑	Serratia spp. 1 UI (1-2)	↑

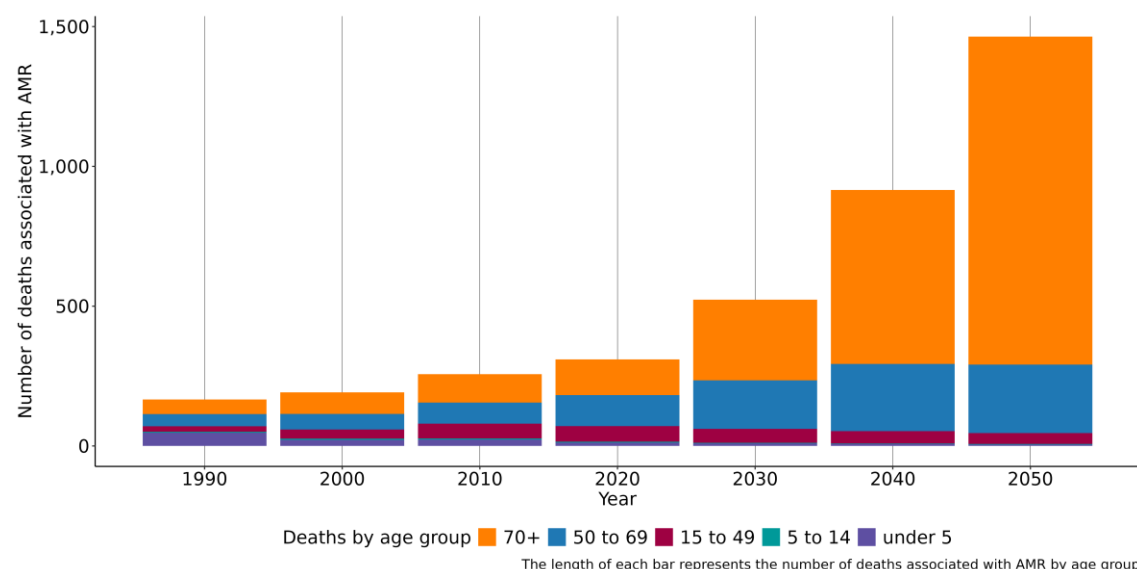
Annualized rate of change (1990-2021) <-3% -3% to -1.5% -1.5% to 0% 0% to 1.5% 1.5% to 3% 3% to 5% >5.0%

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

Burden Rank	Associated			Attributable		
	Staphylococcus aureus Methicillin	52 UI (31-72)	↑	Staphylococcus aureus Methicillin	13 UI (8-18)	↑
	Acinetobacter baumannii Carbapenems	39 UI (34-45)	↑	Acinetobacter baumannii Carbapenems	9 UI (7-11)	↑
	Escherichia coli Aminopenicillin	39 UI (25-53)	↑	Streptococcus pneumoniae Carbapenems	7 UI (5-10)	↓
	Acinetobacter baumannii 4GC	39 UI (33-45)	↑	Pseudomonas aeruginosa Carbapenems	7 UI (4-9)	↑
	Acinetobacter baumannii 3GC	38 UI (33-44)	↑	Acinetobacter baumannii Fluoroquinolones	5 UI (4-6)	↑
	Acinetobacter baumannii Anti-pseudomonal	38 UI (33-44)	↑	Klebsiella pneumoniae Carbapenems	3 UI (3-4)	↑
	Acinetobacter baumannii Fluoroquinolones	38 UI (32-43)	↑	Escherichia coli 3GC	3 UI (2-4)	↑
	Staphylococcus aureus Macrolides	36 UI (26-46)	↑	Klebsiella pneumoniae Aminoglycosides	2 UI (2-3)	↑
	Acinetobacter baumannii Beta-Lactam/Lactamase Inhib.	35 UI (30-40)	↑	Acinetobacter baumannii Aminoglycosides	2 UI (2-3)	↑
	Acinetobacter baumannii Aminoglycosides	31 UI (25-37)	↑	Staphylococcus aureus Fluoroquinolones	2 UI (1-3)	↑
	Annualized rate of change (1990-2021)					
	<-3%			-1.5% to 0%		
-3% to -1.5%			0% to 1.5%			
			1.5% to 3%			
			3% to 5%			
			>5.0%			

- 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 (262 UI (227-298)), lower respiratory infection (excl. COVID) (206 UI (175-236)), infections of the skin and subcutaneous systems (92 UI (73-110)), peritoneal and intra-abdominal infections (61 UI (51-72)) and urinary tract infections and pyelonephritis (32 UI (26-39)).

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



- In Bahrain, people aged 70+ saw the largest number of deaths associated with AMR both in 1990 and 2021, which indicates that 70+ continues to be particularly vulnerable to infections which are resistant to antibiotics. In 2021, the number of deaths associated with AMR among the 70+ was 132 UI (105-158), whereas the mortality rate per 100,000 was 523 UI (419-628).

Data sources for Bahrain

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 Bahrain by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data with outcome	2010-2021	185	Isolates
Literature studies	1990-2021	280	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	35,058	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:

- For inquiries about the analysis and questions from government officials, health departments, or research institutions: engage@healthdata.org
- For media-related inquiries: media@healthdata.org
- **Bluesky:** @ihmeuw.bsky.social
- **Twitter:** @IHME_UW
- **Facebook:** <https://www.facebook.com/IHMEUW>
- **LinkedIn:** <https://www.linkedin.com/company/institute-for-health-metrics-and-evaluation>