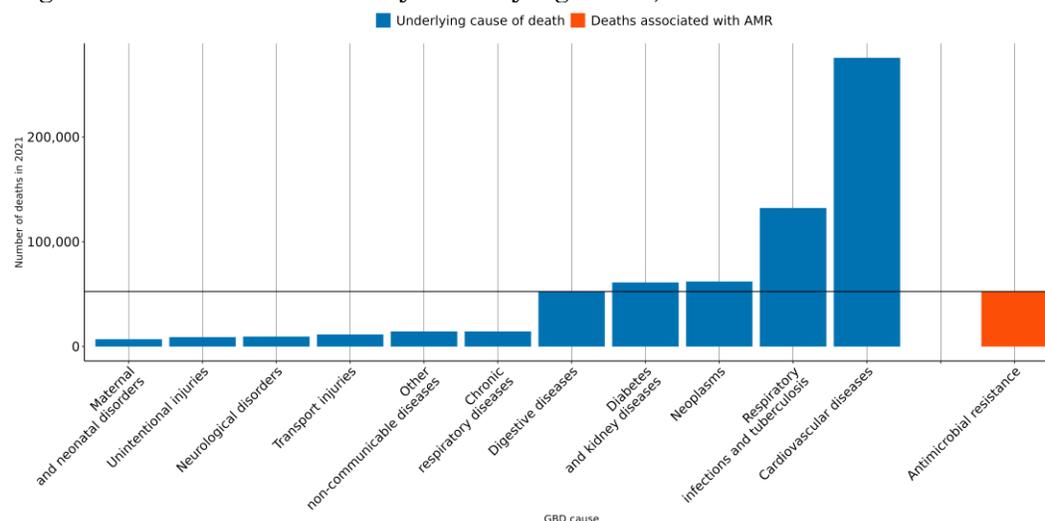


# The burden of antimicrobial resistance (AMR) in Egypt

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **20,000 lives** have been lost each year since 1990 in Egypt due to AMR.
- In 2021, there were an estimated **15,500 UI (12,500-18,500)** deaths attributable to AMR and **52,500 UI (42,600-62,400)** 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 carbapenems and *Streptococcus pneumoniae* resistant to carbapenems.

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



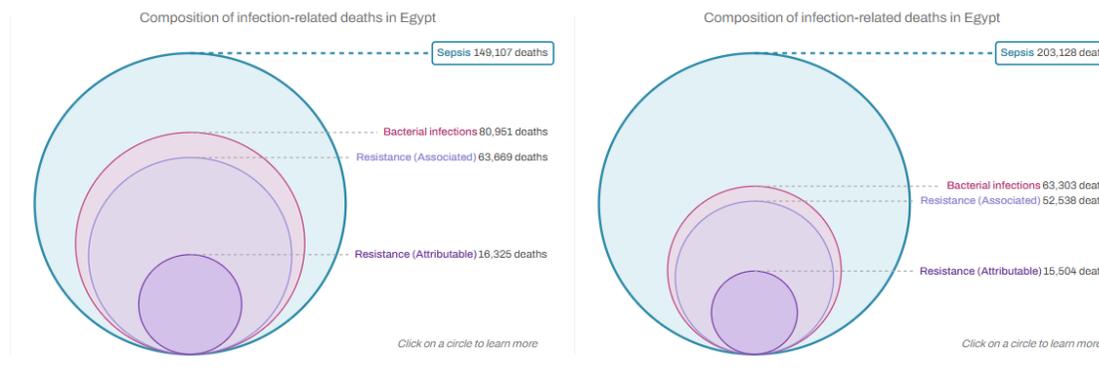
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Egypt, a 10% reduction means to decrease the number of deaths associated with AMR to **50,300**, but currently the trend for this country could reach up to **73,100 UI [57,200-90,700]** AMR-associated deaths in 2030.

## AMR in Egypt

### 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 Egypt between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Egypt** in 2021, there were an estimated **15,500 UI (12,500-18,500)** deaths attributable to AMR and **52,500 UI (42,600-62,400)** 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, **Egypt has the 54th 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	
	Bacteria	Deaths (UI)	Bacteria	Deaths (UI)	Bacteria	Deaths (UI)
	Streptococcus pneumoniae	13,300 UI (10,800-15,700)	Streptococcus pneumoniae	12,900 UI (10,500-15,300)	Streptococcus pneumoniae	3,820 UI (3,020-4,630)
	Staphylococcus aureus	10,700 UI (8,710-12,600)	Staphylococcus aureus	8,740 UI (6,830-10,600)	Acinetobacter baumannii	2,750 UI (2,290-3,210)
	Klebsiella pneumoniae	6,890 UI (5,610-8,170)	Acinetobacter baumannii	6,760 UI (5,480-8,030)	Staphylococcus aureus	2,620 UI (2,020-3,220)
	Acinetobacter baumannii	6,820 UI (5,530-8,110)	Klebsiella pneumoniae	6,140 UI (4,960-7,320)	Klebsiella pneumoniae	1,900 UI (1,540-2,250)
	Pseudomonas aeruginosa	6,590 UI (5,370-7,800)	Pseudomonas aeruginosa	5,680 UI (4,570-6,800)	Pseudomonas aeruginosa	1,540 UI (1,160-1,920)
	Escherichia coli	5,700 UI (4,680-6,720)	Escherichia coli	5,440 UI (4,470-6,410)	Escherichia coli	1,510 UI (1,220-1,790)
	Enterobacter spp.	1,860 UI (1,520-2,210)	Enterobacter spp.	1,270 UI (966-1,570)	Enterobacter spp.	269 UI (211-328)
	Enterococcus faecalis	1,740 UI (1,410-2,070)	Enterococcus faecalis	1,150 UI (867-1,420)	Enterococcus faecalis	247 UI (117-377)
	Enterococcus faecium	1,280 UI (1,040-1,520)	Proteus spp.	896 UI (729-1,060)	Enterococcus faecium	184 UI (132-235)
	Group A Streptococcus	1,280 UI (1,040-1,530)	Enterococcus faecium	888 UI (704-1,070)	Serratia spp.	172 UI (132-212)

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% (black)

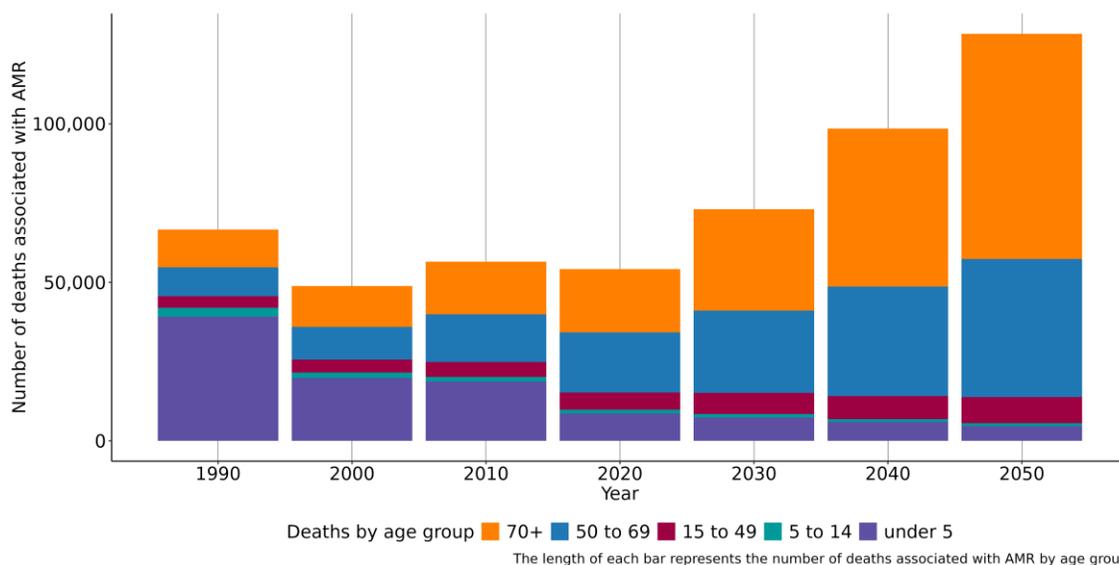
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated		Attributable	
	Combination	Deaths (UI)	Combination	Deaths (UI)
	Streptococcus pneumoniae Beta-Lactam/Lactamase Inhib.	12,800 UI (10,400-15,100)	Streptococcus pneumoniae Carbapenems	2,230 UI (1,580-2,870)
	Streptococcus pneumoniae Carbapenems	8,590 UI (6,320-10,900)	Staphylococcus aureus Methicillin	1,930 UI (1,440-2,430)
	Streptococcus pneumoniae Penicillin	8,070 UI (5,890-10,300)	Acinetobacter baumannii Carbapenems	1,520 UI (1,180-1,860)
	Staphylococcus aureus Methicillin	8,030 UI (5,940-10,100)	Pseudomonas aeruginosa Carbapenems	789 UI (520-1,060)
	Streptococcus pneumoniae TMP-SMX	7,960 UI (5,340-10,600)	Acinetobacter baumannii Fluoroquinolones	770 UI (610-931)
	Streptococcus pneumoniae 3GC	7,660 UI (5,870-9,450)	Klebsiella pneumoniae Carbapenems	688 UI (511-866)
	Acinetobacter baumannii Carbapenems	6,690 UI (5,430-7,960)	Streptococcus pneumoniae Beta-Lactam/Lactamase Inhib.	581 UI (256-907)
	Acinetobacter baumannii Beta-Lactam/Lactamase Inhib.	6,660 UI (5,400-7,920)	Escherichia coli Carbapenems	573 UI (370-776)
	Acinetobacter baumannii 4GC	6,570 UI (5,320-7,820)	Klebsiella pneumoniae Fluoroquinolones	433 UI (294-572)
	Acinetobacter baumannii 3GC	6,490 UI (5,260-7,730)	Acinetobacter baumannii Aminoglycosides	429 UI (310-547)

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- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) lower respiratory infection (excl. COVID) (35,800 UI (29,000-42,700)), bloodstream infections (33,500 UI (27,300-39,800)), peritoneal and intra-abdominal infections (5,920 UI (4,600-7,240)), diarrhea (3,710 UI (2,580-4,850)) and infections of the skin and subcutaneous systems (2,780 UI (2,130-3,430)).

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



- In Egypt, 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 20,000 UI (16,800-23,200), whereas the mortality rate per 100,000 was 880 UI (739-1,020).

### Data sources for Egypt

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 Egypt by source type

Source type	Years	Sample size	Sample size units
Antibiotic use	1990-2021	8,873	Study-year datapoints
Microbial or laboratory data without outcome	2010-2021	13,980	Isolates
Microbial or laboratory data with outcome	1990-2021	6,045	Isolates
Literature studies	1990-2021	57,043	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	35,100	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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