# The burden of antimicrobial resistance (AMR) in Jordan

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **500 lives** have been lost each year since 1990 in Jordan due to AMR.

- In 2021, there were an estimated **613 UI (480-747)** deaths attributable to AMR and **2,280 UI (1,810-2,740)** 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
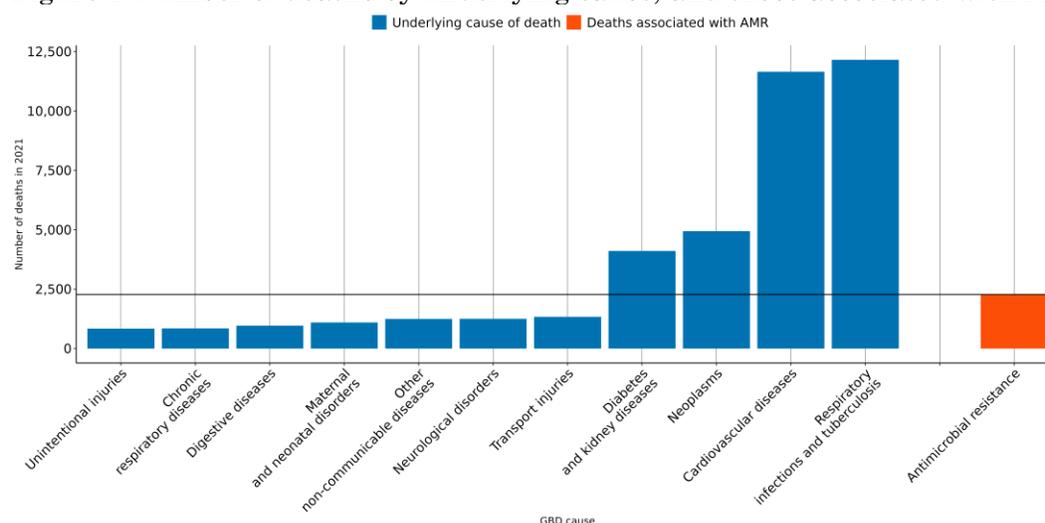


- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Jordan, a 10% reduction means to decrease the number of deaths associated with AMR to **1,930**, but currently the trend for this country could reach up to **3,410 UI [2,570-4,380]** AMR-associated deaths in 2030.

# AMR in Jordan

## 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 Jordan between 1990 and 2019.
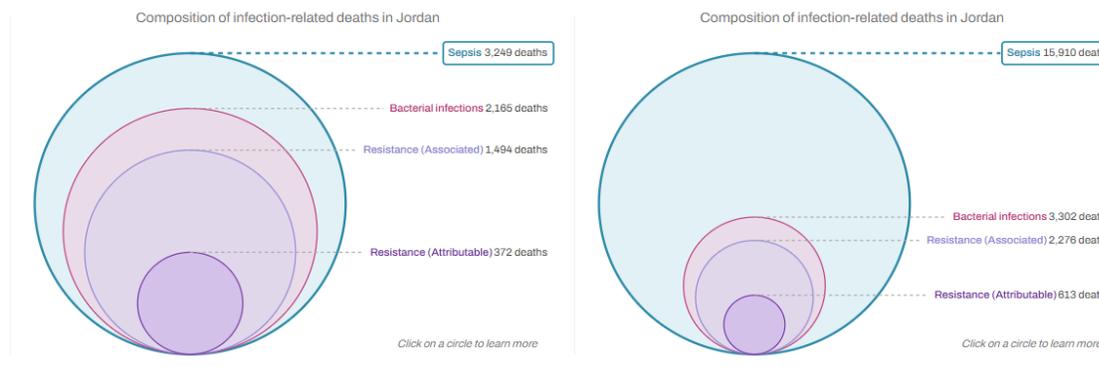


- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE)](#)

- In **Jordan** in 2021, there were an estimated **613 UI (480-747)** deaths attributable to AMR and **2,280 UI (1,810-2,740)** 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, **Jordan has the 52nd 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 | |
|---|---|---|---|---|---|---|
| | Staphylococcus aureus 710 UI (581-840) | ↑ | Staphylococcus aureus 476 UI (357-594) | ↑ | Staphylococcus aureus 139 UI (104-173) | ↑ |
| | Streptococcus pneumoniae 583 UI (478-688) | ↓ | Streptococcus pneumoniae 460 UI (359-560) | ↓ | Streptococcus pneumoniae 134 UI (97-171) | ↑ |
| | Escherichia coli 335 UI (274-395) | ↑ | Escherichia coli 301 UI (246-355) | ↑ | Acinetobacter baumannii 110 UI (91-130) | ↑ |
| | Pseudomonas aeruginosa 330 UI (269-391) | ↑ | Acinetobacter baumannii 275 UI (223-326) | ↑ | Escherichia coli 62 UI (48-75) | ↑ |
| | Klebsiella pneumoniae 308 UI (251-364) | ↑ | Klebsiella pneumoniae 218 UI (173-263) | ↑ | Klebsiella pneumoniae 56 UI (44-68) | ↑ |
| | Acinetobacter baumannii 282 UI (230-335) | ↑ | Pseudomonas aeruginosa 201 UI (156-245) | ↑ | Pseudomonas aeruginosa 54 UI (38-70) | ↑ |
| | Enterobacter spp. 101 UI (82-120) | ↑ | Enterococcus faecium 68 UI (54-82) | ↑ | Enterobacter spp. 13 UI (10-16) | ↑ |
| | Enterococcus faecalis 99 UI (80-118) | ↑ | Enterobacter spp. 51 UI (38-63) | ↑ | Enterococcus faecium 12 UI (8-16) | ↑ |
| | Group A Streptococcus 89 UI (71-106) | ↑ | Enterococcus faecalis 47 UI (37-58) | ↑ | Enterococcus faecalis 8 UI (5-11) | ↑ |
| | Enterococcus faecium 79 UI (64-94) | ↑ | Proteus spp. 35 UI (25-46) | ↑ | Serratia spp. 6 UI (4-7) | ↓ |

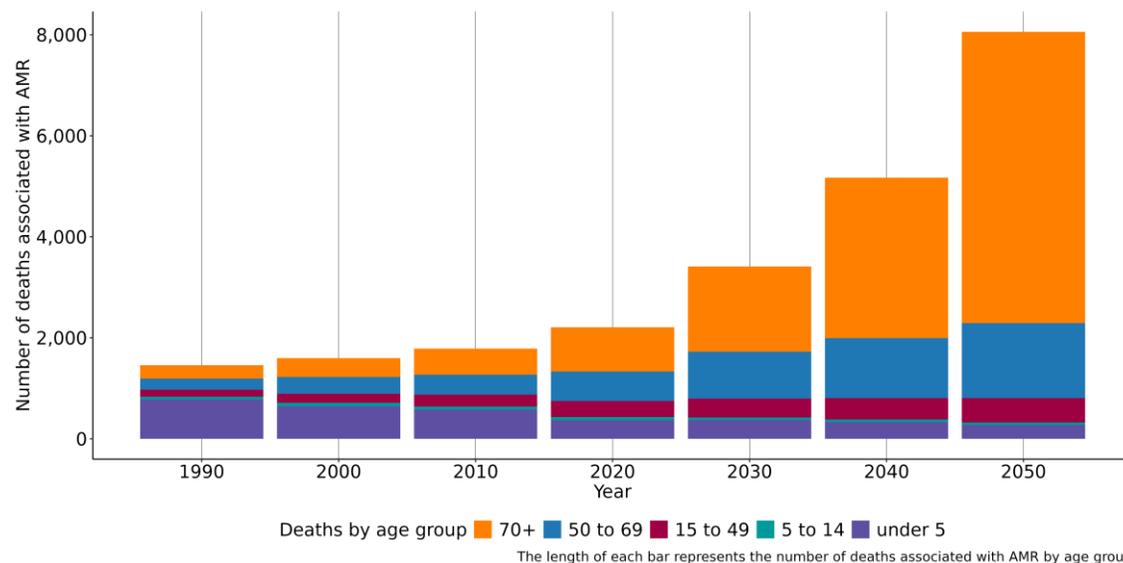Annualized rate of change (1990-2021): <-3% | -1.5% to 0% | 1.5% to 3% | >5.0% | -3% to -1.5% | 0% to 1.5% | 3% to 5%

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

| Burden Rank | Associated | | | Attributable | | |
|---|---|---|---|---|---|---|
| | Staphylococcus aureus Methicillin | 416 UI (297-535) | ↑ | Streptococcus pneumoniae Carbapenems | 112 UI (79-145) | ↑ |
| | Streptococcus pneumoniae Carbapenems | 384 UI (288-479) | ↑ | Staphylococcus aureus Methicillin | 108 UI (79-137) | ↑ |
| | Streptococcus pneumoniae Macrolides | 307 UI (238-376) | ↓ | Acinetobacter baumannii Carbapenems | 55 UI (42-69) | ↑ |
| | Escherichia coli Aminopenicillin | 289 UI (235-342) | ↑ | Acinetobacter baumannii Fluoroquinolones | 34 UI (27-41) | ↑ |
| | Acinetobacter baumannii 4GC | 271 UI (221-322) | ↑ | Pseudomonas aeruginosa Carbapenems | 30 UI (19-42) | ↑ |
| | Acinetobacter baumannii Anti-pseudomonal | 268 UI (218-318) | ↑ | Escherichia coli 3GC | 18 UI (11-25) | ↑ |
| | Acinetobacter baumannii Fluoroquinolones | 266 UI (217-316) | ↑ | Acinetobacter baumannii Aminoglycosides | 16 UI (11-20) | ↑ |
| | Acinetobacter baumannii 3GC | 257 UI (208-307) | ↑ | Escherichia coli Fluoroquinolones | 14 UI (8-21) | ↑ |
| | Acinetobacter baumannii Carbapenems | 256 UI (208-304) | ↑ | Klebsiella pneumoniae Fluoroquinolones | 14 UI (9-19) | ↑ |
| | Streptococcus pneumoniae TMP-SMX | 254 UI (146-361) | ↓ | Klebsiella pneumoniae Carbapenems | 13 UI (9-16) | ↑ |

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

 - 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 (1,820 UI (1,500-2,150)), lower respiratory infection (excl. COVID) (1,530 UI (1,230-1,830)), peritoneal and intra-abdominal infections (360 UI (283-438)), infections of the skin and subcutaneous systems (188 UI (144-232)) and urinary tract infections and pyelonephritis (182 UI (141-223)).

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



Deaths by age group: 70+ | 50 to 69 | 15 to 49 | 5 to 14 | under 5
The length of each bar represents the number of deaths associated with AMR by age group

- In Jordan, 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 915 UI (717-1,110), whereas the mortality rate per 100,000 was 298 UI (233-362).

**Data sources for Jordan**

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 Jordan by source type

| Source type | Years | Sample size | Sample size units |
|---|---|---|---|
| Antibiotic use | 1990-2021 | 4,489 | Study-year datapoints |
| Microbial or laboratory data without outcome | 1990-2021 | 120,418 | Isolates |
| Microbial or laboratory data with outcome | 2010-2021 | 1,380 | Isolates |
| Literature studies | 1990-2021 | 6,853 | Cases/isolates/susceptibility tests |
| Single drug resistance profile data | 1990-2021 | 102,097 | 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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