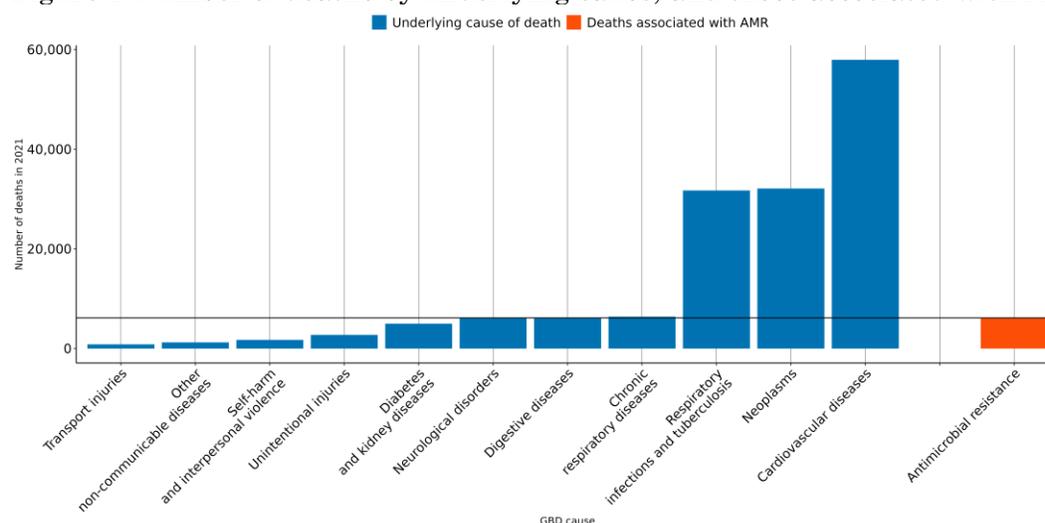


# The burden of antimicrobial resistance (AMR) in Hungary

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **2,000 lives** have been lost each year since 1990 in Hungary due to AMR.
- In 2021, there were an estimated **1,410 UI (1,240-1,580)** deaths attributable to AMR and **6,150 UI (5,440-6,860)** 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, *Pseudomonas aeruginosa* resistant to carbapenems and *Acinetobacter baumannii* resistant to carbapenems.

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



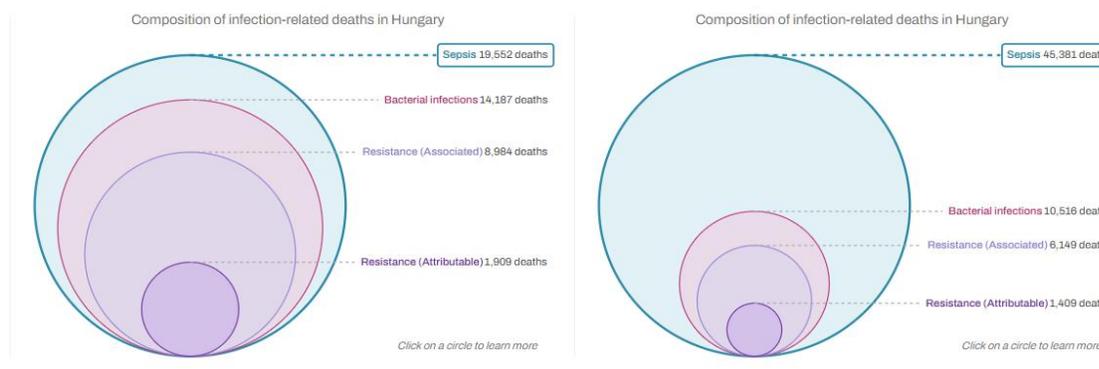
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Hungary, a 10% reduction means to decrease the number of deaths associated with AMR to **5,960**, but currently the trend for this country could reach up to **6,990 UI [5,690-8,340]** AMR-associated deaths in 2030.

## AMR in Hungary

### 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 Hungary between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Hungary** in 2021, there were an estimated **1,410 UI (1,240-1,580)** deaths attributable to AMR and **6,150 UI (5,440-6,860)** 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, **Hungary has the 45th 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)

	Overall susceptible and resistant	Associated	Attributable
Burden rank	Staphylococcus aureus 2,570 UI (2,290-2,840) ↑	Staphylococcus aureus 1,540 UI (1,370-1,720) ↓	Staphylococcus aureus 404 UI (329-480) ↑
	Escherichia coli 2,110 UI (1,880-2,340) ↑	Escherichia coli 1,480 UI (1,300-1,660) ↑	Escherichia coli 269 UI (219-320) ↑
	Pseudomonas aeruginosa 1,060 UI (940-1,170) ↓	Pseudomonas aeruginosa 652 UI (572-732) ↓	Pseudomonas aeruginosa 174 UI (141-207) ↓
	Klebsiella pneumoniae 903 UI (803-1,000) ↓	Klebsiella pneumoniae 634 UI (557-711) ↓	Klebsiella pneumoniae 146 UI (123-168) ↓
	Streptococcus pneumoniae 664 UI (592-737) ↓	Acinetobacter baumannii 350 UI (309-391) ↓	Acinetobacter baumannii 138 UI (121-154) ↓
	Enterococcus faecalis 428 UI (381-476) ↓	Streptococcus pneumoniae 319 UI (241-396) ↓	Streptococcus pneumoniae 66 UI (48-85) ↓
	Group A Streptococcus 384 UI (336-433) ↑	Enterococcus faecium 299 UI (265-334) ↑	Enterococcus faecium 62 UI (49-75) ↑
	Acinetobacter baumannii 375 UI (333-418) ↓	Proteus spp. 197 UI (154-240) ↓	Enterobacter spp. 38 UI (32-44) ↓
	Enterobacter spp. 335 UI (297-372) ↓	Enterococcus faecalis 155 UI (134-177) ↓	Proteus spp. 28 UI (19-36) ↓
	Enterococcus faecium 319 UI (284-355) ↓	Enterobacter spp. 149 UI (124-174) ↓	Enterococcus faecalis 27 UI (19-35) ↓

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)

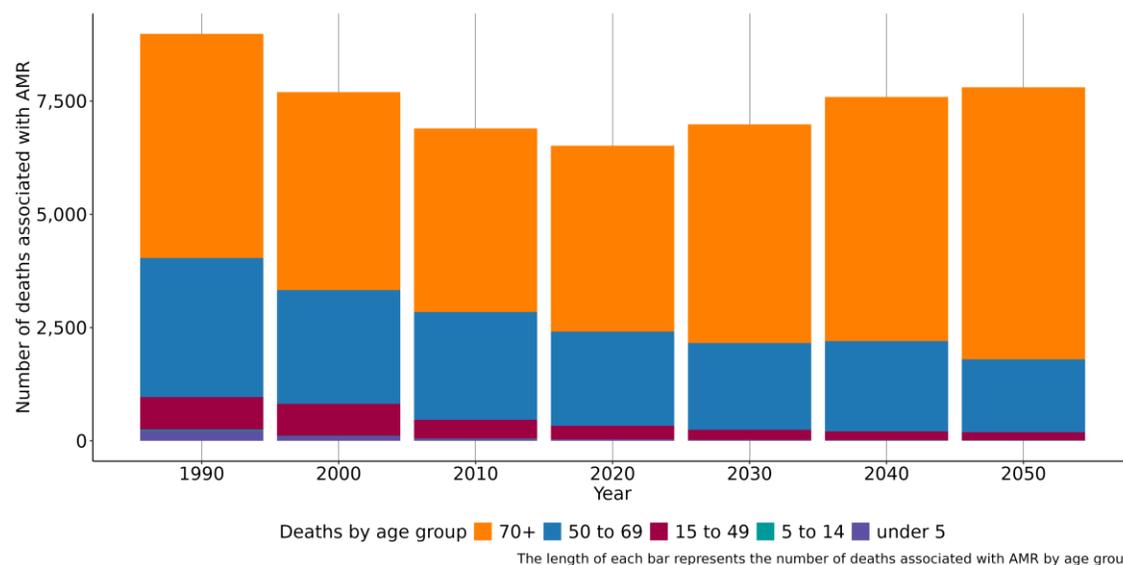
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

	Associated	Attributable
Burden Rank	Escherichia coli Aminopenicillin 1,340 UI (1,130-1,550) ↑	Staphylococcus aureus Methicillin 296 UI (214-378) ↑
	Staphylococcus aureus Methicillin 1,180 UI (883-1,470) ↑	Pseudomonas aeruginosa Carbapenems 113 UI (85-142) ↑
	Staphylococcus aureus Macrolides 1,110 UI (912-1,300) ↓	Acinetobacter baumannii Carbapenems 63 UI (48-77) ↓
	Escherichia coli TMP-SMX 780 UI (601-958) ↓	Escherichia coli Aminopenicillin 57 UI (37-77) ↑
	Escherichia coli Fluoroquinolones 760 UI (608-912) ↑	Escherichia coli Fluoroquinolones 54 UI (29-78) ↑
	Staphylococcus aureus Fluoroquinolones 671 UI (547-795) ↓	Staphylococcus aureus Macrolides 47 UI (31-63) ↓
	Escherichia coli Beta-Lactam/Lactamase Inhib. 666 UI (557-776) ↓	Escherichia coli Beta-Lactam/Lactamase Inhib. 44 UI (12-76) ↓
	Pseudomonas aeruginosa Carbapenems 556 UI (485-626) ↑	Staphylococcus aureus Fluoroquinolones 42 UI (16-69) ↓
	Klebsiella pneumoniae TMP-SMX 476 UI (387-566) ↓	Streptococcus pneumoniae Carbapenems 42 UI (28-56) ↓
	Klebsiella pneumoniae Fluoroquinolones 451 UI (374-527) ↑	Escherichia coli TMP-SMX 41 UI (22-60) ↓

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)

- 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 (6,610 UI (5,890-7,320)), lower respiratory infection (excl. COVID) (3,340 UI (2,900-3,770)), peritoneal and intra-abdominal infections (2,100 UI (1,840-2,360)), urinary tract infections and pyelonephritis (817 UI (690-944)) and infections of the skin and subcutaneous systems (666 UI (560-773)).

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



- In Hungary, 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 3,810 UI (3,350-4,260), whereas the mortality rate per 100,000 was 283 UI (249-316).

### Data sources for Hungary

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 Hungary by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	1,275,848	Isolates
Microbial or laboratory data with outcome	1990-2021	32,796	Isolates
Literature studies	1990-2021	37,332	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	87,160	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](mailto:engage@healthdata.org)
- For media-related inquiries: [media@healthdata.org](mailto: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>