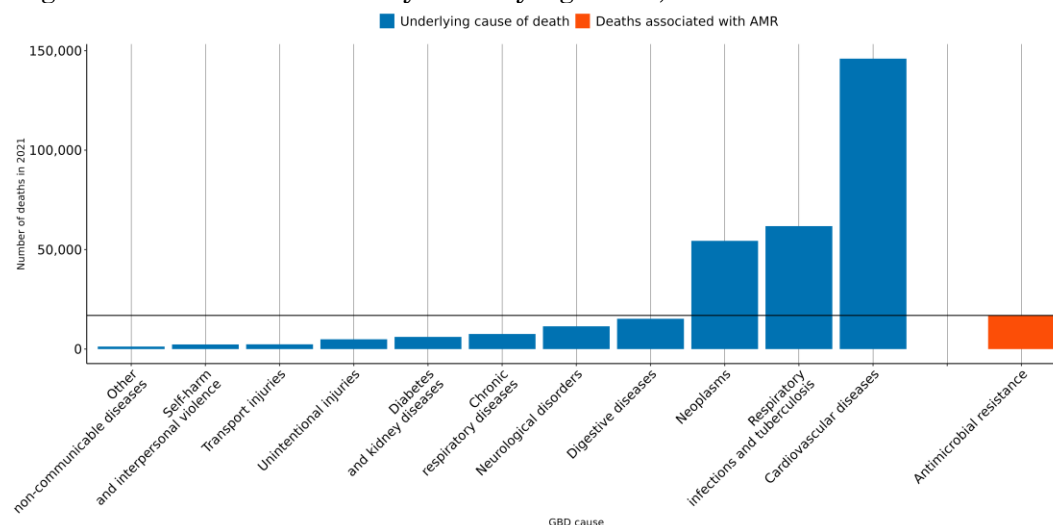


The burden of antimicrobial resistance (AMR) in Romania

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **4,000 lives** have been lost each year since 1990 in Romania due to AMR.
- In 2021, there were an estimated **4,110 UI (3,470-4,760)** deaths attributable to AMR and **16,900 UI (14,600-19,200)** 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



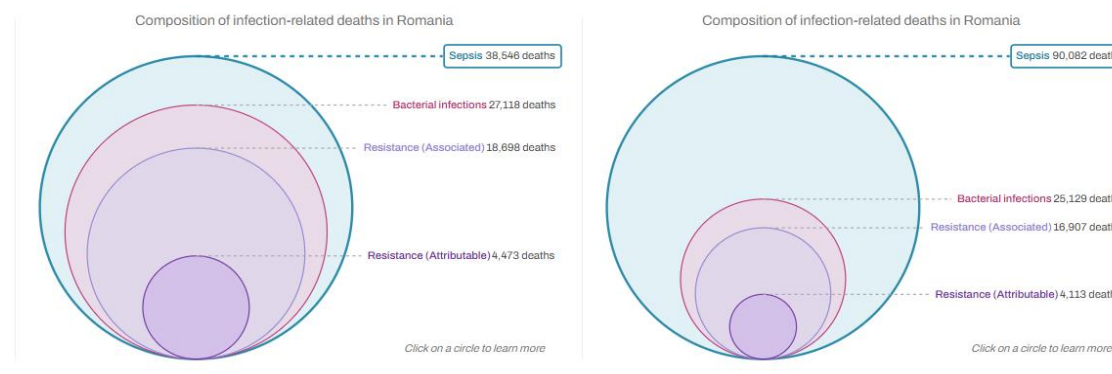
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Romania, a 10% reduction means to decrease the number of deaths associated with AMR to **16,000**, but currently the trend for this country could reach up to **17,300 UI [13,800-20,800]** AMR-associated deaths in 2030.

AMR in Romania

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 Romania between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Romania** in 2021, there were an estimated **4,110 UI (3,470-4,760)** deaths attributable to AMR and **16,900 UI (14,600-19,200)** 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, **Romania has the 80th 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 5,530 UI (4,970-6,090)	↑		Staphylococcus aureus 3,760 UI (3,100-4,420)	↑		Staphylococcus aureus 1,020 UI (779-1,260)	↑	
	Escherichia coli 4,040 UI (3,620-4,460)	↑		Escherichia coli 3,010 UI (2,660-3,360)	↑		Escherichia coli 541 UI (451-630)	↑	
	Streptococcus pneumoniae 3,050 UI (2,750-3,350)	↓		Streptococcus pneumoniae 2,260 UI (1,870-2,650)	↓		Klebsiella pneumoniae 540 UI (469-611)	↑	
	Pseudomonas aeruginosa 2,400 UI (2,150-2,640)	↓		Pseudomonas aeruginosa 1,890 UI (1,650-2,130)	↓		Pseudomonas aeruginosa 499 UI (410-589)	↓	
	Klebsiella pneumoniae 2,170 UI (1,950-2,390)	↓		Klebsiella pneumoniae 1,790 UI (1,580-1,990)	↓		Acinetobacter baumannii 490 UI (433-547)	↓	
	Acinetobacter baumannii 1,260 UI (1,130-1,400)	↓		Acinetobacter baumannii 1,220 UI (1,090-1,360)	↓		Streptococcus pneumoniae 459 UI (333-586)	↓	
	Enterococcus faecalis 1,050 UI (933-1,170)	↑		Enterococcus faecium 528 UI (469-587)	↑		Enterobacter spp. 134 UI (115-153)	↓	
	Enterobacter spp. 860 UI (771-950)	↓		Enterobacter spp. 519 UI (443-594)	↓		Enterococcus faecium 104 UI (80-128)	↑	
	Mycobacterium tuberculosis 817 UI (717-917)	↓		Enterococcus faecalis 475 UI (417-534)	↑		Enterococcus faecalis 84 UI (59-108)	↑	
	Group A Streptococcus 708 UI (593-824)	↑		Proteus spp. 381 UI (301-460)	↑		Serratia spp. 65 UI (52-78)	↓	

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	3,050 UI (2,200-3,900)	↑	Staphylococcus aureus Methicillin	792 UI (583-1,000)	↑
	Staphylococcus aureus Macrolides	2,860 UI (2,440-3,280)	↑	Streptococcus pneumoniae Carbapenems	279 UI (188-371)	↓
	Escherichia coli Aminopenicillin	2,830 UI (2,380-3,270)	↑	Acinetobacter baumannii Carbapenems	240 UI (191-289)	↓
	Streptococcus pneumoniae TMP-SMX	1,760 UI (1,250-2,270)	↓	Pseudomonas aeruginosa Carbapenems	234 UI (164-305)	↓
	Escherichia coli TMP-SMX	1,650 UI (1,310-1,990)	↑	Klebsiella pneumoniae Carbapenems	208 UI (161-254)	↑
	Escherichia coli Fluoroquinolones	1,520 UI (1,180-1,870)	↑	Acinetobacter baumannii Fluoroquinolones	138 UI (112-164)	↑
	Pseudomonas aeruginosa Carbapenems	1,410 UI (1,220-1,600)	↓	Escherichia coli Aminopenicillin	135 UI (90-180)	↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib.	1,410 UI (1,200-1,620)	↓	Staphylococcus aureus Macrolides	121 UI (81-161)	↑
	Klebsiella pneumoniae Fluoroquinolones	1,370 UI (1,160-1,580)	↑	Klebsiella pneumoniae Fluoroquinolones	115 UI (80-150)	↑
	Klebsiella pneumoniae Aminoglycosides	1,340 UI (1,150-1,540)	↓	Escherichia coli Fluoroquinolones	103 UI (53-154)	↑

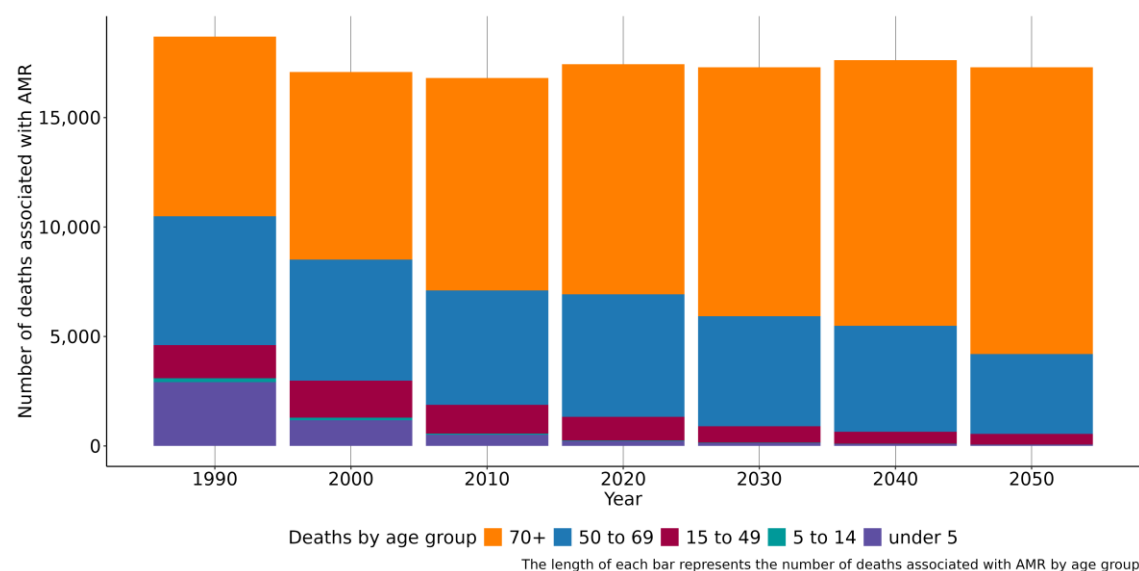
Annualized rate of change (1990-2021)

<-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 (14,200 UI (12,700-15,800)), lower respiratory infection (excl. COVID) (11,500 UI (10,200-12,800)), peritoneal and intra-abdominal infections (3,740 UI (3,290-4,190)), infections of the skin and subcutaneous systems (1,350 UI (1,040-1,670)) and urinary tract infections and pyelonephritis (1,240 UI (1,010-1,480)).

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



- In Romania, 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 10,300 UI (8,820-11,800), whereas the mortality rate per 100,000 was 407 UI (348-466).

Data sources for Romania

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 Romania by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	510,232	Isolates
Microbial or laboratory data with outcome	1990-2021	405,075	Isolates
Literature studies	1990-2021	72	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	47,482	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>