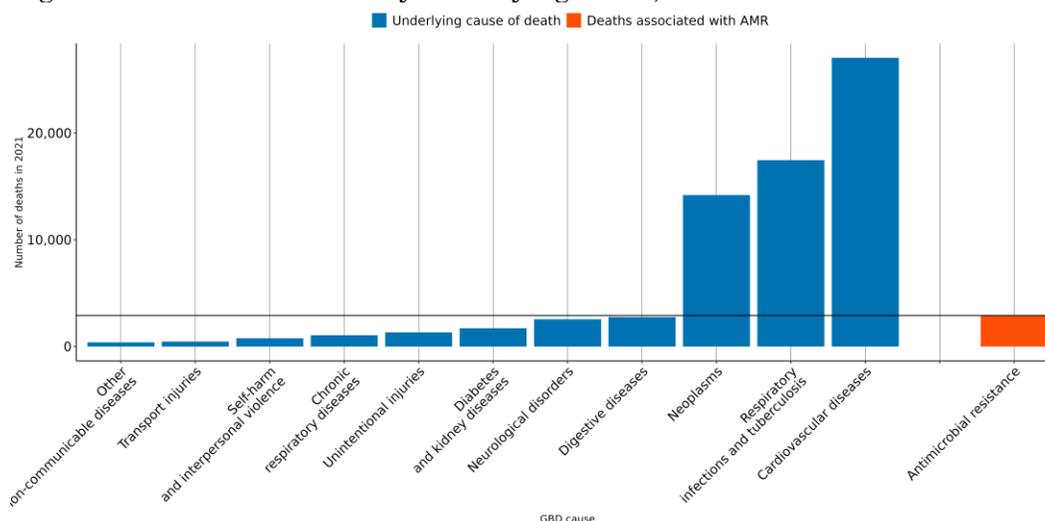


The burden of antimicrobial resistance (AMR) in Slovakia

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **800 lives** have been lost each year since 1990 in Slovakia due to AMR.
- In 2021, there were an estimated **635 UI (515-754)** deaths attributable to AMR and **2,910 UI (2,430-3,390)** 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, *Escherichia coli* resistant to fluoroquinolones and *Pseudomonas aeruginosa* resistant to carbapenems.

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



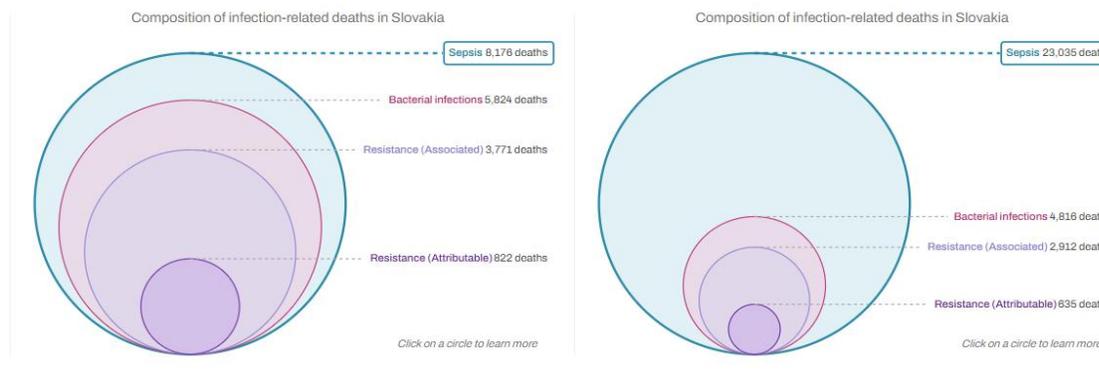
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Slovakia, a 10% reduction means to decrease the number of deaths associated with AMR to **2,740**, but currently the trend for this country could reach up to **3,500 UI [2,800-4,280]** AMR-associated deaths in 2030.

AMR in Slovakia

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 Slovakia between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Slovakia** in 2021, there were an estimated **635 UI (515-754)** deaths attributable to AMR and **2,910 UI (2,430-3,390)** 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, **Slovakia has the 47th 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 1,190 UI (1,040-1,340) ↑	Staphylococcus aureus 696 UI (561-831) ↓	Staphylococcus aureus 151 UI (109-193) ↑
	Escherichia coli 901 UI (785-1,020) ↑	Escherichia coli 688 UI (595-780) ↑	Escherichia coli 127 UI (103-152) ↑
	Pseudomonas aeruginosa 497 UI (433-561) ↓	Klebsiella pneumoniae 367 UI (312-421) ↓	Pseudomonas aeruginosa 93 UI (74-111) ↓
	Klebsiella pneumoniae 438 UI (381-495) ↓	Pseudomonas aeruginosa 354 UI (305-403) ↓	Klebsiella pneumoniae 84 UI (68-100) ↓
	Streptococcus pneumoniae 382 UI (333-432) ↓	Streptococcus pneumoniae 178 UI (121-234) ↓	Acinetobacter baumannii 52 UI (44-60) ↓
	Enterococcus faecalis 176 UI (152-200) ↓	Acinetobacter baumannii 129 UI (108-150) ↓	Streptococcus pneumoniae 40 UI (25-54) ↓
	Group A Streptococcus 168 UI (144-191) ↑	Enterococcus faecium 108 UI (92-124) ↑	Enterococcus faecium 22 UI (16-27) ↑
	Acinetobacter baumannii 149 UI (130-169) ↓	Proteus spp. 97 UI (72-123) ↑	Enterobacter spp. 16 UI (12-19) ↓
	Enterobacter spp. 142 UI (123-160) ↓	Enterobacter spp. 64 UI (49-78) ↓	Proteus spp. 14 UI (9-20) ↑
	Proteus spp. 137 UI (119-155) ↑	Enterococcus faecalis 51 UI (42-59) ↓	Enterococcus faecalis 9 UI (6-11) ↓

Annualized rate of change (1990-2021):
 <-3% (dark blue), -1.5% to 0% (light blue), 1.5% to 3% (red), >5.0% (dark red),
 -3% to -1.5% (medium blue), 0% to 1.5% (orange), 3% to 5% (brown)

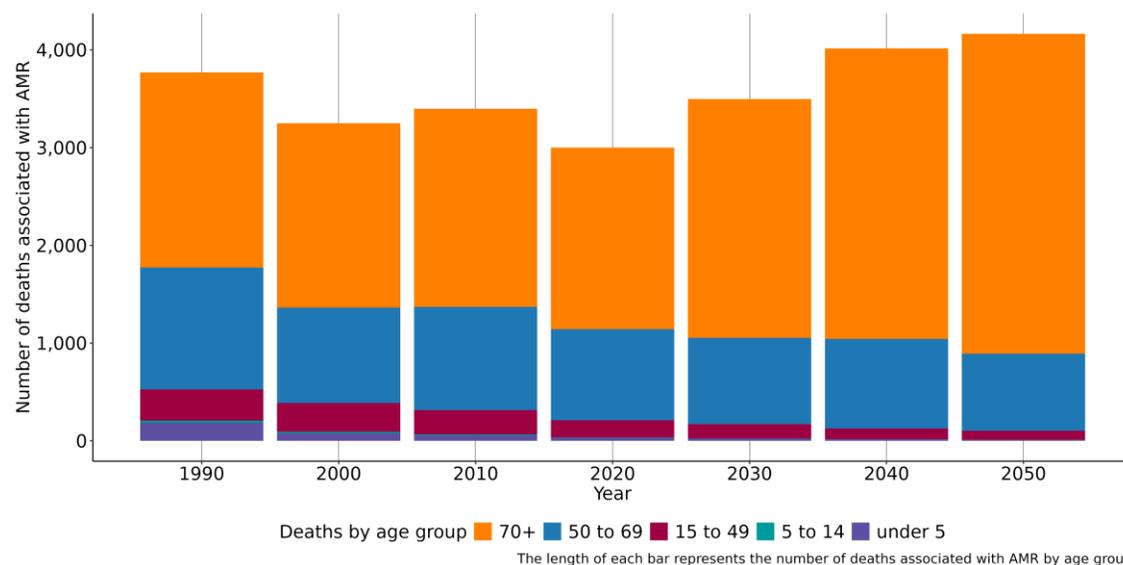
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

	Associated	Attributable
Burden Rank	Escherichia coli Aminopenicillin 598 UI (484-712) ↑	Staphylococcus aureus Methicillin 93 UI (60-126) ↑
	Staphylococcus aureus Macrolides 574 UI (452-696) ↓	Pseudomonas aeruginosa Carbapenems 44 UI (29-58) ↑
	Escherichia coli Fluoroquinolones 437 UI (335-538) ↑	Escherichia coli Fluoroquinolones 32 UI (16-48) ↑
	Staphylococcus aureus Methicillin 398 UI (247-549) ↑	Acinetobacter baumannii Carbapenems 30 UI (23-36) ↓
	Escherichia coli TMP-SMX 387 UI (263-511) ↑	Escherichia coli 3GC 29 UI (16-42) ↑
	Staphylococcus aureus Fluoroquinolones 355 UI (285-426) ↑	Klebsiella pneumoniae Fluoroquinolones 28 UI (18-38) ↑
	Klebsiella pneumoniae Fluoroquinolones 328 UI (275-380) ↑	Staphylococcus aureus Macrolides 25 UI (17-34) ↓
	Escherichia coli Beta-Lactam/Lactamase Inhib. 314 UI (250-379) ↑	Streptococcus pneumoniae Carbapenems 24 UI (14-34) ↓
	Klebsiella pneumoniae TMP-SMX 314 UI (256-372) ↓	Staphylococcus aureus Fluoroquinolones 23 UI (8-38) ↑
	Klebsiella pneumoniae Beta-Lactam/Lactamase Inhib. 265 UI (196-335) ↓	Pseudomonas aeruginosa Fluoroquinolones 23 UI (15-30) ↓

Annualized rate of change (1990-2021):
 <-3% (dark blue), -1.5% to 0% (light blue), 1.5% to 3% (red), >5.0% (dark red),
 -3% to -1.5% (medium blue), 0% to 1.5% (orange), 3% to 5% (brown)

- 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 (2,950 UI (2,570-3,340)), lower respiratory infection (excl. COVID) (2,370 UI (2,010-2,730)), peritoneal and intra-abdominal infections (857 UI (724-991)), urinary tract infections and pyelonephritis (292 UI (232-351)) and infections of the skin and subcutaneous systems (254 UI (206-303)).

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



- In Slovakia, 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 1,790 UI (1,490-2,090), whereas the mortality rate per 100,000 was 298 UI (248-348).

Data sources for Slovakia

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 Slovakia by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	276,593	Isolates
Microbial or laboratory data with outcome	1990-2021	20,456	Isolates
Literature studies	1990-2009	467	Cases/isolates/susceptibility tests

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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