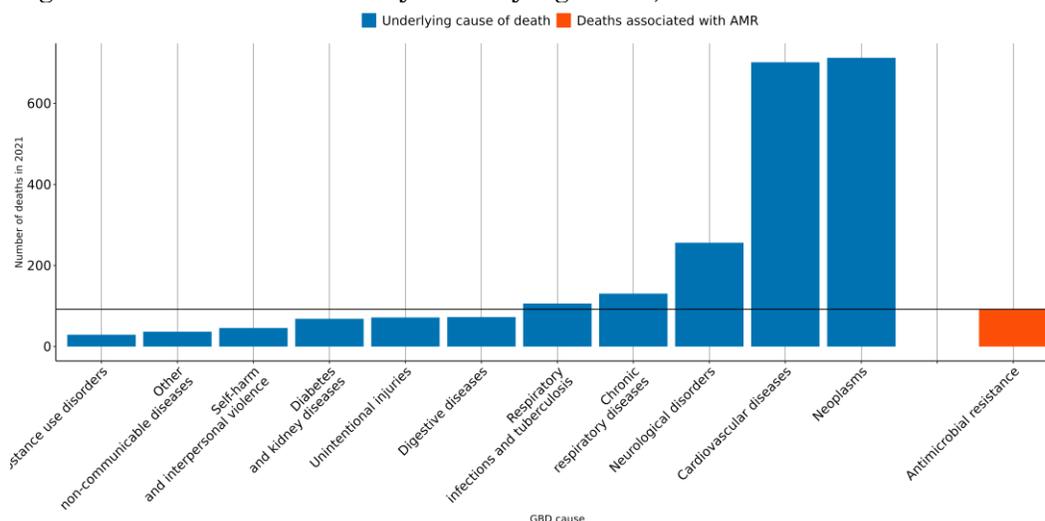


# The burden of antimicrobial resistance (AMR) in Iceland

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **20 lives** have been lost each year since 1990 in Iceland due to AMR.
- In 2021, there were an estimated **19 UI (10-28)** deaths attributable to AMR and **92 UI (57-127)** 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 aminopenicillin and *Pseudomonas aeruginosa* resistant to carbapenems.

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



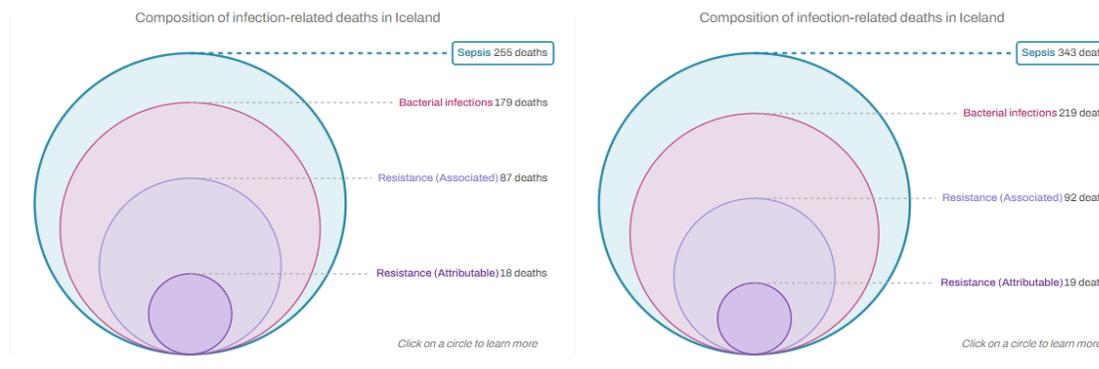
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Iceland, a 10% reduction means to decrease the number of deaths associated with AMR to **84**, but currently the trend for this country could reach up to **115 UI [77-166]** AMR-associated deaths in 2030.

## AMR in Iceland

### 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 Iceland between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Iceland** in 2021, there were an estimated **19 UI (10-28)** deaths attributable to AMR and **92 UI (57-127)** 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, **Iceland has the 5th 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	
	Bacteria	Annualized rate of change (1990-2021)	Bacteria	Annualized rate of change (1990-2021)	Bacteria	Annualized rate of change (1990-2021)
	Staphylococcus aureus 68 UI (59-78)	↑	Escherichia coli 22 UI (11-34)	↑	Staphylococcus aureus 5 UI (2-8)	↑
	Escherichia coli 35 UI (30-40)	↑	Staphylococcus aureus 22 UI (11-33)	↑	Escherichia coli 4 UI (2-7)	↑
	Streptococcus pneumoniae 24 UI (21-28)	↓	Pseudomonas aeruginosa 8 UI (5-10)	↑	Pseudomonas aeruginosa 2 UI (1-3)	↑
	Pseudomonas aeruginosa 21 UI (18-24)	↑	Klebsiella pneumoniae 7 UI (5-9)	↑	Klebsiella pneumoniae 2 UI (1-2)	↑
	Klebsiella pneumoniae 15 UI (13-17)	↑	Streptococcus pneumoniae 7 UI (4-10)	↓	Streptococcus pneumoniae 1 UI (1-2)	↓
	Enterococcus faecalis 7 UI (6-8)	↑	Enterococcus faecium 5 UI (4-6)	↑	Acinetobacter baumannii 1 UI (1-1)	↓
	Enterococcus faecium 7 UI (6-8)	↑	Enterobacter spp. 4 UI (3-4)	↑	Enterobacter spp. 1 UI (0-1)	↓
	Group A Streptococcus 7 UI (6-8)	↑	Enterococcus faecalis 4 UI (3-4)	↑	Enterococcus faecium 1 UI (0-1)	↑
	Enterobacter spp. 6 UI (5-7)	↑	Proteus spp. 4 UI (3-5)	↑	Enterococcus faecalis 1 UI (0-1)	↑
	Proteus spp. 6 UI (5-6)	↑	Acinetobacter baumannii 3 UI (2-4)	↓	Proteus spp. 1 UI (0-1)	↑

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% (pink), 3% to 5% (orange)

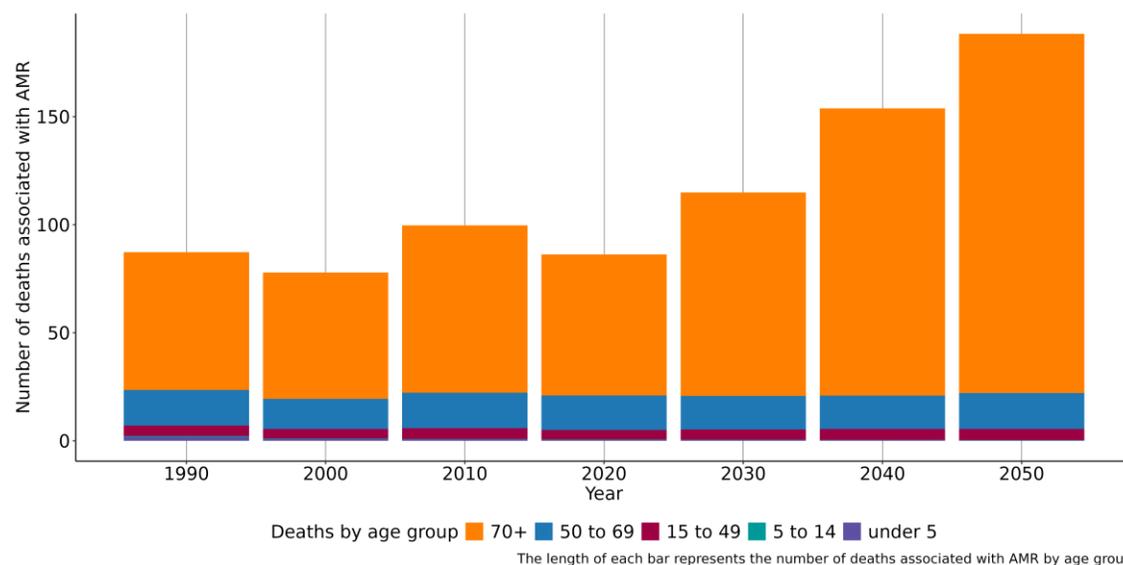
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated			Attributable		
	Bacteria	UI (range)	Annualized rate of change (1990-2021)	Bacteria	UI (range)	Annualized rate of change (1990-2021)
	Escherichia coli Aminopenicillin	20 UI (5-34)	↑	Staphylococcus aureus Methicillin	3 UI (1-6)	↑
	Staphylococcus aureus Macrolides	15 UI (10-20)	↑	Escherichia coli Aminopenicillin	1 UI (0-2)	↑
	Staphylococcus aureus Methicillin	13 UI (1-25)	↑	Pseudomonas aeruginosa Carbapenems	1 UI (0-1)	↑
	Escherichia coli TMP-SMX	10 UI (6-14)	↑	Escherichia coli Carbapenems	1 UI (0-2)	↑
	Escherichia coli Fluoroquinolones	10 UI (2-17)	↑	Klebsiella pneumoniae Aminoglycosides	1 UI (1-1)	↑
	Escherichia coli Beta-Lactam/Lactamase Inhib.	9 UI (6-11)	↑	Escherichia coli 3GC	1 UI (0-1)	↑
	Staphylococcus aureus Fluoroquinolones	7 UI (5-10)	↑	Staphylococcus aureus Macrolides	1 UI (0-1)	↑
	Klebsiella pneumoniae Aminoglycosides	7 UI (5-9)	↑	Streptococcus pneumoniae Carbapenems	1 UI (0-1)	↓
	Escherichia coli 3GC	7 UI (3-11)	↑	Escherichia coli Fluoroquinolones	1 UI (0-1)	↑
	Enterococcus faecium Fluoroquinolones	6 UI (5-7)	↑	Pseudomonas aeruginosa Fluoroquinolones	1 UI (0-1)	↑

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% (pink), 3% to 5% (orange)

- 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) (135 UI (113-158)), bloodstream infections (101 UI (87-115)), peritoneal and intra-abdominal infections (38 UI (32-43)), urinary tract infections and pyelonephritis (22 UI (18-26)) and infections of the skin and subcutaneous systems (9 UI (8-11)).

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



- In Iceland, 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 71 UI (43-98), whereas the mortality rate per 100,000 was 187 UI (114-260).

### Data sources for Iceland

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 Iceland by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	2010-2021	611	Isolates
Literature studies	1990-2009	117	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:*

- 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>