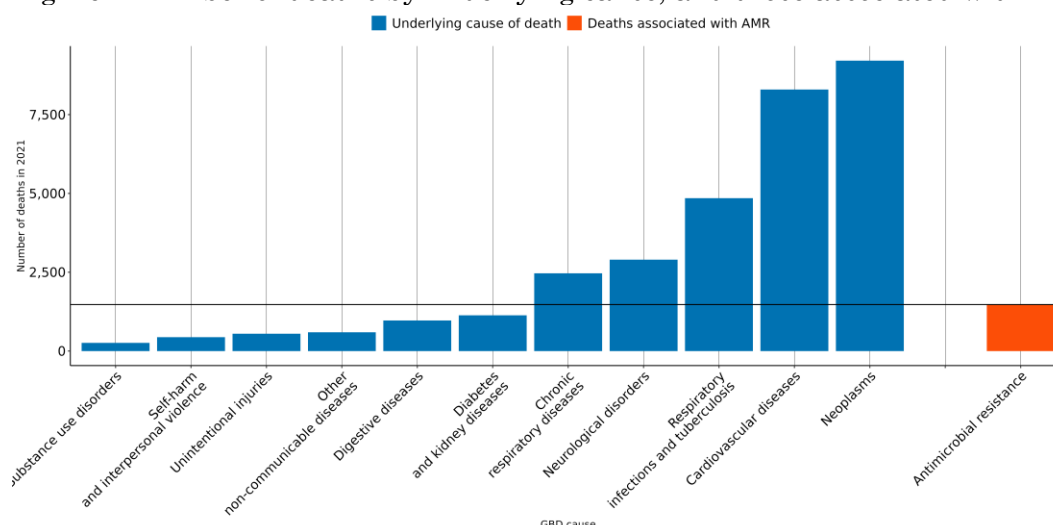


The burden of antimicrobial resistance (AMR) in Ireland

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **500 lives** have been lost each year since 1990 in Ireland due to AMR.
- In 2021, there were an estimated **314 UI (269-359)** deaths attributable to AMR and **1,480 UI (1,250-1,700)** 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 beta lactam / beta-lactamase inhibitors and *Streptococcus pneumoniae* resistant to carbapenems.

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



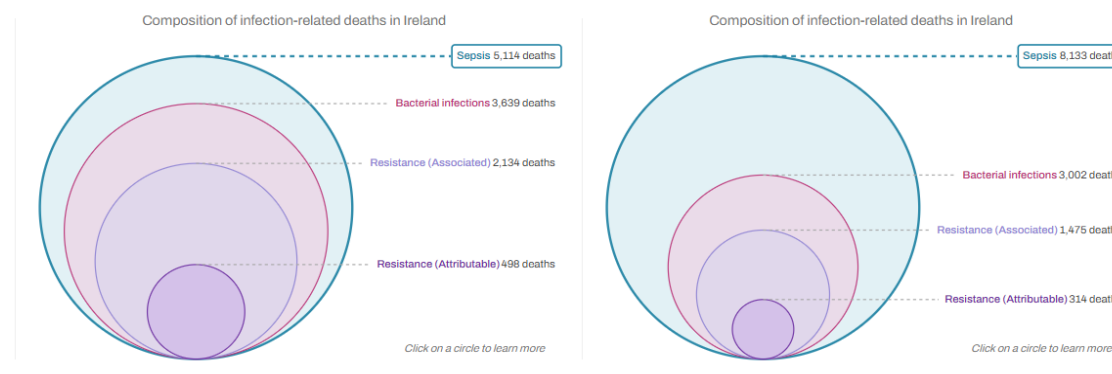
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Ireland, a 10% reduction means to decrease the number of deaths associated with AMR to **1,550**, but currently the trend for this country could reach up to **2,020 UI [1,540-2,490]** AMR-associated deaths in 2030.

AMR in Ireland

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 Ireland between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation \(MICROBE\)](#)
- In **Ireland** in 2021, there were an estimated **314 UI (269-359)** deaths attributable to AMR and **1,480 UI (1,250-1,700)** 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, **Ireland has the 17th 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	UI (range)	Rate of change	Bacteria	UI (range)	Rate of change	Bacteria	UI (range)	Rate of change
	Staphylococcus aureus	897 UI (786-1,010)	↑	Staphylococcus aureus	392 UI (338-446)	↓	Staphylococcus aureus	80 UI (62-98)	↓
	Escherichia coli	506 UI (444-568)	↑	Escherichia coli	361 UI (307-415)	↑	Escherichia coli	65 UI (49-80)	↑
	Streptococcus pneumoniae	300 UI (262-339)	↓	Streptococcus pneumoniae	162 UI (131-192)	↓	Streptococcus pneumoniae	43 UI (33-53)	↓
	Pseudomonas aeruginosa	286 UI (252-321)	↓	Pseudomonas aeruginosa	114 UI (95-134)	↓	Pseudomonas aeruginosa	29 UI (22-36)	↓
	Klebsiella pneumoniae	214 UI (187-240)	↓	Klebsiella pneumoniae	100 UI (79-121)	↓	Enterococcus faecium	22 UI (18-25)	↑
	Group A Streptococcus	114 UI (98-130)	↑	Enterococcus faecium	85 UI (75-95)	↑	Klebsiella pneumoniae	22 UI (16-27)	↓
	Enterococcus faecalis	101 UI (89-112)	↓	Acinetobacter baumannii	50 UI (38-61)	↓	Acinetobacter baumannii	18 UI (15-22)	↓
	Enterococcus faecium	89 UI (78-99)	↑	Proteus spp.	47 UI (35-59)	↑	Enterobacter spp.	10 UI (9-12)	↓
	Proteus spp.	81 UI (70-92)	↑	Enterobacter spp.	44 UI (36-51)	↓	Proteus spp.	6 UI (4-8)	↑
	Enterobacter spp.	79 UI (69-88)	↓	Enterococcus faecalis	28 UI (24-32)	↓	Enterococcus faecalis	5 UI (4-7)	↓

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)

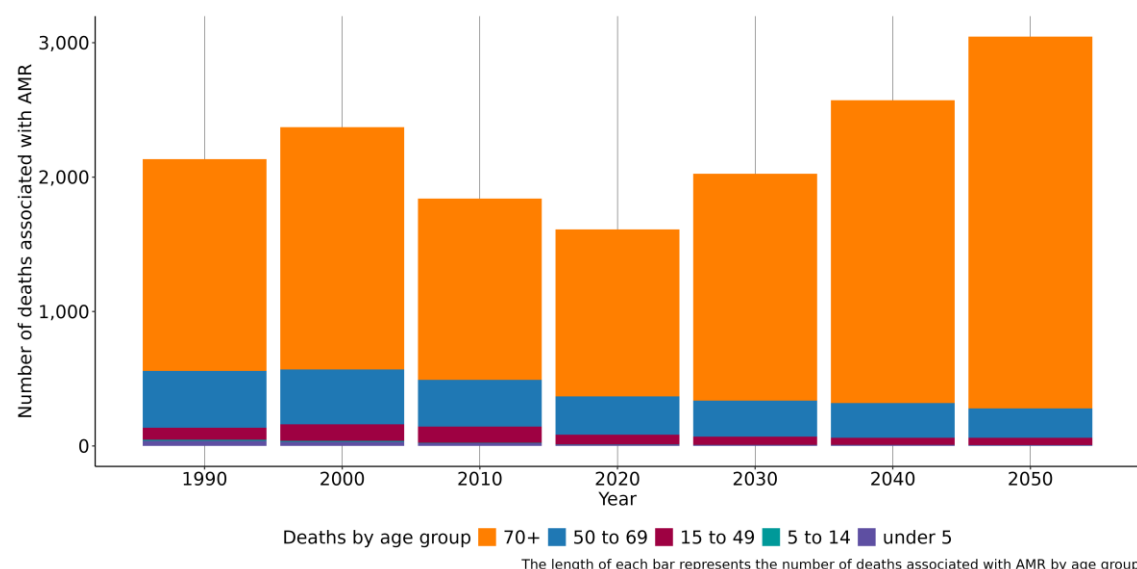
Table 2. Combinations which cause most deaths in 2021 (Number of deaths in parenthesis)

Burden Rank	Associated			Attributable		
	Combination	UI (range)	Rate of change	Combination	UI (range)	Rate of change
	Escherichia coli Aminopenicillin	353 UI (298-408)	↑	Staphylococcus aureus Methicillin	46 UI (26-66)	↓
	Staphylococcus aureus Macrolides	307 UI (248-366)	↑	Streptococcus pneumoniae Carbapenems	34 UI (23-44)	↓
	Escherichia coli Beta-Lactam/Lactamase Inhib.	199 UI (167-231)	↑	Escherichia coli Beta-Lactam/Lactamase Inhib.	16 UI (5-27)	↑
	Staphylococcus aureus Methicillin	194 UI (114-274)	↓	Escherichia coli Aminopenicillin	15 UI (12-19)	↑
	Escherichia coli TMP-SMX	171 UI (131-210)	↓	Enterococcus faecium Vancomycin	14 UI (12-17)	↑
	Staphylococcus aureus Fluoroquinolones	164 UI (126-202)	↓	Staphylococcus aureus Macrolides	14 UI (9-19)	↑
	Escherichia coli Fluoroquinolones	138 UI (106-170)	↑	Pseudomonas aeruginosa Carbapenems	14 UI (9-18)	↓
	Streptococcus pneumoniae Carbapenems	113 UI (83-142)	↓	Staphylococcus aureus Fluoroquinolones	11 UI (3-19)	↓
	Streptococcus pneumoniae TMP-SMX	86 UI (57-115)	↓	Escherichia coli TMP-SMX	9 UI (5-13)	↓
	Enterococcus faecium Fluoroquinolones	81 UI (72-91)	↑	Escherichia coli Fluoroquinolones	9 UI (4-13)	↑

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) (1,710 UI (1,460-1,970)), bloodstream infections (1,410 UI (1,260-1,570)), peritoneal and intra-abdominal infections (480 UI (420-539)), urinary tract infections and pyelonephritis (346 UI (290-401)) and infections of the skin and subcutaneous systems (187 UI (158-216)).

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



- In Ireland, 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 1,130 UI (934-1,330), whereas the mortality rate per 100,000 was 217 UI (180-255).

Data sources for Ireland

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 Ireland by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	1990-2021	1,027,928	Isolates
Microbial or laboratory data with outcome	1990-2021	17,528	Isolates
Literature studies	1990-2009	1,010	Cases/isolates/susceptibility tests
Single drug resistance profile data	2010-2021	52,062	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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