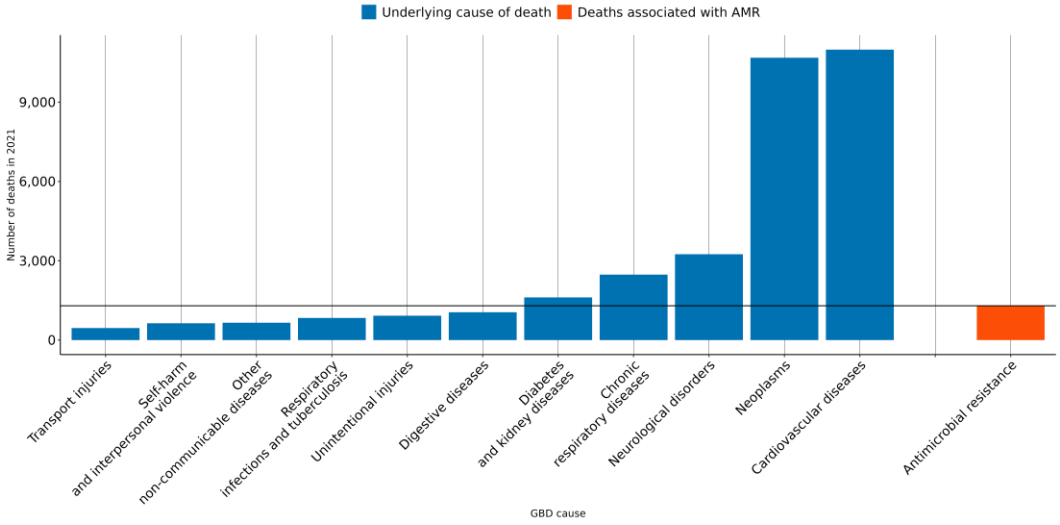
The burden of antimicrobial resistance (AMR) in New Zealand

Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **200 lives** have been lost each year since 1990 in New Zealand due to AMR.
- In 2021, there were an estimated **278 UI (222-334)** deaths attributable to AMR and **1,300 UI (1,090-1,510)** 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



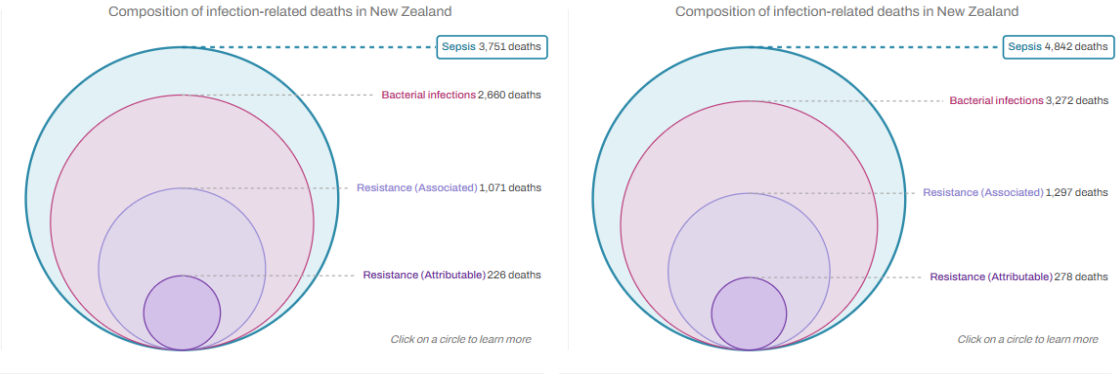
- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 New Zealand, a 10% reduction means to decrease the number of deaths associated with AMR to **1,170**, but currently the trend for this country could reach up to **1,780 UI [1,370-2,160]** AMR-associated deaths in 2030.

AMR in New Zealand

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 New Zealand between 1990 and 2019.



- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE)]
- In **New Zealand** in 2021, there were an estimated **278 UI (222-334)** deaths attributable to AMR and **1,300 UI (1,090-1,510)** 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, **New Zealand has the 7th 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
1	Staphylococcus aureus 929 UI (828-1,030) ↑	Escherichia coli 361 UI (317-405) ↑	Escherichia coli 65 UI (54-76) ↑
2	Escherichia coli 569 UI (506-633) ↑	Staphylococcus aureus 243 UI (192-294) ↑	Staphylococcus aureus 65 UI (49-81) ↑
3	Pseudomonas aeruginosa 328 UI (293-362) ↑	Klebsiella pneumoniae 121 UI (94-148) ↑	Pseudomonas aeruginosa 29 UI (21-37) ↓
4	Streptococcus pneumoniae 278 UI (248-309) ↓	Streptococcus pneumoniae 115 UI (101-130) ↓	Klebsiella pneumoniae 27 UI (20-33) ↑
5	Klebsiella pneumoniae 244 UI (217-270) ↑	Pseudomonas aeruginosa 115 UI (90-139) ↓	Streptococcus pneumoniae 20 UI (15-24) ↓
6	Group A Streptococcus 147 UI (128-165) ↑	Enterococcus faecium 86 UI (76-95) ↑	Acinetobacter baumannii 18 UI (14-22) ↓
7	Enterococcus faecalis 113 UI (101-125) ↑	Acinetobacter baumannii 53 UI (40-66) ↓	Enterococcus faecium 17 UI (13-21) ↑
8	Acinetobacter baumannii 101 UI (91-111) ↓	Proteus spp. 44 UI (31-56) ↑	Enterobacter spp. 10 UI (8-12) ↓
9	Enterococcus faecium 100 UI (89-110) ↑	Enterobacter spp. 36 UI (31-41) ↓	Proteus spp. 7 UI (4-9) ↑
10	Proteus spp. 93 UI (82-104) ↑	Enterococcus faecalis 21 UI (13-29) ↓	Enterococcus faecalis 5 UI (2-7) ↓

Annualized rate of change (1990-2021): <-3%; -3% to -1.5%; -1.5% to 0%; 0% to 1.5%; 1.5% to 3%; 3% to 5%; >5.0%

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

Burden Rank	Associated		Attributable	
1	Escherichia coli Aminopenicillin	323 UI (267-379) ↑	Staphylococcus aureus Methicillin	46 UI (33-59) ↑
2	Escherichia coli Fluoroquinolones	176 UI (144-208) ↑	Escherichia coli Aminopenicillin	17 UI (11-22) ↑
3	Staphylococcus aureus Methicillin	172 UI (122-222) ↑	Pseudomonas aeruginosa Carbapenems	14 UI (9-19) ↑
4	Escherichia coli TMP-SMX	162 UI (130-194) ↑	Escherichia coli Fluoroquinolones	13 UI (7-19) ↑
5	Escherichia coli Beta-Lactam/Lactamase Inhib.	132 UI (107-156) ↑	Enterococcus faecium Vancomycin	9 UI (7-12) ↑
6	Staphylococcus aureus Macrolides	121 UI (103-139) ↑	Escherichia coli Beta-Lactam/Lactamase Inhib.	9 UI (2-16) ↑
7	Klebsiella pneumoniae Aminoglycosides	98 UI (73-122) ↑	Escherichia coli 3GC	9 UI (6-12) ↑
8	Escherichia coli 3GC	85 UI (68-102) ↑	Klebsiella pneumoniae Aminoglycosides	9 UI (6-11) ↑
9	Escherichia coli Aminoglycosides	78 UI (58-97) ↑	Escherichia coli TMP-SMX	9 UI (5-12) ↑
10	Enterococcus faecium Fluoroquinolones	78 UI (68-87) ↑	Enterococcus faecium Fluoroquinolones	8 UI (4-12) ↑

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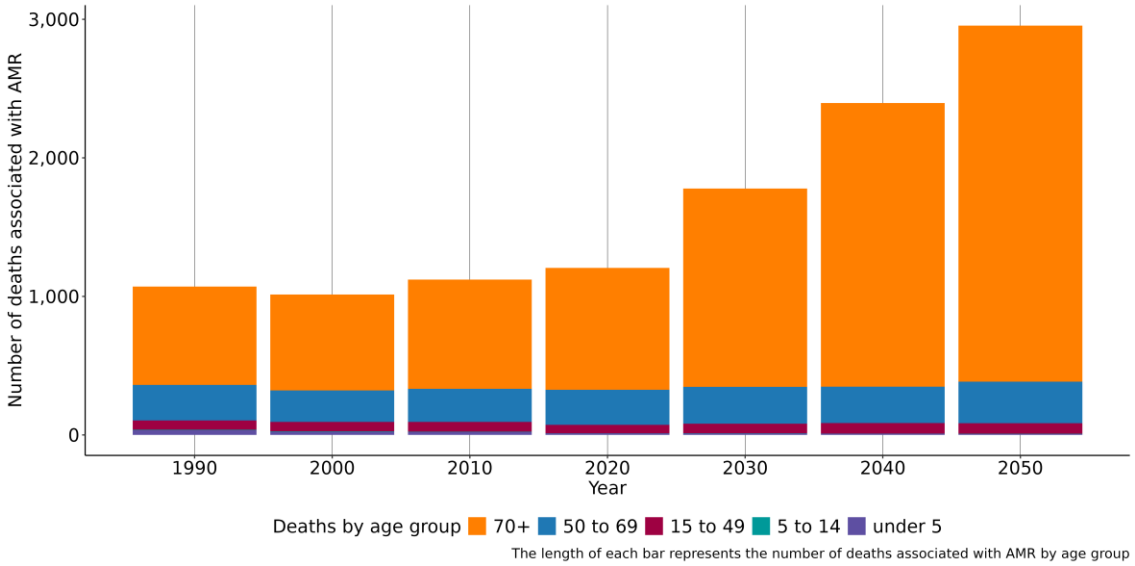
- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) bloodstream infections (1,760 UI (1,580-1,940)), lower respiratory infection (excl. COVID) (1,500 UI (1,310-1,700)), peritoneal and intra-abdominal infections (583 UI (515-650)), urinary tract infections and pyelonephritis (294 UI (249-340)) and infections of the skin and subcutaneous systems (263 UI (227-299)).

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



- In New Zealand, 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 959 UI (784-1,130), whereas the mortality rate per 100,000 was 171 UI (140-203).

Data sources for New Zealand

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 New Zealand by source type

Source type	Years	Sample size	Sample size units
Microbial or laboratory data without outcome	2010-2021	28,207	Isolates
Literature studies	1990-2021	3,574	Cases/isolates/susceptibility tests
Single drug resistance profile data	1990-2021	3,720,458	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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