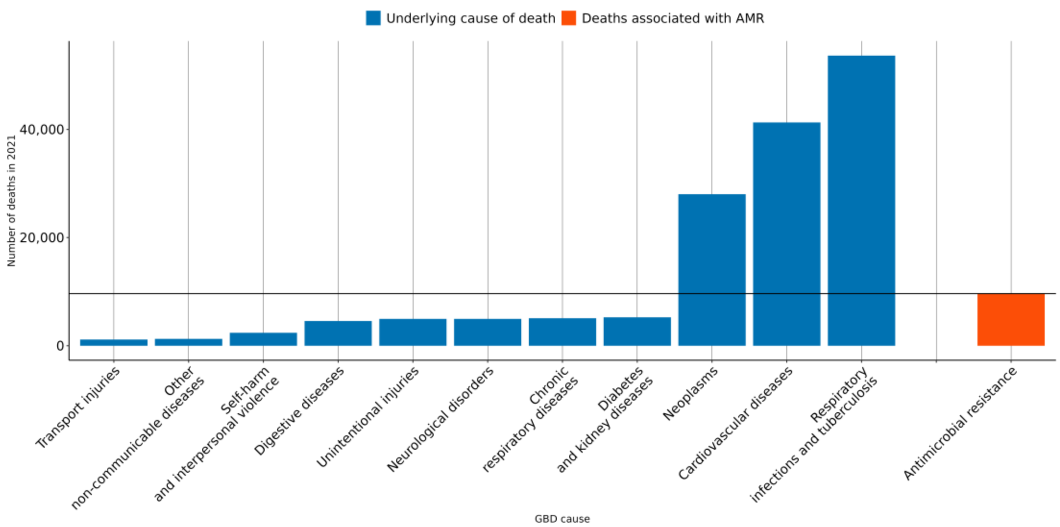
# The burden of antimicrobial resistance (AMR) in Cuba

## Executive summary

- Antimicrobial Resistance (AMR) is a major global health threat, over **2,000 lives** have been lost each year since 1990 in Cuba due to AMR.
- In 2021, there were an estimated **2,360 UI (1,860-2,860)** deaths attributable to AMR and **9,640 UI (7,960-11,300)** 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 *Acinetobacter baumannii* resistant to fluoroquinolones.

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



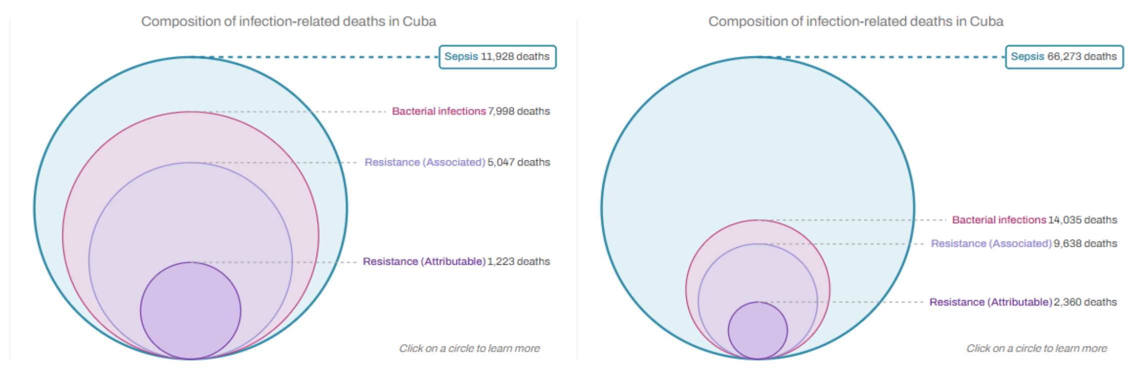

- In 2021, the number of deaths associated with AMR (orange bar in *figure 2*) were high compared to the most relevant underlying causes of death (depicted in blue) in the country. AMR associated deaths occur within multiple Global Burden of Disease (GBD) causes of death and AMR is not an underlying 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 Cuba, a 10% reduction means to decrease the number of deaths associated with AMR to **9,140**, but currently the trend for this country could reach up to **12,000 UI [9,570-15,000]** AMR-associated deaths in 2030.

# AMR in Cuba

## 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 Cuba between 1990 and 2019.




- To look at these and more visualization interactively visit [Measuring Infectious Causes and Resistance Outcomes for Burden Estimation (MICROBE)]
- In **Cuba** in 2021, there were an estimated **2,360 UI (1,860-2,860)** deaths attributable to AMR and **9,640 UI (7,960-11,300)** 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, **Cuba has the 87th 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 3,210 UI (2,810-3,610) ↑ | Staphylococcus aureus 2,230 UI (1,700-2,760) ↑ | Staphylococcus aureus 564 UI (369-760) ↑ |
| 2 | Streptococcus pneumoniae 2,670 UI (2,330-3,000) ↑ | Streptococcus pneumoniae 1,840 UI (1,460-2,220) ↑ | Acinetobacter baumannii 505 UI (431-578) ↑ |
| 3 | Escherichia coli 1,420 UI (1,240-1,600) ↑ | Acinetobacter baumannii 1,260 UI (1,090-1,430) ↑ | Streptococcus pneumoniae 303 UI (209-397) ↑ |
| 4 | Pseudomonas aeruginosa 1,350 UI (1,180-1,530) ↑ | Escherichia coli 1,180 UI (996-1,370) ↑ | Klebsiella pneumoniae 300 UI (252-348) ↑ |
| 5 | Acinetobacter baumannii 1,330 UI (1,160-1,500) ↑ | Klebsiella pneumoniae 1,150 UI (992-1,300) ↑ | Escherichia coli 247 UI (196-298) ↑ |
| 6 | Klebsiella pneumoniae 1,310 UI (1,140-1,480) ↑ | Pseudomonas aeruginosa 860 UI (675-1,040) ↑ | Pseudomonas aeruginosa 220 UI (157-282) ↑ |
| 7 | Enterobacter spp. 402 UI (352-453) ↑ | Enterococcus faecium 212 UI (179-245) ↑ | Enterococcus faecium 54 UI (42-66) ↑ |
| 8 | Enterococcus faecalis 389 UI (340-438) ↑ | Proteus spp. 198 UI (143-253) ↑ | Enterobacter spp. 49 UI (38-61) ↑ |
| 9 | Group A Streptococcus 347 UI (301-393) ↑ | Enterobacter spp. 197 UI (140-253) ↑ | Serratia spp. 30 UI (24-36) ↑ |
| 10 | Proteus spp. 297 UI (259-336) ↑ | Serratia spp. 113 UI (92-135) ↑ | Proteus spp. 29 UI (15-42) ↑ |

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 | Staphylococcus aureus Macrolides | 1,750 UI (1,410-2,090) ↑ | Staphylococcus aureus Methicillin | 376 UI (212-540) ↑ |
| 2 | Staphylococcus aureus Methicillin | 1,550 UI (834-2,270) ↑ | Acinetobacter baumannii Carbapenems | 294 UI (232-356) ↑ |
| 3 | Streptococcus pneumoniae Macrolides | 1,540 UI (1,260-1,820) ↑ | Acinetobacter baumannii Fluoroquinolones | 131 UI (106-157) ↑ |
| 4 | Acinetobacter baumannii Beta-Lactam/Lactamase Inhib. | 1,220 UI (1,060-1,390) ↑ | Streptococcus pneumoniae Penicillin | 123 UI (79-167) ↑ |
| 5 | Acinetobacter baumannii Carbapenems | 1,190 UI (1,000-1,370) ↑ | Klebsiella pneumoniae Aminoglycosides | 115 UI (90-139) ↑ |
| 6 | Klebsiella pneumoniae Aminoglycosides | 1,130 UI (977-1,290) ↑ | Pseudomonas aeruginosa Carbapenems | 100 UI (63-137) ↑ |
| 7 | Acinetobacter baumannii 4GC | 1,110 UI (910-1,310) ↑ | Escherichia coli 3GC | 76 UI (32-121) ↑ |
| 8 | Acinetobacter baumannii 3GC | 1,070 UI (858-1,280) ↑ | Staphylococcus aureus Macrolides | 74 UI (49-99) ↑ |
| 9 | Acinetobacter baumannii Fluoroquinolones | 1,020 UI (843-1,200) ↑ | Klebsiella pneumoniae Carbapenems | 68 UI (50-86) ↑ |
| 10 | Streptococcus pneumoniae Penicillin | 1,020 UI (646-1,390) ↑ | Streptococcus pneumoniae Macrolides | 65 UI (41-90) ↑ |

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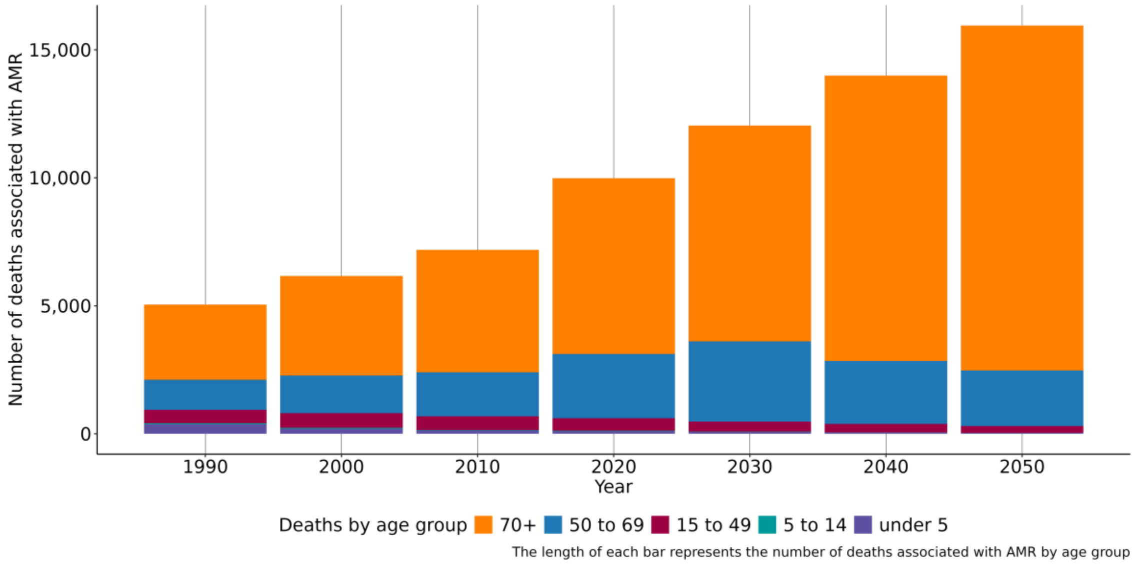
- Independently of antimicrobial resistance, the infectious syndromes accounting for the most deaths in 2021 were as follows (estimated thousands of deaths in parenthesis) lower respiratory infection (excl. COVID) (9,720 UI (8,460-11,000)), bloodstream infections (5,370 UI (4,700-6,030)), peritoneal and intra-abdominal infections (1,600 UI (1,370-1,820)), urinary tract infections and pyelonephritis (944 UI (801-1,090)) and infections of the skin and subcutaneous systems (789 UI (680-899)).

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




- In Cuba, 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 6,600 UI (5,430-7,770), whereas the mortality rate per 100,000 was 531 UI (437-626).

## Data sources for Cuba

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 Cuba by source type

| Source type | Years | Sample size | Sample size units |
|---|---|---|---|
| Antibiotic use | 2010-2021 | 945 | Study-year datapoints |
| Microbial or laboratory data with outcome | 1990-2021 | 31 | Isolates |
| Literature studies | 1990-2021 | 2,130 | Cases/isolates/susceptibility tests |
| Single drug resistance profile data | 1990-2021 | 5,314 | 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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