# The burden of antimicrobial resistance in G7 countries and globally:

## AN URGENT CALL FOR ACTION

IHME | UNIVERSITY of WASHINGTON

GRAM
Global Research on Antimicrobial Resistance

IN COOPERATION WITH ROBERT KOCH INSTITUT

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# The burden of antimicrobial resistance in G7 countries and globally: an urgent call for action

**Global context:** a total of **4.95 million deaths** per year **are associated with** resistant bacteria – with at least **1.27 million deaths** per year **directly attributable to** antimicrobial resistance.

## Antimicrobial resistance (AMR) – Important definitions and background

### What is antimicrobial resistance (AMR)?

Changes in microorganisms leading to less effective or ineffective treatment of infections.

### What are deaths attributable to AMR?

Deaths that were directly caused by drug resistance (as a result of an ineffective treatment).

### What are deaths associated with AMR?

Deaths that occurred from a drug-resistant infection, but for which AMR may or may not have been the cause.

### What is age-standardization?

A technique for comparing populations with different age structures to account for over- or under-representation of age groups in different countries.

*(Source: Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. Lancet, 2022).*

### REAL

AMR is a leading cause of death globally, higher than HIV/AIDS or malaria. It also poses a unique global threat due to its spread from one country to another.

### INCREASING

Continued worldwide spread of antimicrobial- resistant bacteria has increasingly reduced the effectiveness of available therapies, and new drugs are not developing fast enough.

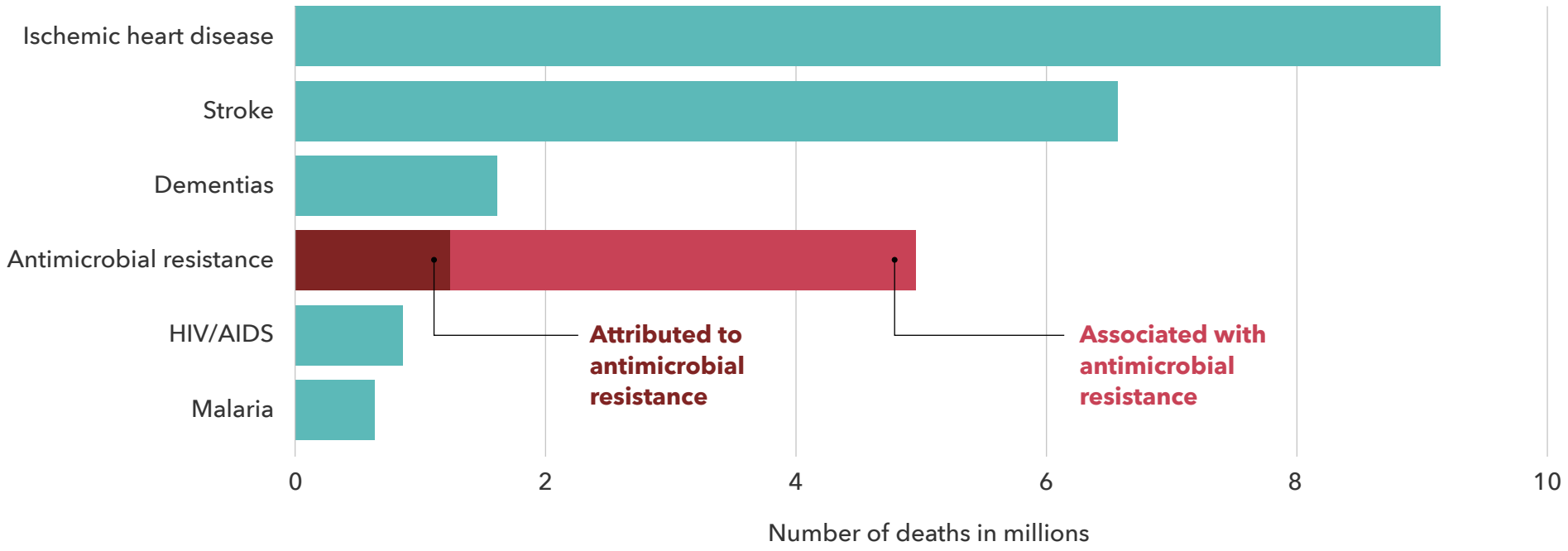
### RELEVANT

AMR is already putting extra pressure on frontline health care workers by making common infections harder to treat and causing millions of preventable deaths worldwide.

### PREVENTABLE

There are immediate actions that can help countries around the world protect their health systems against the threat of AMR, but we need a multipronged and comprehensive approach now.

## Placing global burden of AMR in context: How big is the threat and how did it compare to other deaths in 2019 (in millions)?




Over a million people are now dying each year due to infections such as lower respiratory, bloodstream, and intra-abdominal infections caused by bacteria which have become resistant to treatment.

Sub-Saharan Africa faces the highest burden of AMR, with 255,000 deaths attributable to AMR, and a particularly high number from vaccine-preventable bacterial disease (*Streptococcus pneumoniae*).

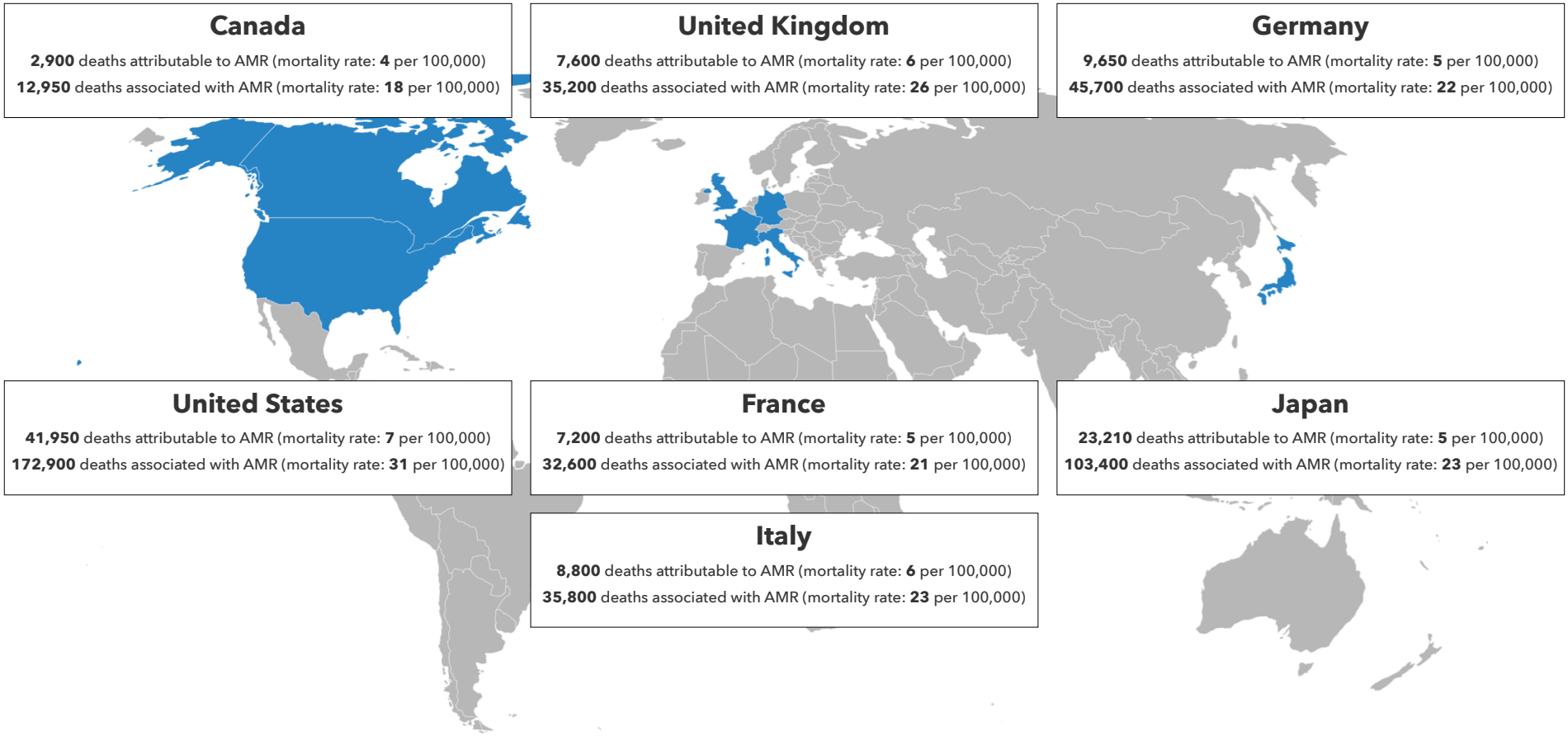
High income countries also face high levels of antimicrobial resistance, including to treatments for *Escherichia coli*, which commonly causes kidney infections, and *Staphylococcus aureus*, which can cause sepsis.

Young children are at significant risk: In 2019, 1 in 5 deaths caused by AMR occurred in children under the age of five – often from previously treatable infections.

Beyond the human cost, with 52,800,000 productive life years lost attributable to AMR, we should be cognizant of the growing economic impact of inaction.

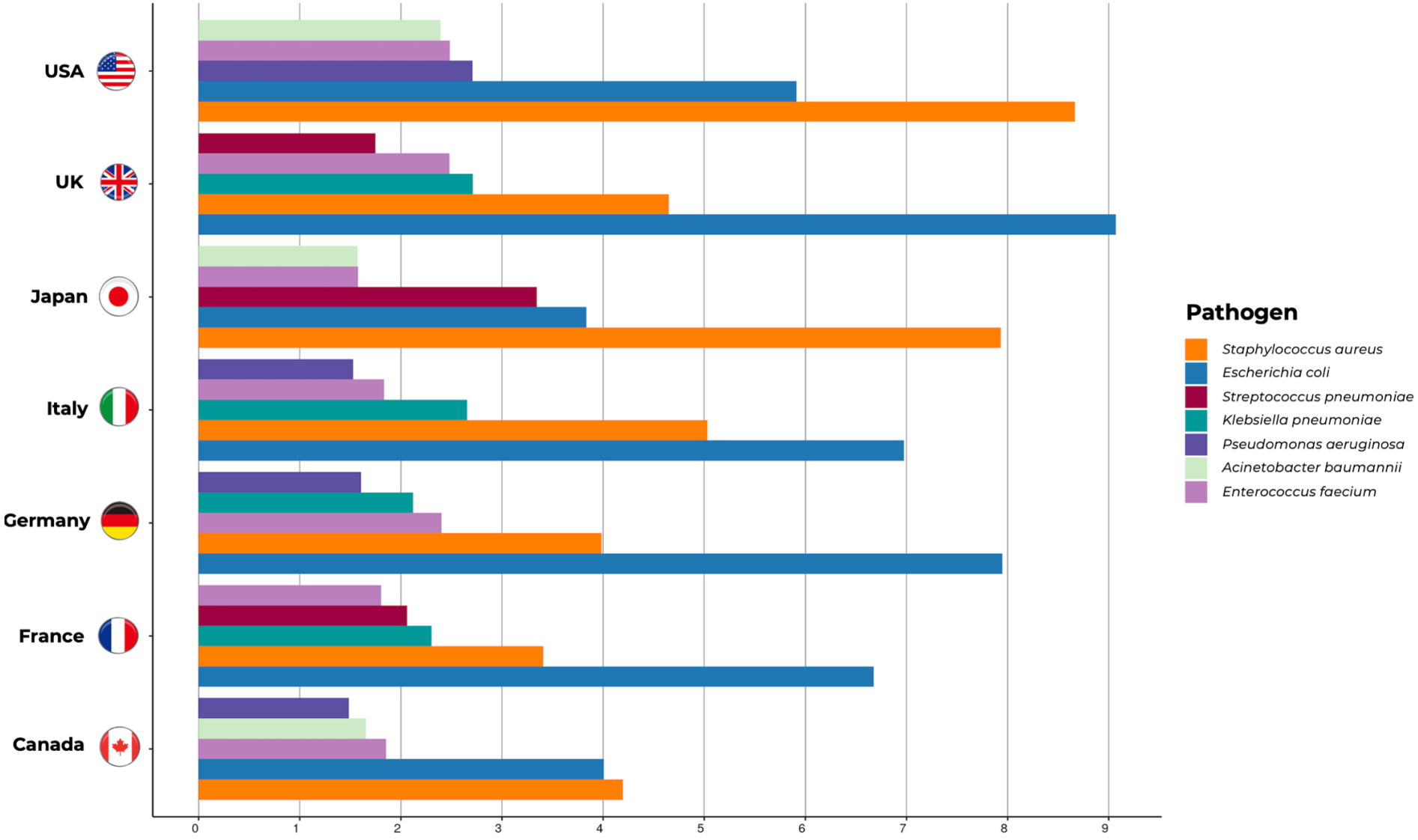
In 2019, seven bacteria caused more than 80,000 deaths attributable to AMR: *S. aureus, E. coli, Klebsiella pneumoniae, S. pneumoniae, Acinetobacter baumannii, Mycobacterium tuberculosis,* and *Pseudomonas aeruginosa.*

# A snapshot of the AMR landscape in the G7 countries:
# Attributable and associated death counts with age-standardized mortality rates per 100,000 people




In 2019, almost **half a million deaths** could have been prevented in all G7 countries combined, if all drug-resistant infections were prevented.

## Top five leading pathogens for every G7 country in 2019:
## With age-standardized mortality rates associated with AMR per 100,000 people

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Among all the G7 countries combined, the most common pathogen-drug combination for deaths attributable to AMR was **methicillin-resistant** *Staphylococcus aureus*, while **aminopenicillin-resistant** *Escherichia coli* predominated for deaths associated with AMR.

The number of deaths associated with AMR is **higher than all deaths from cancer** in Japan, **higher than all cirrhosis deaths** in Canada, France, Germany and Italy, and it is also **higher than all deaths from Alzheimer's disease** in the United Kingdom and the United States.

## Antimicrobial Resistance (AMR) – A call for leadership and action

| INDIVIDUAL ACTION | STEWARDSHIP | SURVEILLANCE | NATIONAL POLICY |
|---|---|---|---|
| Everyone has a role to play to reduce the spread of AMR by adhering to good hygiene practices and following the recommendations of health care professionals to take antibiotics only as prescribed. | Country differences in leading drug-bug combinations may emphasize the true potential of antibiotic stewardship – the management of an optimal therapy for every patient. | Even among the G7 countries, we found gaps in the AMR data that hinder comprehensive surveillance and burden estimation, highlighting the need for more data sources. | Countries should have a stringent national action plan to prevent and control illness and death related to resistance. Preliminary analyses show, that current action plans may not have been sufficient to stop an overall upward trend in AMR spread – both in humans and animals. |