

Antimicrobial Resistance: Global Problem, State Action

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Disclosures

I have no relevant relationships with ineligible companies to disclose.

Learning Objectives

- Understand how the global problem of antibiotic resistance is affecting North Carolina
- Describe actions the state is taking to slow resistance and improve public health

Global Considerations

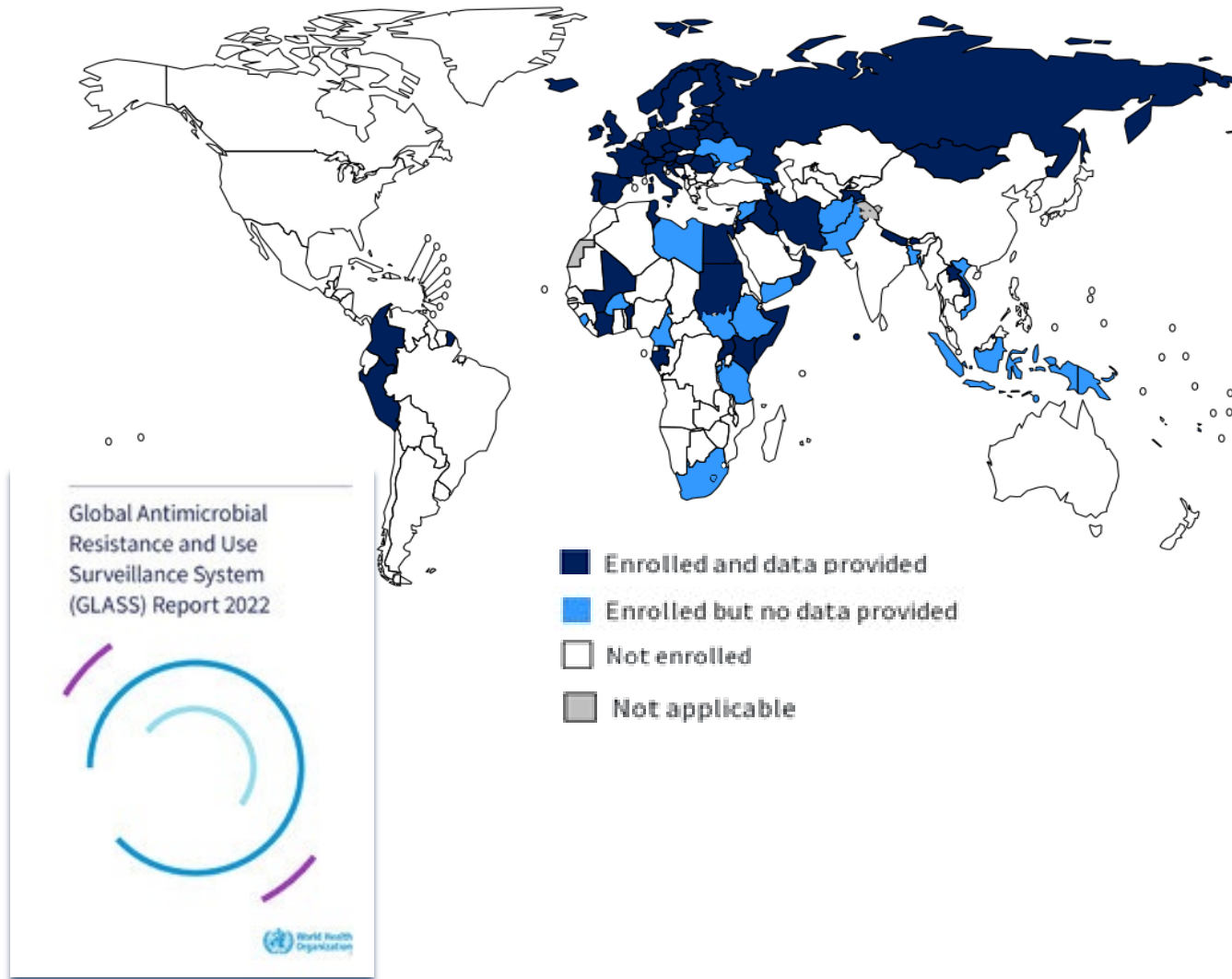
Antimicrobial resistance (AMR): Threat to global development and health

- Bacterial AMR was directly responsible for an estimated 1.27 million global deaths in 2019 and contributed to 4.95 million deaths (1)
- Misuse and overuse of antimicrobials in humans, animals and plants are the main drivers of AMR
- Countries in all regions and at all income levels are affected
 - Low- and middle-income countries are most affected
 - Drivers and consequences are exacerbated by poverty and inequality
- The World Bank estimates that AMR could result in \$1 trillion in additional healthcare costs by 2050, and \$1 trillion to \$3.4 trillion gross domestic product (GDP) losses per year by 2030 (2).

1. Antimicrobial Resistance Collaborators. (2022). Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *The Lancet*; 399(10325): P629-655.
DOI: [https://doi.org/10.1016/S0140-6736\(21\)02724-0](https://doi.org/10.1016/S0140-6736(21)02724-0)

2. Drug-Resistant Infections: A Threat to Our Economic future (March 2027) <https://www.worldbank.org/en/topic/health/publication/drug-resistant-infections-a-threat-to-our-economic-future>

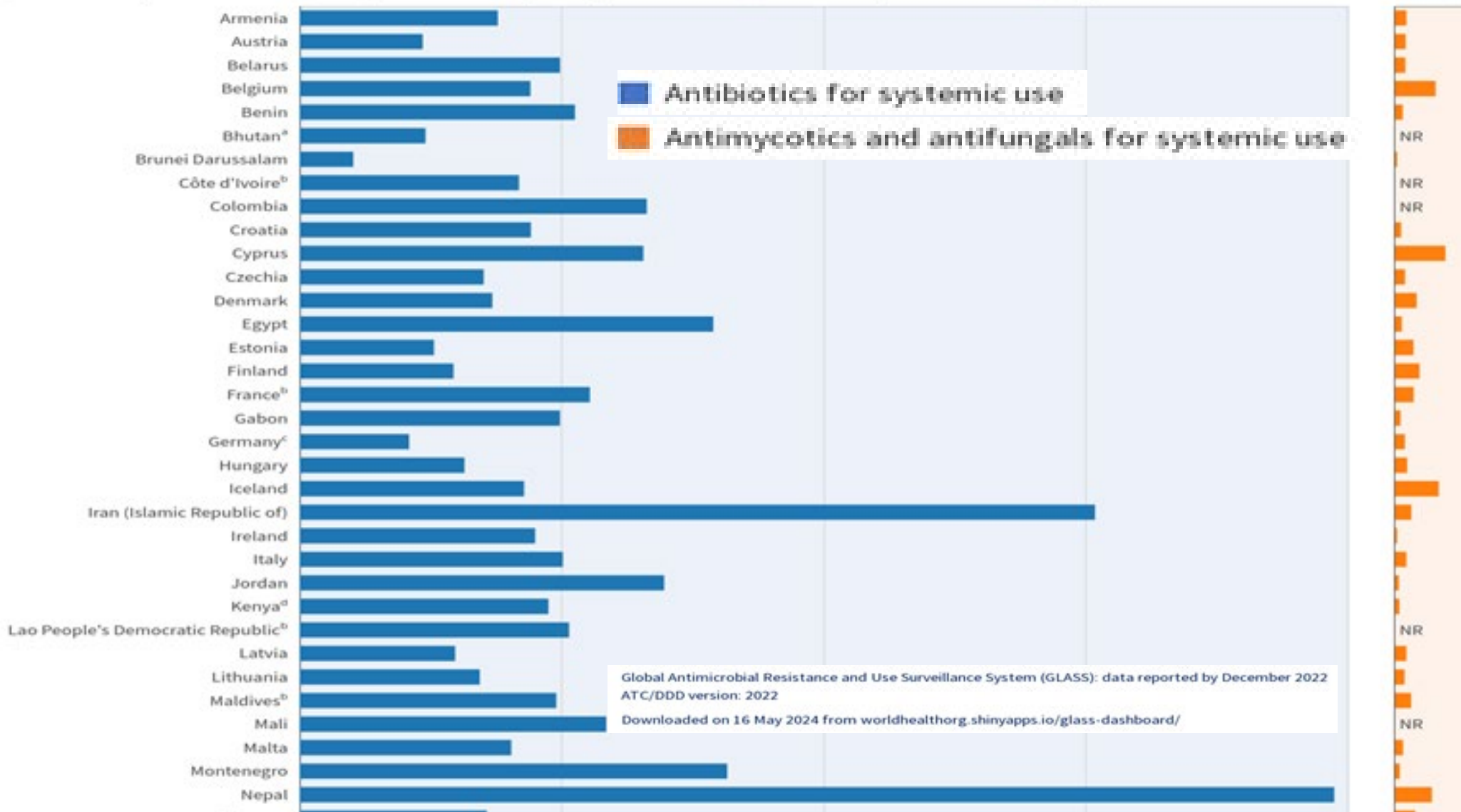
GLASS



The WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS) was launched in 2015 to foster AMR surveillance and inform strategies to contain AMR. The system started with surveillance of AMR in bacteria causing common human infections and has expanded its scope to include surveillance of antimicrobial consumption (AMC), invasive fungal infections, and a One Health surveillance model relevant to human health. As of the end of 2022, 127 countries, territories and areas participate in GLASS.

Global Antimicrobial Resistance and Use Surveillance System (GLASS): data reported by 12/2022. ATC/DDD version: 2022. Downloaded May 16, 2024.

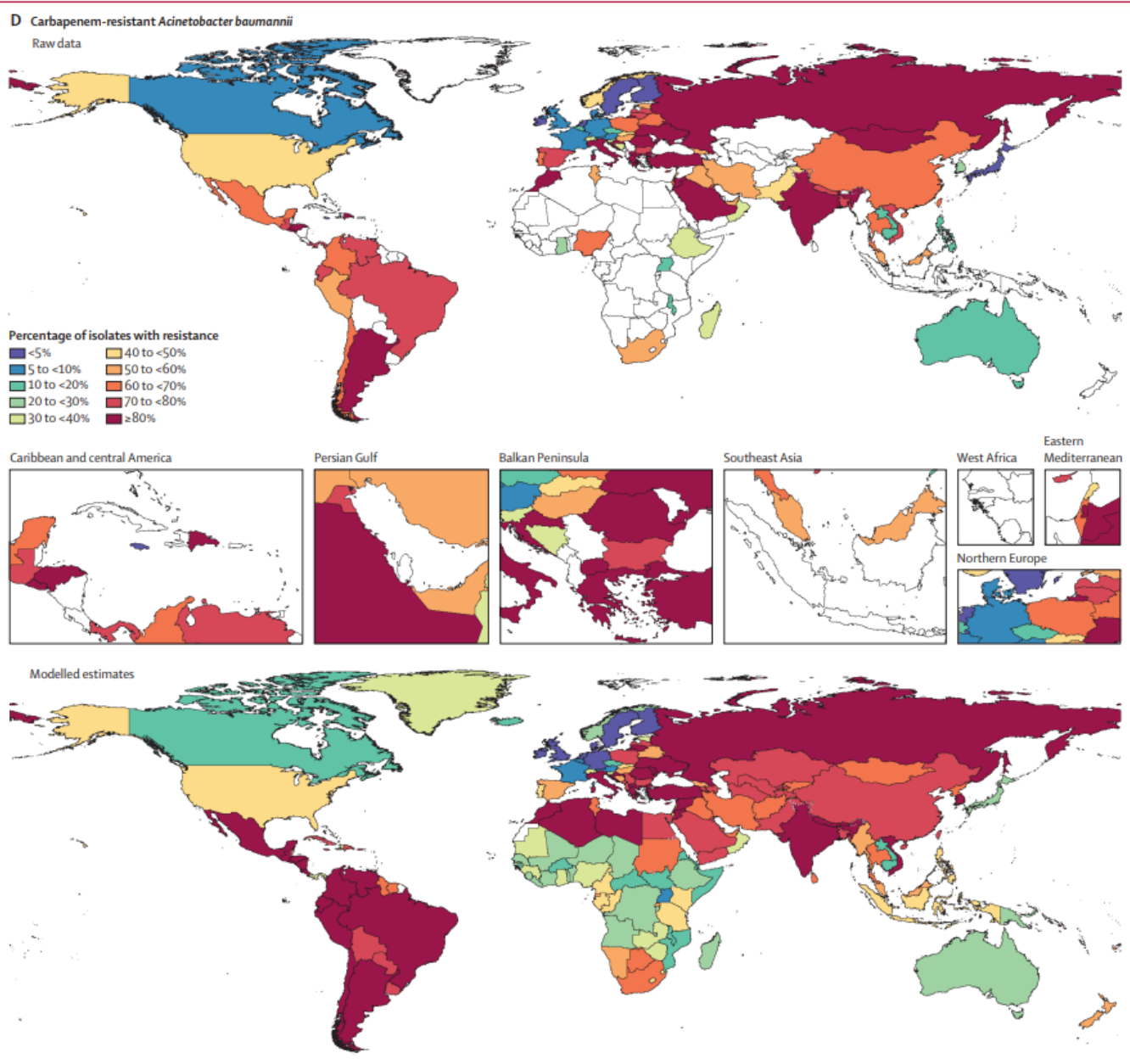
Dashboard Snapshot: Country Consumption by Antimicrobials Class



Factors Driving AMR

- Selection pressure on susceptible microbes by use of therapeutic agents
- Social and administrative factors also contribute to the emergence and spread of resistance
- In the United States and other developed countries AMR driven by over-prescribing of antimicrobials, particularly antibiotics, even in the absence of appropriate indications
 - Diagnostic uncertainty
 - Lack of opportunity for patient follow-up
 - Lack of knowledge regarding optimal therapies
 - Patient demand
- Hospitals are fertile grounds for breeding resistant microbes.
 - Large numbers of patients (many with suppressed immune systems) in proximity to each other
 - Intensive and prolonged antimicrobial therapy
- In many developing countries, antimicrobial agents are readily available and can be purchased as a commodity without the advice or prescription of a trained healthcare provider
- Use of antimicrobial agents in animals raised commercially for food (poultry, pigs, cows) for therapeutic use or to promote growth

Institute of Medicine(US) Forum on Emerging Infections; Knobler SL, Lemon SM, Najafi M, et al, editors. The Resistance Phenomenon in Microbes and Infectious Disease Vectors: Implications for Human Health and Strategies for Containment: Workshop Summary. Washington (DC): National Academies Press (US); 2003. Factors Contributing to the Emergence of Resistance. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK97126/>

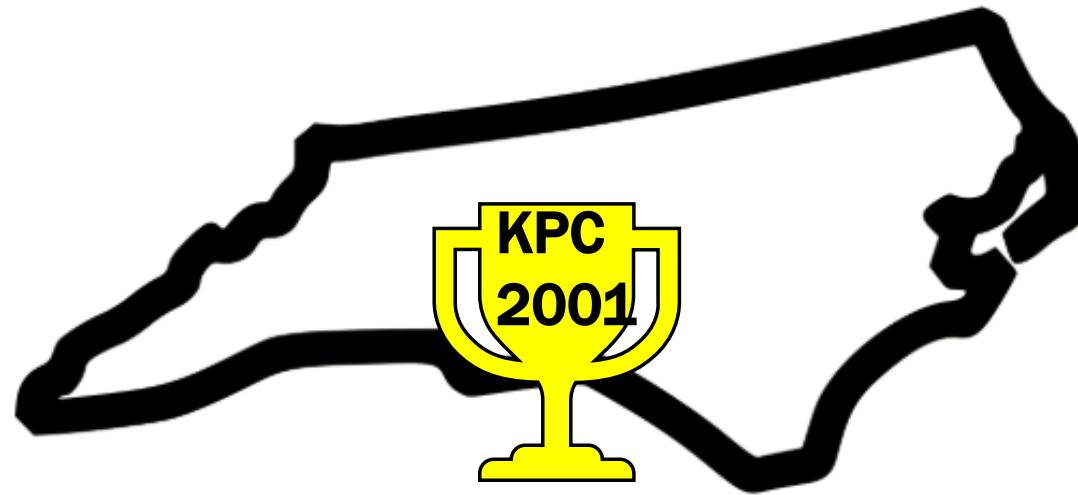


Percentage of *Carbapenem-resistant Acinetobacter baumannii* Isolates with resistance, 2019

Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *The Lancet* Vol 399, Issue 10325, P 629-655, Feb 12, 2022

Antimicrobial Resistance in North Carolina

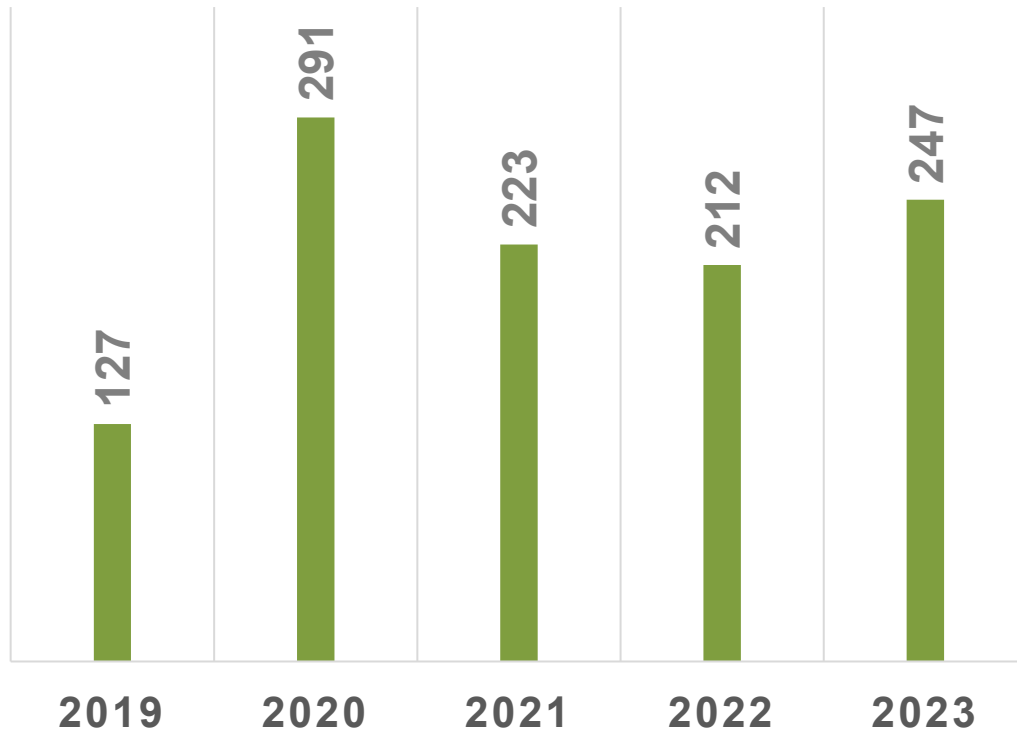
Coming in First



Carbapenem-resistant Enterobacterales (CRE) Surveillance

Carbapenemase-Producing CRE

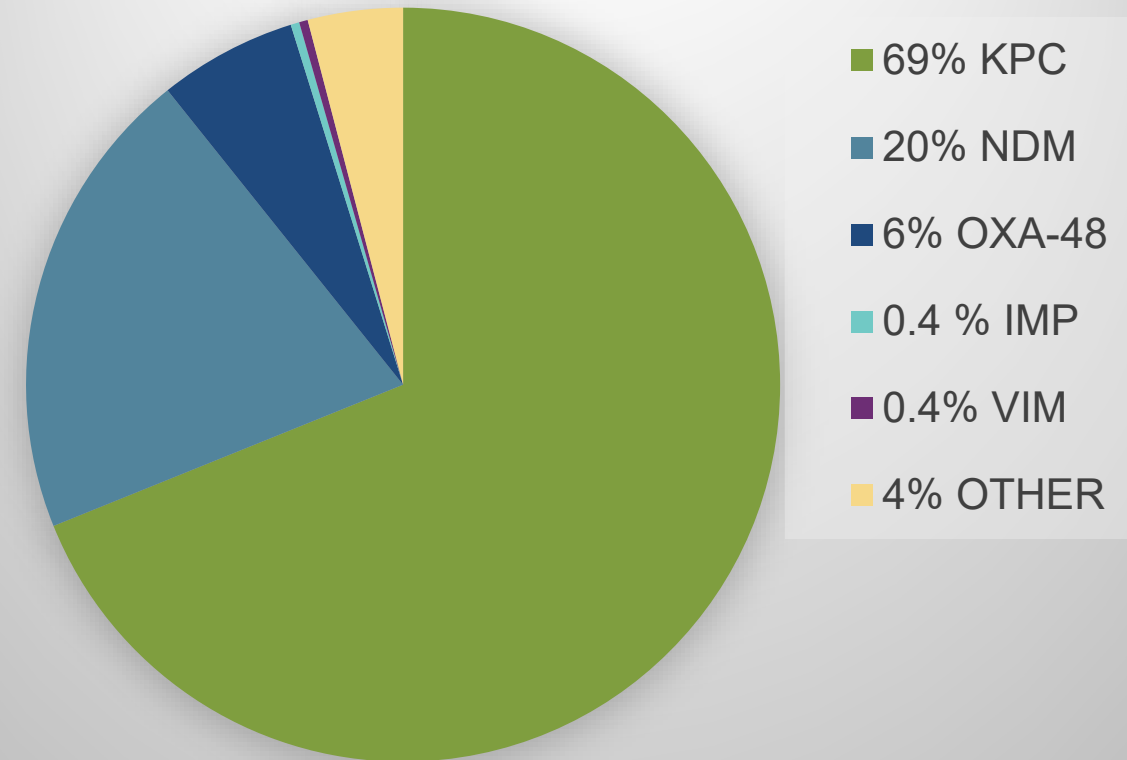
CP-CRE CASE COUNTS BY YEAR IN NC FROM 2019-2023



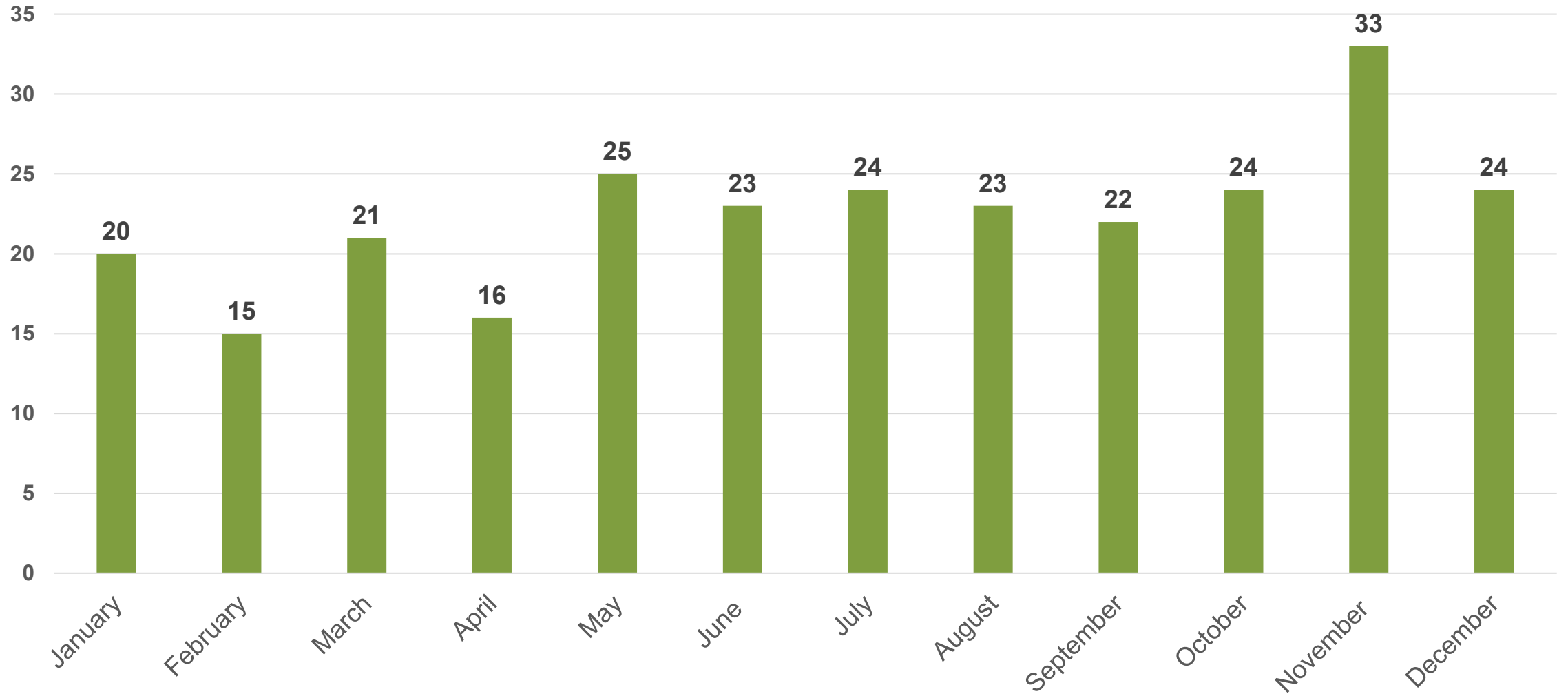
Source: NC EDSS

Mechanisms of Carbapenemase production

Percentage of CP-CRE by Mechanism in 2023 in NC



CP-CRE Case Count by Month in 2023 in NC



Combating AMR in North Carolina: Role of Public Health

- Improve quality and consistency of infection control statewide
- Detect and respond to AR organisms early, containing them before they becomes widespread
- Reduce unnecessary use of antimicrobials through Antimicrobial Stewardship
- Collect, access, analyze, and present data on MDROs and antimicrobial use

Combating AMR in North Carolina: Role of Public Health

- Improve quality and consistency of infection control statewide
- Detect and respond to AR organisms early, containing them before they becomes widespread
- Reduce unnecessary use of antimicrobials
 - Foster antimicrobial stewardship programs
 - Educate prescribers
 - Engage partners: NC DHHS Antimicrobial Stewardship Work Group
- Collect, access, analyze, and present data on MDROs and antimicrobial use

NC DHHS Antimicrobial Stewardship Work Group

- Convened February 2024
- Membership represents
 - Multiple healthcare systems
 - Outpatient and inpatient Antimicrobial Stewards
 - Multiple disciplines (physicians, pharmacists, health director)
 - Western, central, and eastern parts of North Carolina
- Focus on improving antimicrobial prescribing practices in North Carolina
 - Select, host, and distribute clinical guidelines for common infectious disease conditions
 - Work with health insurance payers to facilitate and incentivize appropriate antimicrobial prescribing

Data on MDROs and Antimicrobial Use

- MDROs
 - Reportable conditions
 - CP-CRE: individual case reports
 - *C. auris*: individual case reports
 - MRSA: aggregate reports to NHSN from hospitals
- Antimicrobial Use
 - DUA with NHSN pending
 - DUA with NC HealthConnex (HIE) pending
 - Medicare Part D public data
 - Medicaid claims data

“Public health depends on winning over hearts and minds. It's not enough to just have a good policy, you have to convince people to actually follow it.”

— Leana S. Wen