

# RISING TEMPERATURES, RISING THREATS:

## How Climate Change Accelerates Antimicrobial Resistance



Partnership to Fight  
Infectious Disease



Antimicrobial resistance (AMR) and climate change rank high on the list of global threats to human health, but few appreciate the links between them. Our ability to prevent and cure infections is foundational to modern medicine, but we are losing ground as resistance to medicines grows and new pathogens emerge. Climate changes accelerate these threats, helping pathogens spread more rapidly and evolve to evade both our natural defenses and antibiotic and other antimicrobial medicines.

### DEVASTATING IMPACT OF GROWTH IN ANTIMICROBIAL RESISTANCE

- Drug-resistant bacteria caused **1.27 million deaths worldwide in 2019**, including more than **35,000 people in the U.S.**<sup>1</sup>
- The pandemic has increased the pace of antibiotic resistance in the U.S.: hospital-acquired resistant infections increased by 20% during the pandemic and remain above pre-pandemic levels.<sup>2</sup>

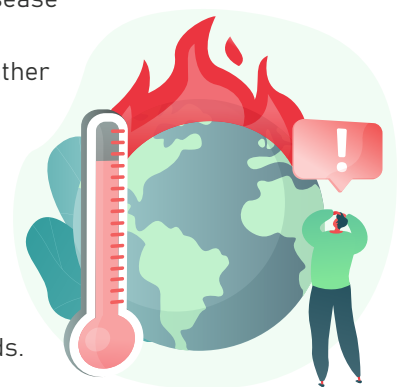


### ENVIRONMENTAL CHANGES FAVOR SPREAD OF RESISTANT PATHOGENS

- Multi-drug resistant *Candida Auris* fungal infections emerged simultaneously on three different continents and have grown rapidly to a CDC-named “urgent threat”. *C. auris* infections in hospitals increased 318% in 2019 compared with 2015-2017 and another **500% from 2019 to 2022.**<sup>3</sup> Researchers believe warming temperatures may have been pivotal in the rise of this new fungal disease globally.<sup>4</sup>
- The range of the fungal spores inhaled to cause Valley Fever has spread from the U.S. southwest to expand dramatically. Higher temperatures, drier conditions, and an increase of dust storms have led to a spike in Valley Fever infections.<sup>5</sup>
- Lyme disease, an infection caused by tick bites, is treated with a course of antibiotics, but incidence in the U.S. has **nearly doubled since 1991**, with largest increases in Maine and Vermont. Climate change is expanding the range of suitable habitat for ticks carrying this disease and extending time for tick activity. **Ten to twenty percent** of people treated with antibiotics for Lyme disease experience persistent infections.<sup>6</sup>

### NUMEROUS WAYS WARMING CLIMATE AND EXTREME WEATHER FUEL AMR

- The body's temperature kills many fungal pathogens, but as they evolve to grow in a warming climate, **fungi are able to evade this first line of our natural defenses.**<sup>7</sup> Dry, hot conditions and windy conditions also facilitate the spread of fungal spores.
- **Bacteria can grow faster in warmer weather.** Adding humidity further facilitates bacterial and insect-borne pathogen growth and range of spread.<sup>8</sup>
- Heat-related drought causes malnutrition, which makes children and others at risk, more vulnerable to pathogens and disease spread.
- **Flooding** also leads to water contamination and crowded living conditions which aid infectious disease spread.
- Extreme weather also **reduces crops and animal production**, which may increase the use of antibiotics to improve yields.



1. Global Burden of Bacterial Antimicrobial Resistance in 2019: A Systematic Analysis. The Lancet. 2022;339:P629-655. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)02724-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext)

2. CDC. Antimicrobial Resistance Threats in the United States, 2021-2022. <https://www.cdc.gov/antimicrobial-resistance/media/pdfs/antimicrobial-resistance-threats-update-2022-508.pdf>

3. Ibid.

4. A Casadevall, DP Kontoyannis, et al. On the Emergence of *Candida Auris*: Climate Change, Azoles, Swamps, & Birds. MBio. July 23, 2019. <https://journals.asm.org/doi/10.1128/mbio.01397-19>

5. J Partlow, V Penney, & C Van Houten. The Human Limit: An Invisible Killer. The Washington Post. Nov. 13, 2023. <https://www.washingtonpost.com/climate-environment/interactive/2023/valley-fever-spread-climate-change-coccidioides-fungus/>; <https://www.lung.org/blog/how-climate-change-has-led-to-an-increase-in-valle#:~:text=According%20to%20the%20NOAA%2C%20dust,the%20rise%20in%20valley%20fever.>

6. EPA. Climate Change Indicators: Lyme Disease. <https://www.epa.gov/climate-indicators/climate-change-indicators-lyme-disease>. June 27, 2024; FC Cabello, ME Embers, et al. Borrelia burgdorferi Antimicrobial-Tolerant Persistence in Lyme Disease & Posttreatment Lyme Disease Syndromes. Antimicrobial Chemistry. Apr 25, 2022. <https://journals.asm.org/doi/10.1128/mbio.03440-21>

7. American Society for Microbiology. Rise in *Candida Auris* May Be Blamed on Global Warming. July 23, 2019. <https://asm.org/press-releases/2019/july/rise-of-candida-auris-may-be-blamed-on-global-warm>

8. SE Dogan. Wellcome Foundation. Will Climate Change Lead to More Antimicrobial Resistance? [https://wellcome.org/news/climate-change-antimicrobial-resistance?gad\\_source=1&gclid=Cj0KCQjwz7C2BhDkARIsAA\\_SZKa3c-22I5E\\_ZIF6V3xpcDLB0rbPJV1rU-EdhGnVcAfPK7dqRl4nrrkaAkCAEALw\\_wcB](https://wellcome.org/news/climate-change-antimicrobial-resistance?gad_source=1&gclid=Cj0KCQjwz7C2BhDkARIsAA_SZKa3c-22I5E_ZIF6V3xpcDLB0rbPJV1rU-EdhGnVcAfPK7dqRl4nrrkaAkCAEALw_wcB)

As temperatures rise and extreme weather events increase, so do the threats from infectious diseases and antimicrobial resistance. Protecting people's health now and in the future must include ensuring we have the tools needed to treat antimicrobial resistance – namely, the **PASTEUR Act**.