Defusing Disasters

Climate change is propelling heat waves to new extremes. Governments must build resilience to extreme heat and other climate-change-induced catastrophes to protect its most vulnerable communities.

EXTREME TEMPERATURES POSE POTENTIALLY DISASTROUS RISKS TO PUBLIC HEALTH

Human activity on Earth has fundamentally changed our relationship with the natural world, increasing the frequency, intensity and duration of extreme weather events. One weather-related cause of death already claims more lives each year than hurricanes, tornadoes and floods combined: extreme heat. The Global Burden of Disease Study estimated that, in 2019, approximately 1.7 million deaths were attributable to exposure to extreme temperatures.

Climate change only stands to worsen this toll, even in countries with reliable infrastructure. As a result of rising temperatures and the retirement of power plants contributing to global warming in North America, one study estimates that two-thirds of the continent may face deadly power outages from electrical grid shortfalls. If multi-day shortfalls hit during summer heat waves, thousands of deaths could occur across major U.S. cities.

Moreover, severe heat exposure also poses an outsized threat to disadvantaged communities. A significant contributing factor to this worrying trend are heat islands—pockets of communities where a combination of low tree cover, sprawling black top, sparse nature areas and a high concentration of buildings and freeways causes the built environment to absorb more heat than other neighborhoods. In cities throughout the country, these heat islands overlap with historically redlined neighborhoods and entrenched segregation patterns, which created communities that experienced decades of disinvestment and cyclical poverty. Further, these communities are often poorly consulted in the decision-making processes that influence urban planning and climate mitigation policies, perpetuating the issues they are facing.

Heat islands create significant temperature increases in segregated urban environments, causing disparities with dangerous outcomes. Chicago's 1995 summer heat wave was one of the worst weather-related disasters in U.S. history—causing over 700 deaths over the course of five days. In addition to higher temperatures, the heat wave's impact was most felt in communities already experiencing the brunt of structural and environmental racism. Most of its victims were low-income, Black and elderly, and many of their homes lacked the air conditioning and ventilation needed to stay safe from the heat. In 1995, Chicago was slow to act against this heat emergency. Now, a new collaboration is taking critical steps to ensure this disaster won't be repeated.

UNIVERSITY, GOVERNMENT AND COMMUNITY COLLABORATION LAUNCHES TO DIVERT HEAT DISASTERS

A recently launched partnership in Chicago shows promise for producing a globally applicable but locally informed model for addressing the complex challenges of building urban resilience to extreme heat. The Defusing Disasters Global Working Group—established through a unique Idea Incubation Process led by Northwestern University's Roberta Buffett

Institute for Global Affairs—is a multidisciplinary collaborative addressing the impacts of climate change in Chicago communities. The group includes researchers with expertise in a broad range of disciplines, from emergency medicine and disaster management to Earth and environmental sciences, as well as leaders of government agencies like the Chicago Department of Public Health (CDPH) and the Chicago Metropolitan Agency for Planning. Additional institutional partners include the Federal Emergency Management Agency (FEMA), the University of Chicago, the Pacific Northwest National Laboratory, the Chicago Area Patient-Centered Outcomes Research Network (CAPriCORN), Elevate and MAPSCorps. These researchers and public officials together seek to mitigate the adverse effects of extreme weather events in Chicago by leveraging the group's diverse expertise, conducting rigorous research and engaging affected communities.

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Their first initiative aims to identify populations in Chicago most vulnerable to extreme heat and leverage resources to build community resilience, thereby developing a model for similar efforts in other cities worldwide. Further, to ensure that future disaster preparedness efforts are inclusive and adequately consider the needs of all communities, the Defusing Disasters group is engaging culturally, ethnically, politically and socially diverse stakeholders in discussions informing their approach. Through this collaborative research project, public health officials, health systems and emergency management teams will gain foreknowledge of those within their communities that are most vulnerable to extreme heat, thereby developing more effective, potentially life-saving mitigation strategies.

DEVELOPMENTS TO WATCH

The group publicly launched this effort in close collaboration with the CDPH through Chicago's "Heat Watch 2023" campaign supported by a grant from the National Oceanic and Atmospheric Administration (NOAA). This grant is available to cities and towns across the U.S. seeking to participate in the annual NOAA Urban Heat Island Mapping campaign to identify specific neighborhoods where heat-mitigating interventions could save lives. With the help of the National Weather Service Chicago Forecast Office, CDPH staff trained and mobilized Heat Watch 2023 volunteers on one of the hottest and clearest days of the year to drive with specially designed heat sensors on their cars in the morning, midday and evening on routes informed by the community. Each sensor recorded temperature, humidity, time and location.

This information will be merged with public health and social infrastructure data by the Defusing Disasters group to give the City of Chicago data that will be used to improve the city's heat safety strategies. Ultimately, the Defusing Disasters group seeks to expand their collaborative approach outside of Chicago and the U.S. to help prevent extreme heat-related deaths globally and encourage collaborative problem-solving and knowledge co-creation among universities, local governments and community groups. If armed with a deeper understanding of local vulnerabilities, cities worldwide could strategically allocate investments toward infrastructure, policies and programs that enhance long-term resilience and foster sustainable development in the face of a changing climate.

Climate change is propelling heat waves to new extremes. Exposure presents a dire health hazard, and as heat waves become longer and more frequent, heat-related deaths are rising across the world. At the national and local levels, governments must build resilience to extreme heat and other climate-change-induced catastrophes to protect its most vulnerable communities.

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