



Temperatures Rising: Global Warming Turns up the Heat on Human Health

Urgent action is needed to limit the trend toward more severe, more frequent, and more deadly heat waves.

As global warming continues to raise the average temperature of our planet, heat waves have become more frequent and thermometers have hit record highs. These high temperatures and the increasing number of heat-related deaths worldwide over the last few decades have given us an alarming picture of the extreme weather conditions and devastating impacts on human health to come if this warming continues unmitigated.^{1,2} Congress must address global warming through mandatory legislation that reduces global warming pollution on the order of 80 percent by 2050. In addition, county and municipal governments must implement plans to help communities cope with higher temperatures and avoid preventable heat-related deaths.

For more information please contact
Kim Knowlton
at (212) 727-4579.

Higher Temperatures Will Be the Norm

The Intergovernmental Panel on Climate Change projects that the average temperature in the United States will rise more than 7.2 degrees Fahrenheit by the end of the 21st century.³ Maximum temperatures may climb even higher as hot spells become longer and more frequent. Summers similar to those experienced in the 2003 European heat wave, in which daily maximum temperatures reached above 100 degrees Fahrenheit for more than two weeks, may become a “normal summer occurrence within several decades.”⁴ Projections for large northeastern cities like Philadelphia suggest

nearly an entire summer of days hotter than 90 degrees Fahrenheit may be a reality by the 2080s.⁵

Heat Waves Bring Major Health Impacts

In a hot environment, the body relies mainly on two mechanisms for cooling off and maintaining a safe temperature: evaporation of sweat from the skin and increased skin blood flow. These processes can place strain on the heart and lungs. Excessive heat can result in a range of adverse health impacts, including heat cramps, heat edema (swelling), heat syncope (fainting), heat exhaustion, and life-threatening heat stroke.⁶

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High humidity presents an additional threat by hindering the evaporation of sweat, which can cause body heat to accumulate and further increase the risk of health problems.

In the United States, an average of 400 deaths each year are directly related to heat,⁷ and many more—an estimated 1,800—perish from a range of illnesses that are exacerbated by heat stress.⁸ The average annual death toll from heat far exceeds that of any other natural disaster in the United States.⁹ The deadly heat wave in July 2006 affected most of North America and claimed more than 200 lives, many of them in California.¹⁰ In Europe, an unprecedented heat wave in 2003 killed an estimated 35,000 people.¹¹ In general, heat-related fatalities and illnesses are projected to increase as heat waves become more intense, longer-lasting, and more frequent.

Risk Factors Increase Heat Vulnerability

The elderly are especially susceptible to heat-related illness. The body's ability to physically cope with heat is impaired by the aging process. Additionally, a number of chronic medical conditions can increase vulnerability to heat stress: obesity; vascular disease; multiple sclerosis; hyperthyroid; diabetes; heart, kidney, or breathing problems; skin disease; or psychiatric problems. Other factors associated with increased heat risk include social isolation, use of drugs, and taking medications to treat depression, high blood pressure, or insomnia. Very young children are also especially susceptible during heat waves.¹² And many studies have found that economically disadvantaged communities have an increased likelihood of adverse health impacts from extreme heat.¹³

Geography can also increase a community's vulnerability to heat waves. In cities, buildings, pavement, and dark roofs tend to absorb more heat during the day and retain more heat during the night than does the surrounding countryside—referred to as the “urban heat island effect”—which can compound the intensity of high temperatures for city dwellers. Summer sun, stagnant air, and hot temperatures tend to worsen ozone smog, which can further harm people with breathing problems like asthma.¹⁴ In addition, residents of colder climates may be unaccustomed to high temperatures and are less likely to own or use air conditioning.¹⁵

Protecting Your Family During Heat Waves

Follow these tips to minimize the harmful health effects of heat waves when they do occur:

- Get informed and plan ahead. Contact your local health department and national weather service office to learn about heat warning systems, advisories, and resources available in your area.
- Limit exertion and outdoor activity, and stay in the shade as much as possible.
- Wear cool, loose clothes, take cool showers or baths, and drink plenty of non-alcoholic, non-caffeinated fluids.
- Eat lightly, and avoid using stoves and ovens to heat food.
- Keep curtains or blinds closed during the day to keep out the sun's rays.
- Use air conditioning while indoors. If air conditioning is not available, try moving to a lower floor of your building where the air tends to be cooler. Use a fan, and open the window if the outside air is cooler than the inside air. If needed, help elderly or at-risk people get to a municipal cooling center.
- Family, friends, and neighbors should monitor each other for signs of heat illness. Symptoms can develop rapidly, and a phone call or visit at least twice a day during a heat wave is a good idea.

Protecting Communities from the Health Effects of Global Warming

In order to protect public health and combat climate change, governments must immediately enact mandatory legislation to reduce global warming pollution and implement comprehensive heat preparedness plans. This should include creation of heat-health warning systems, establishment of cooling centers, mobilization of emergency response systems, and public education and outreach. Some 19 cities throughout the United States—including San Francisco, Washington, D.C., Philadelphia, and Chicago—already provide coordinated warning and emergency response systems that target people most at risk from extreme heat. These systems are reducing heat-related death rates,¹⁶ and more public education and outreach about the steps individuals should take to protect their health once heat waves strike will further prevent unnecessary illness and death.

^{1,3,4} Committee on the Environment and Natural Resources (CENR). 2008. *Scientific Assessment of the Effects of Global Change on the United States*.

^{2,11,14} Confalonieri U, Menne B, Akhtar R, et al. 2007. Human health. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)* (chapter 8); Cambridge University Press, Cambridge, UK.

⁵ Frumhoff PC, McCarthy JJ, Melillo JM, et al. 2007. *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions*. Cambridge, MA: Union of Concerned Scientists (UCS).

^{6,7} Allen A, Segal-Gidan F. 2007. Heat-related illness in the elderly. *Clinical Geriatrics* 15(7):37-45.

^{8,9,15} Carlson AE. 2007. Heat waves, global warming & mitigation. *Issues in Legal Scholarship. Catastrophic Risks: Prevention, Compensation, and Recovery*, Article 7.

^{10,13,16} US Climate Change Science Program (CCSP). 2008. *Analyses of the effects of global change on human health and welfare and human systems*. Synthesis and Assessment Product 4.6 (July 2008).

¹² US Environmental Protection Agency. 2006. *Excessive Heat Events Guidebook*. EPA 430-B-06-005 (June 2006).