

MAJOR HEAT IMPACTS

The Wisconsin Heat Health Network seeks to build awareness among Madison and Milwaukee area stakeholders about heat impacts and climate change. Our research documents the changing nature of air masses due to climate change and the impacts on human health. We strive to take action alongside local governments to adopt solutions to cool our cities. Project collaborators include UniverCity Alliance, WICCI, Global Health Institute, City of Madison, Dane County, Applied Climatologists, Inc., and the City of Milwaukee.



What are the health risk associated with heat?

- Heat is the leading weather-related cause of death in the U.S.
- Hospital admissions increase in Milwaukee during times of high temperatures
- Heat related deaths are most often caused by cardiac arrest, respiratory diseases, and stroke
- Climate change will likely exacerbate the heat-health problem

When is the greatest risk?

- In Madison, hot and humid summer weather is the most deadly
- In Milwaukee, hot and dry summer weather is the most deadly
- Early summer hot weather is more harmful to health than late summer hot weather (people acclimate)

Where is the greatest risk?

- The urban heat island effect puts people living in cities at greater risk
- Regions with high summer weather variability are most vulnerable to heat-related deaths
- The most heat-sensitive U.S. cities are in the Northeast and Midwest

Who faces the greatest risk?

- Lower income and more densely populated urban neighborhoods are most vulnerable
- People who are very old or very young, people who are obese, people who take certain medications, and people with alcohol or other drug dependencies are more at risk
- People who live and work alone have been found to face more negative health impacts from heat

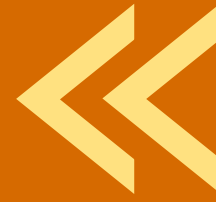
What does heat risk look like in Wisconsin?

- From 2010-2014, Dane County had a 47% increase in heat-related emergency room visits
- Heat-related emergency room visits in Milwaukee County increased 28% to 557 during the same period
- The difference between urban and rural overnight temperatures in southern Wisconsin has grown to 4°F
- Milwaukee County's urban population experiences more heat-related death than residents of more suburban surrounding counties

How can we reduce the risk of extreme heat?

- Many cities' heat-related emergency plans need to be improved and expanded
- Changes in building structure and landscaping can cool urban areas
- Public cooling centers and access to air conditioning can drastically limit heat stress

MAJOR HEAT RISKS IN WISCONSIN



Larry Kalkstein and Elizabeth Berg

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Extreme heat causes more deaths in the United States than any other weather phenomena, but most people are not aware of the danger. In fact, as summer temperatures rise, multiple types of hospital admissions increase. Deaths from heat stroke, cardiac arrest, respiratory diseases, and strokes increase, sometimes dramatically, in hotter weather. Climate change could make heat-health problems worse, especially if summer weather becomes more variable and more extreme.

The greatest health risks are during long heat events when nights do not cool off. Heat events are more harmful earlier in the summer when people are less acclimated to high temperatures. Certain conditions are more deadly: hot-dry weather and hot-humid weather are most dangerous to health. Overall, the number of heat-related deaths is connected to how often these oppressive spells of weather occur.

In southern Wisconsin, there is an increasing trend of hot, humid air masses. These large bodies of air -- with similar temperature and humidity throughout -- cause spells of oppressive summer days and more heat-health issues: 10% more people die, on average, in Milwaukee on a hot, dry day than on a typical summer day. In Madison and Milwaukee, more people die on hot, humid days than on other days. Milwaukee's urban population experiences more heat-related death than residents of surrounding counties.

There are many ways to reduce health risks during heat waves and save lives. Improved heat-health warning systems can alert people about the dangers of oppressive weather and provide accurate guidance to the National Weather Service, which issues excessive heat warnings. Air conditioned public cooling centers can be opened for people without air conditioning, and this can save lives. Cities can develop heat health task forces, to design and implement procedures that make people safer during extreme events. Increasing tree canopy can lower air temperatures significantly. Technological innovations for rooftops and buildings can cool vulnerable urban areas.

Together we can reduce the risk of extreme heat by better preparing for it. Local governments can expand and improve their emergency plans for excess heat. Communities can discuss "cool city" solutions and adopt innovative heat warning systems. Currently, a health-based heat warning system is under consideration for the local National Weather Service office in southern Wisconsin.

- Sheridan, SC and MJ Allen. 2018. "Temporal trends in human vulnerability to excessive heat." *Environmental Research Letters* 13, 043001, 12 pp.
- Harvard Medical School. 2005. "Climate change futures: health, ecological and economic dimensions," UN Development Programme, Harvard Medical School, Swiss RE, 138 pp.
- Li, B, S Sain, LO Mearns, HA Anderson, S Kovats, KL Ebi, MYV Bekkedal, MS Kanarek, and JA Patz. 2012. "The Impact of Extreme Heat on Morbidity in Milwaukee, Wisconsin." *Climatic Change* 110 (3-4): 959-76.
- Kalkstein, AJ and SC Sheridan. 2007. "The social impacts of the heat-health watch/warning system in Phoenix, Arizona: assessing the perceived risk and response of the public." *International Journal of Biometeorology* 52, 43-55.
- Madrigano, J, K Lane, N Petrovic, M Ahmen, M Blum, and T Matte. 2018. "Awareness, risk perception, and protective behaviors for extreme heat and climate change in New York City." *International Journal of Environmental Research and Public Health*, 15, 1433.
- Greene, S, LS Kalkstein, DM Mills, and J Samenow. 2011. "An Examination of Climate Change on Extreme Heat Events and Climate-Mortality Relationships in Large U.S. Cities." *Weather, Climate, and Society*, 3, 281-292.
- Sheridan, SC, AJ Kalkstein, and LS Kalkstein. 2008. "Trends in heat-related mortality in the United States, 1975-2004." *Natural Hazards*, 50, 145-160.
- Gronlund, CJ. 2014. "Racial and socioeconomic disparities in heat-related health effects and their mechanisms: a review." *Current Epidemiology Reports* 1, 165-173.
- Centers for Disease Control and Prevention. "Extreme heat can impact our health in many ways." Available at https://www.cdc.gov/climateandhealth/pubs/extreme-heat-final_508.pdf
- US EPA, 2016. "Excessive heat events guidebook". EPA 430-B-16-001, 60 pp.
- Kalkstein, LS, F Klink, K Shickman, S Schneider, M Egolf, and D Sailor, "The Potential Impact of Cool Roof Technologies upon Heat Wave Meteorology and Human Health in Boston and Chicago," in *Roofing Research and Standards Development: 9th Volume*, ed. S. Molletti and W. Rossiter (West Conshohocken, PA: ASTM International, 2020), 1-27.

