



Heat in the Heartland

60 Years of Warming in the Midwest

The summer of 2011 was a scorcher. All but eight states reported above-average summer temperatures, and four states broke records for extreme heat. Such sticky, steamy, uncomfortable weather is poised to become even more common as our climate warms. But hot, humid days are not just uncomfortable. Extreme heat kills. Heat is actually the biggest weather-related killer in the United States, claiming, on average, more lives each year than floods, lightning, tornadoes, and hurricanes combined. From 1999 to 2003, exposure to excessive heat killed an estimated 3,442 U.S. residents.

High temperatures can lead to dehydration, heat exhaustion, and deadly heat-stroke. Very hot weather can also aggravate existing medical conditions, such as diabetes, respiratory disease, kidney disease, and heart disease. Urban residents, the elderly, children, agricultural workers, and people with impaired health and limited mobility are particularly susceptible to heat-related illness and death. Air pollutants such as ozone and particulate matter may also work in concert with heat, exacerbating its health effects.

Dangerous heat is not just a future concern. Through original research, we found that hot summer weather and heat waves have indeed become more common, on average, in the nation's heartland over the last six decades. In other words, many baby boomers living in the Midwest have already faced these changes during their lifetimes.

Some 65 million Americans call the Midwest home, and some of our nation's most populous and vibrant cities thrive in the eight states in the region. The Midwest also boasts one of the largest bodies of fresh-water in the world,

We updated our findings in 2013*:

- **St. Louis** now experiences nearly triple the number of heat waves as it did 67 years ago (from three to almost nine), and more than double the number of hot, humid days that are closely associated with public health risks (from six to more than 15). St. Louis has lost more than four days of cool, comfortable summer weather (from an average of 7 to 3).
- **Chicago** has, in an average summer, gained a heat wave, from about two to about three, and has added six dangerously hot days. Chicago has also lost more than eight days of cool, comfortable weather (from an average of 17 to nine).
- The **Twin Cities** have gained two extra heat waves, for a total of three per summer (though in 2012 they experienced 11), and added six dangerously hot days. Furthermore, Minneapolis/St. Paul have lost more than five days of cool, comfortable weather (from an average of 13 to eight).
- **Detroit** has, in an average summer, doubled the number of its heat waves (from two to four), and also doubled the number of the hottest, most humid days—associated with tropical air masses—it experiences (from three to more than six). The city has also gained hot, dry air masses from the American Southwest, which it rarely experienced in the 1960s. It now suffers, on average, more than five days from such desert sources each summer. Detroiters have also lost more than 11 days of cool, comfortable weather.

* Update includes data for 2011 and 2012.

and is intersected by two major rivers. To represent this vast and varied region, we selected five major metropolitan areas and five nearby smaller cities. Some of these cities are landlocked, while some sit on the Great Lakes; some are in the northern tier of states while others are more southerly; some are on the region's easterly edge, while one was once considered a gateway to the West. Our analysis includes these 10 cities: Chicago and Peoria, IL; Cincinnati and Toledo, OH; Detroit, MI; Lexington, KY; Minneapolis and Rochester, MN; and St. Louis and Columbia, MO.

Our research focuses on weather systems called air masses: vast bodies of air that define the weather around us. We explored whether the number of days with dangerously hot summer air masses, which are linked to human health risks, as well as cool, dry summer air masses has changed over the last 60 years. We also examined how average daytime and nighttime temperatures and humidity levels within these weather systems have changed over time. We did so because high temperature, lack of cooling relief at night, and high humidity all contribute to heat-related illness.

Implications of Our Findings

We aimed not only to understand how summer weather has changed in cities in the Midwest, but also to shed light on the importance of city-level efforts to minimize the health risks of future climate change. Our findings suggest several consequences for public health, as well as implications for local preparedness and efforts to reduce the effects of a changing climate.

Health



The weather types that have become more common, on average, in cities in the Midwest—very hot, humid air masses and hot, dry air masses—are associated with heat-related illness and death. Very hot, humid air masses increase the risk of hyperthermia—elevated body temperature—while hot, dry air masses raise the risk of dehydration.

Heat waves, which are also becoming more common on average, further affect human health. Rising overnight temperatures are also problematic, because a lack of nighttime relief could increase the risk of heat-related complications.

Preparation and Mitigation



We cannot ignore the potential consequences of climate change, including the risk of deadly heat waves, and we must invest in preventive measures to protect public health and save lives during extreme heat events. The cities we studied are already

taking some steps to minimize the health effects of dangerous hot weather. However, many other cities in the region are woefully unprepared.

We must also take aggressive action to reduce heat-trapping emissions from the burning of fossil fuels. If we do not, temperatures will likely continue to rise, and we will have to cope with the effects of extreme heat on our daily lives, our health, and our economy for decades to come.

Conclusion

We need strategies to both build climate-resilient communities and reduce the global warming emissions that are driving climate change. Our health and well-being—and those of our children—depend on it.



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The Union of Concerned Scientists puts rigorous, independent science to work to solve our planet's most pressing problems.

The report and technical appendix are available online (in PDF format) at www.ucsusa.org/heatintheheartland.

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