

# SURVEILLANCE BRIEF

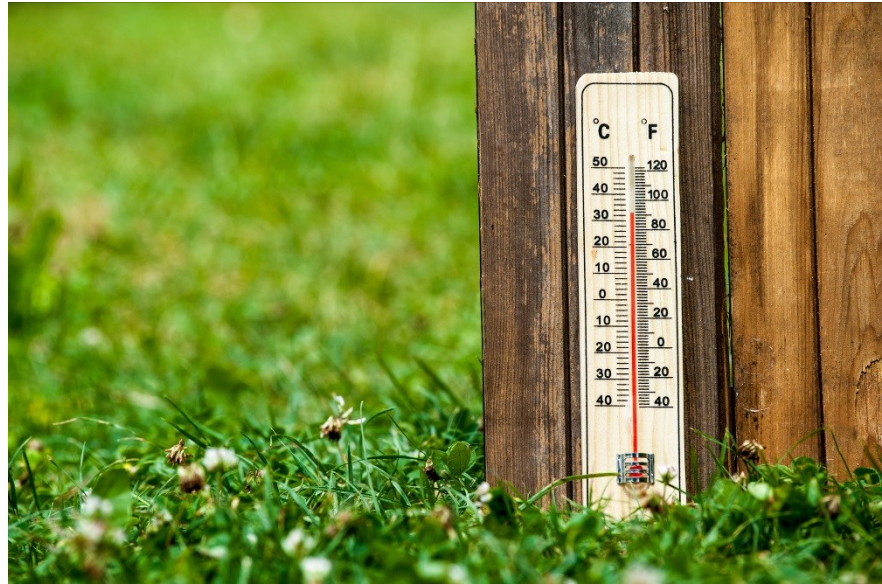
Wisconsin Environmental Public Health Tracking Program

JULY 2015

## HEAT STRESS IN WISCONSIN: RESOURCES AND OPPORTUNITIES FOR ACTION

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**SUMMARY** - Average annual temperatures are increasing both nationally and in Wisconsin, which has implications for public health.

Groups vulnerable to heat-related illness and death include infants, the elderly, and individuals who are overweight and/or chronically ill. Those without air conditioning are also at risk.

Staying in air conditioned areas, staying hydrated, and avoiding strenuous activity during heat waves are all ways to prevent heat-related illness and death.

Data on temperature and heat-related health outcomes are available at the National Environmental Public Health Tracking Network.

Resources such as those from the Wisconsin Climate and Health Program can help individuals and communities plan for potential heat events and prevent heat-related morbidity and mortality.

## BACKGROUND

Average temperatures have been increasing across the United States and are projected to increase further. Heat stress-related illness and mortality are correlated with higher temperatures.<sup>1</sup> According to the Centers for Disease

Control and Prevention (CDC), extreme heat is a leading cause of weather-related deaths in the United States.<sup>2</sup> CDC estimates that, on average, 608 people died annually from heat in the United States from 1999 to 2010.<sup>2</sup>

High temperatures can cause heat rash, heat edema (swelling), heat tetany (hyperventilation and heat stress), heat cramps, heat syncope (fainting), heat exhaustion, and heat stroke.<sup>3</sup> Heat stroke is the most severe

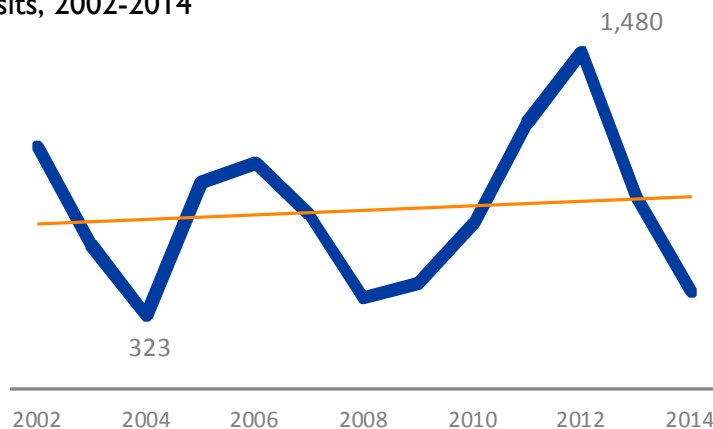
heat-related illness and can be life-threatening.<sup>4</sup> It is characterized by an extremely high body temperature, hot and dry skin, rapid pulse, headache, nausea, dizziness, confusion, and loss of consciousness. Groups vulnerable to heat-related illness and death include infants, the elderly, and individuals who are overweight and/or chronically ill.<sup>4</sup> Certain medications, particularly those used to treat mental illnesses, can also increase one’s risk to heat-related health outcomes by interfering with the body’s ability to thermoregulate.<sup>5,6</sup>

## HEAT TRENDS IN WISCONSIN

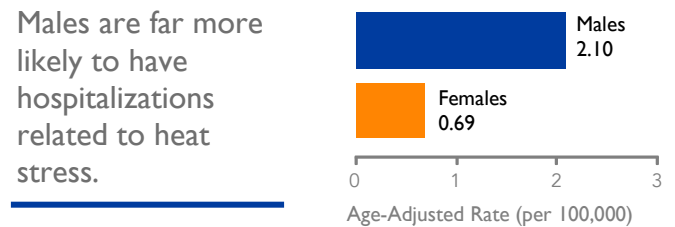
### Temperature Trends and Health Effects

Consistent with trends in the United States, Wisconsin has warmed by approximately 1°F from 1950 to 2006.<sup>7</sup> The year 2012 was the warmest on record for the United States;<sup>8</sup> Wisconsin similarly had record highs that summer, which had notable implications for the number of heat-related fatalities that occurred. Figure 1 displays yearly counts of heat stress emergency department (ED) visits from 2002 to 2014, with a notable peak in 2012. The impacts of the 2012 heat wave are also reflected in heat-related illness data (Figure 1). In 2012, 1,480 heat stress ED visits occurred compared with 1,168 visits the previous year.

**FIGURE 1. Heat Stress Emergency Department (ED) Visits, 2002-2014**



**FIGURE 2. Average Heat Stress Hospitalization Rate by Gender, 2010-2014**



### Risk Factors

The Wisconsin Department of Health Services authored a descriptive study that identified and characterized 27 heat-related fatalities that occurred in Wisconsin during summer 2012.<sup>9</sup> In this case series, all the individuals who died lacked functioning air conditioning in their homes and the majority had a cardiovascular disease. Both lack of air conditioning and cardiovascular disease are known risk factors for heat-related death. Other heat stress risk factors in Wisconsin are consistent with existing national studies. As shown in Figure 2, Wisconsin males have higher rates of heat stress illness than females.<sup>1,10</sup> This could be due to the fact that men may be more likely to work outdoors than women.

Heat stress illness is also highest among older adults (Figure 3, next page). Elderly populations are at higher risk because they have a more limited ability to regulate their body temperature than younger individuals. This group is also more likely to suffer from chronic health conditions, which can increase risk of heat-related illness.

Though infants are a vulnerable group to heat-related illness in general, this particular trend is not reflected in Wisconsin’s heat stress hospitalization data in 2014.

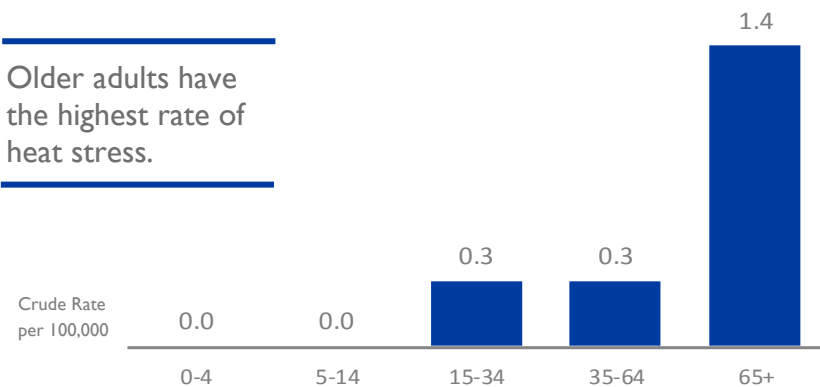
**Data and Resources**

Since 2002, the CDC has been collecting environmental health data across the U.S. through the National Environmental Public Health Tracking Network (Tracking Network). The Tracking Network houses heat-related health data, which can be accessed at their website. Measures are available for 25 states (including Wisconsin) and one city. The Tracking Network provides data about elderly populations and nine other risk factors for heat-related health outcomes in their heat

vulnerability indicator. These risk factors can be mapped; Figure 4 displays the percent of the population aged 65 or older that also live alone. Living alone is a proxy for social isolation, which is a known risk factor for heat-related fatality.<sup>11</sup>

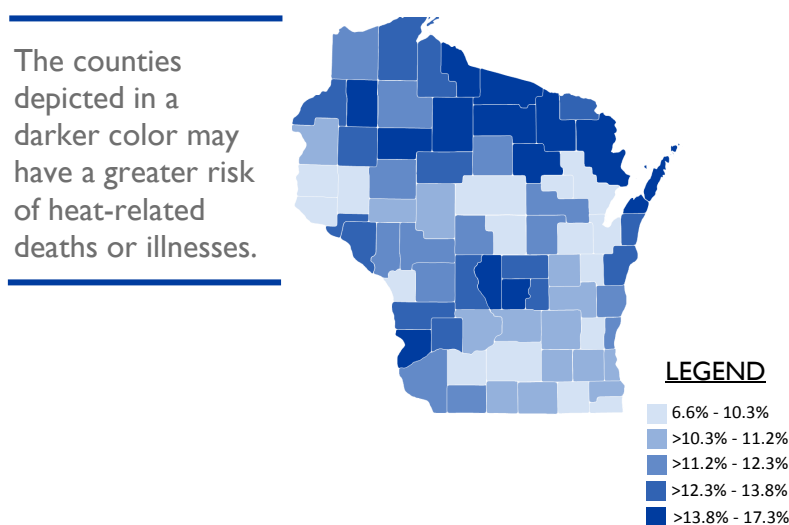
The Wisconsin Climate and Health Program also provides resources to help individuals and communities prepare for heat events. One example of this is the Wisconsin Extreme Heat Toolkit, which provides information on heat illness and its risk factors and symptoms as well as tips to stay cool. Local health departments, faith-based organizations, and other entities that serve the community can use the toolkit to communicate the risks of extreme heat and help protect their residents. The Wisconsin Extreme Heat Toolkit can be accessed at [dhs.wi.gov/publications/p0/p00632.pdf](http://dhs.wi.gov/publications/p0/p00632.pdf).

**FIGURE 3. Wisconsin Heat Stress Hospitalization Rate by Age, 2014**



Older adults have the highest rate of heat stress.

**FIGURE 4. Percent of Population Aged 65 Years and Older That Live Alone in Wisconsin in 2014**



The counties depicted in a darker color may have a greater risk of heat-related deaths or illnesses.

**PREVENTING HEAT-RELATED ILLNESS**

*As an Individual*

**Take steps to stay cool.** Keep cool during a heat wave by staying hydrated, avoiding exertion outside, taking a cool shower or bath, and wearing light clothing. Stay in an air conditioned place if possible during extreme heat. Fans may provide some relief but will not prevent heat-related illness when the temperature is in the high 90s.<sup>4</sup>

**Check on vulnerable populations during a heat event.** Groups at higher risk in a heat wave include elderly, young, and socially isolated individuals, as well as those without air conditioning. If you do not have air conditioning at home, consider visiting a designated cooling facility that does, such as a public library, community center, or shopping mall.

### As an Organization

**Make a plan.** Use data resources from the Tracking Network to graph heat events and form a plan for high-risk time periods. For example, daily estimates of maximum temperature and maximum heat index could be graphed to view historical trends of heat waves.

**Use available resources.** Check out the heat toolkit developed by the Wisconsin Climate and Health Program to help communities prepare for heat waves. The Wisconsin Extreme Heat Toolkit can be accessed at [dhs.wi.gov/publications/p0/p00632.pdf](http://dhs.wi.gov/publications/p0/p00632.pdf). Use our short heat safety video on social media and at public events. The video can be found at [dhs.wi.gov/climate/heat.htm](http://dhs.wi.gov/climate/heat.htm).

**Promote your area cooling centers.** Spread the word to your constituents about where they can find cooling centers in your community. Promote the centers in press releases, social media, print materials, etc. A sample cooling center press release is available at [www.bit.ly/sampleccpress](http://www.bit.ly/sampleccpress).

## CONCLUSIONS

It is important to take care during extreme heat events to avoid heat-related morbidity and mortality. It is particularly important to pay attention to the populations in our communities who are most vulnerable, including infants, the elderly, and individuals who are overweight

and/or chronically ill. Those with cardiovascular disease, those without air conditioning, those who live alone, and individuals who work outdoors are also at increased risk. Data about populations vulnerable to heat and heat-related health outcomes is available on the Tracking Network website. To learn more about what you can do during an extreme heat event to protect yourself and others, check out the Wisconsin Extreme Heat Toolkit ([dhs.wi.gov/publications/p0/p00632.pdf](http://dhs.wi.gov/publications/p0/p00632.pdf)).

## REFERENCES

- <sup>1</sup>Choudhary E, Vaidyanathan A. Heat stress illness hospitalizations—Environmental Public Health Tracking Program, 20 states, 2001-2010. *MMWR Surveill Summ* 2014;63(13):1-10.
- <sup>2</sup>Centers for Disease Control and Prevention. Extreme Heat. 2014. Retrieved June 25, 2015, from <http://ephtracking.cdc.gov/showClimateChangeExtremeHeat.action>.
- <sup>3</sup>Centers for Disease Control and Prevention. Indicator: Heat Stress Emergency Department Visits. 2012. Retrieved July 1, 2015, from <http://ephtracking.cdc.gov/showIndicatorPages.action>.
- <sup>4</sup>Centers for Disease Control and Prevention. Extreme Heat Prevention Guide. 2012. Retrieved June 25, 2015, from [http://emergency.cdc.gov/disasters/extremeheat/heat\\_guide-page-2.asp](http://emergency.cdc.gov/disasters/extremeheat/heat_guide-page-2.asp).
- <sup>5</sup>Batscha CL. Heat stroke: keeping your clients cool in the summer. *J Psychosoc Nurs Ment Health Serv*. 1997;35(7):12-17.
- <sup>6</sup>City of Milwaukee Health Department. How Can Heat Illness Be Affected by Medications? Retrieved July 1, 2015, from [http://www.city.milwaukee.gov/ImageLibrary/Groups/healthAuthors/DCP/PDFs/how\\_can\\_heat\\_illnesssmall.pdf](http://www.city.milwaukee.gov/ImageLibrary/Groups/healthAuthors/DCP/PDFs/how_can_heat_illnesssmall.pdf).
- <sup>7</sup>Wisconsin's Changing Climate: Impacts and Adaptation. 2011. Wisconsin Initiative on Climate Change Impacts. Nelson Institute for Environmental Studies, University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, Madison, Wisconsin.
- <sup>8</sup>2012 was warmest and second most extreme year on record for the contiguous US [press release]. *Science Daily*. January 8, 2013. Retrieved September 10, 2013, from <http://www.sciencedaily.com/releases/2013/01/130108131149.htm>.
- <sup>9</sup>Christenson ML, Geiger SD, Anderson HA. Heat-related fatalities in Wisconsin during the summer of 2012. *WMJ* 2013;112(5):219-223.
- <sup>10</sup>Pillai SK, Noe RS, Murphy MW, et al. Heat illness: predictors of hospital admissions among emergency department visits—Georgia, 2002-2008. *J Community Health* 2014;39(1):90-98.
- <sup>11</sup>Naughton MP, Henderson A, Mirabelli MC, et al. Heat-related mortality during a 1999 heat wave in Chicago. *Am J Prev Med*. 2002;22(4):221-227.

## ACKNOWLEDGEMENTS

The authors would like to thank Jennifer Camponeschi, Dr. Mark Werner, and Jeff Phillips for their editorial contributions to this surveillance brief.

## ABOUT TRACKING

The Wisconsin Environmental Public Health Tracking Program is your source for environmental public health data on Wisconsin communities.

Explore the data at [dhs.wisconsin.gov/epht](http://dhs.wisconsin.gov/epht).

## FUNDING

The Wisconsin Environmental Public Health Tracking Program is funded by the Centers for Disease Control and Prevention.

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