



UNDERSTANDING THE LINK BETWEEN CLIMATE AND HEALTH

Wisconsin Climate and Health Program

BACKGROUND

Over the past 60 years, Wisconsin has generally become warmer and wetter, especially during the winter months.¹ A warmer and wetter Wisconsin will affect our health.

HOW CLIMATE CAN IMPACT HEALTH

Evidence and research drawn from the Wisconsin Initiative on Climate Change Impacts (WICCI) suggests the following climate and health impacts:

Precipitation Changes

A general increase in precipitation may occur across the state. Seasonal changes in precipitation may cause

extended dry periods during the summer, but also flooding during heavy and intense rain periods.¹ Potential health impacts include risk of stress and mental health disorders,² flood-related food and waterborne illnesses,³ injuries, and drowning.⁴

Heat Extremes

Average annual temperatures in Wisconsin could increase by 4-9°F by 2055.¹ Extreme heat is associated with increased loss of life.⁵ Certain populations, especially the elderly and socially isolated individuals, are at increased risk of heat-related death.⁶ Air quality degradation due to heat may lead to respiratory distress

and additional airborne pollen may lead to allergic reactions.^{7,8}

Drought

Drought conditions could lead to reduced drinking water in the late winter and spring, followed by an extended period of warming and drought.¹ Drought conditions may lead to reduced drinking water availability, food insecurity, and respiratory distress from dust, pollen, and airborne particulates.⁴

Winter Weather Changes

Winter storms producing heavy snowfall or ice can lead to more traffic accidents, deaths, and injuries due to poor travel conditions. Winter weather patterns in much of

the state may shift to more rain, sleet, or ice, which can damage power lines, leading to power outages that place chronically ill patients on medical devices at greater risk.^{1,3}

Disease Vectors

A warmer, wetter climate could create more favorable conditions for human cases of West Nile Virus, carried by mosquitoes, and Lyme disease, carried by deer ticks. Changing environmental conditions may also support new mosquito-borne diseases in Wisconsin, and a northward shift in the range of the lone star tick and associated tick-borne diseases into Wisconsin.^{9,10}

Surface Water

Changes to precipitation volume, seasonality, and intensity may all lead to increased risk for flooding and flood-related health problems.¹ Flood events can produce increases in bacterial and viral infections and waterborne outbreaks in drinking water and lakes and rivers.³ Contamination of surface water with phosphorous and nitrogen may lead to blooms of toxin-producing blue-green algae that will pose a risk to residents, visitors, and their pets.¹¹

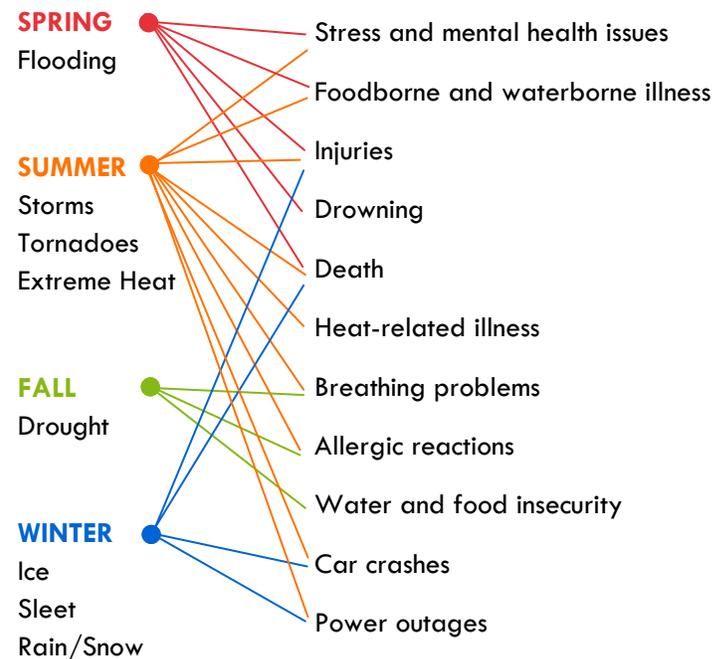
Groundwater

Extremely intense and frequent rainfall events may lead to excessively fast recharge of local groundwater levels, which leads to “groundwater flooding.” Conversely, water demands during extended dry periods may quickly draw down the local water table, leading to shallow wells going dry.¹² Drought conditions can potentially threaten and impact all water users. Residents utilizing groundwater for drinking water may notice water with different tastes or odors due to changes in water chemistry, and may be at risk for consuming heavy metals, organics, and other contaminants.^{3,11}

PREPARING FOR CLIMATE EFFECTS

Learn how to prepare for the health impacts of climate by reviewing the Climate and Health Program’s extreme weather toolkits and other resources at dhs.wisconsin.gov/climate.

**FIGURE 1
CONNECTING CLIMATE TO HEALTH
OUTCOMES**



REFERENCES

1. Wisconsin Initiative on Climate Change Impacts (WICCI). Wisconsin’s changing climate: impacts and adaptation. *Nelson Institute for Environmental Studies, University of Wisconsin and Wisconsin Department of Natural Resources*. 2011. Available at: http://www.wicci.wisc.edu/report/2011_WICCI-Report.pdf. Accessed October 30, 2013.
2. Portier C.J., Thigpen Tart K., Carter S.R., et al. A human health perspective on climate change: a report outlining the research needs on the human health effects of climate change. *Environmental Health Perspectives and the National Institute of Environmental Health Sciences*. 2010. Available at: https://www.niehs.nih.gov/health/materials/a_human_health_perspective_on_climate_change_full_report_508.pdf. Accessed October 30, 2013.
3. Rose J., Epstein P.R., Lipp E.K., Sherman B.H., Bernard S.M., Patz J.A. Climate variability and change in the United States: potential impacts on water- and foodborne diseases caused by microbiologic agents. *Environmental Health Perspectives*. 2001; 109(Sup. 2): 211-220.
4. Greenough G., McGeehin M., Bernard S.M., Trtanj J., Riad J., Engleberg D. The potential impacts of climate variability and change on health impacts of extreme weather events in the United States. *Environ. Health Perspect*. 2001; 109:191-198.
5. Curriero F.C., Heiner K.S., Samet J.M., Zeger S.L., Strug L., Patz J.A. Temperature and mortality in 11 cities of the eastern United States. *American Journal of Epidemiology*. 2002; 155(1): 80-87.
6. Semenza J.C., Rubin C.H., Falter K.H., et al. Heat-related deaths during the July 1995 heat wave in Chicago. *NEJM*. 1996; 335(2): 84-90.
7. Shea K.M., Truckner R.T., Weber R.W., Peden D.B. Climate change and allergic disease. *J Allergy Clin Immunol*. 2008; 122 (3): 443-453.
8. Ziska L., Knowlton K., Rogers C., et al. Recent warming by latitude associated with increased length of ragweed pollen season in central North America. *PNAS*. 2011; 108(10): 4248-4251.
9. Chung W.M., Buseman C.M., Joyner S.N., et al. The 2012 West Nile encephalitis epidemic in Dallas, Texas. *JAMA*. 2013; 310(3): 297-303.
10. WI DHS BCD. Anaplasmosis and Ehrlichiosis Webpage. At <https://www.dhs.wisconsin.gov/communicable/TickBorne/AandE/Index.htm>. Accessed October, 2013.
11. Boxall A.B.A., Hardy A., Beulke S., et al. Impacts of climate change on indirect human exposure to pathogens and chemicals from agriculture. *Environmental Health Perspectives*. 2009; 117(4): 508-514.
12. Augustyn F., Chou B. Getting climate smart: a water preparedness guide for state action. 2012; American Rivers, Washington, DC and Natural Resources Defense Council, New York, NY. At www.nrdc.org. Accessed May, 2013.