When people think of climate change, they tend to think of melting polar ice caps, homeless polar bears, and low-lying regions being flooded by rising sea levels. But a much more immediate, and dangerous, aspect of climate change lies in its effects on public health. Jonathan Patz, MD, MPH, Professor in the Department of Population Health Sciences at the University of Wisconsin-Madison, studies how climate change affects the health and wellbeing of those living in the Great Lakes region and beyond, and will speak about some of his findings at Ohio State University’s Climate Change webinar series on September 28.

Climate change affects public health in many ways. Some of the effects that can be felt in the Great Lakes region include heat waves and stagnant air masses, water cycle extremes like droughts or heavy precipitation, and air pollution which in turn fuels climate change.

The Great Lakes region is prone to heat waves, such as the 1995 Chicago heat wave that killed over 700 people in just 11 days. Large amounts of concrete in the urban core of cities intensify heat waves, and a lack of nighttime cooling caused by climate change makes them even more deadly. In Ohio, about 75 people already die each summer in cities like Columbus, Cleveland and Cincinnati, and projections from Harvard Medical School suggest that by 2050, Cincinnati is likely to have heat waves similar to the 1995 Chicago events once every three years.

The elderly and people with chronic medical conditions are especially susceptible to heat stress, including heat stroke, which can cause permanent neurological damage. Heat waves also increase the incidence of respiratory symptoms like asthma, which leads to 18,000 hospitalizations, 63,000 emergency room visits and 160 deaths in Ohio each year.

“We know that heat waves kill people,” Patz says. “Since the 1995 heat wave, Chicago has made great efforts to have an early warning system and a heat wave response initiative that has reduced that impact.” Options to reduce the impact of heat waves include setting up emergency shelters with air conditioning, providing drinking water to the homeless population, and generally raising awareness about the dangers of high temperatures.

Climate change doesn’t just require people to consume more water; it also affects all areas of the water cycle. As the climate in the Great Lakes region changes, higher temperatures evaporate moisture from the ground and from bodies of water, leading to periods of drought. At the same time, the warmer air is able to hold more moisture, which means that when clouds travel and hit cooler air, the resulting rainfall is much heavier than it used to be. This can lead to flooding in both agricultural areas and in cities.

In about 1300 Ohio communities, combined sewer systems handle both storm water and sewage through the same set of pipes. These sewers are of special concern to public health officials and water managers, because during extreme rainfall events, the systems simply are not equipped to handle so much water at once. During so-called combined sewage
overflow events (CSOs), water treatment facilities are overwhelmed by the amount of water running through their system, and they have to dump untreated water, including sewage-contaminated runoff, without cleaning it first. As many treatment plants are designed to release clean water into streams and wetlands that may be part of the drinking water supply for a city, these emergency solutions create a contamination risk for public drinking water as well as for recreational water such as Lake Erie.

While combined sewer systems are no longer allowed to be newly built, existing systems are expensive to update, and climate change could put a large strain on an imperfect design that could create a major public health risk for this region if the projections for increased heavy precipitation events hold true. For example, research expects an increase of CSO events into Lake Michigan by 50 to 120%, and other Great Lakes could be similarly affected.

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These are some risks to our region from climate change, but at the same time, when we think about getting prepared for these risks, and having water managers plan for more runoff, having public health officials set up better heat wave early warning and response systems, adapting to these inevitable changes, there’s also the question of getting to the root of the problem of climate change,” Patz explains.

The root of the problem is carbon dioxide, a major greenhouse gas that is produced when burning fossil fuels, such as coal and oil products. Carbon dioxide prevents heat from escaping through the earth’s atmosphere, which leads to an overall increase in temperature. Trees and other plants play a major role in removing carbon dioxide from the atmosphere by using it for growth, but deforestation for industry and agriculture purposes has lead to an imbalance between carbon dioxide production and removal. However, the same efforts made to reduce greenhouse gas emissions (through reforestation and cleaner car engines, for example) would also have a positive effect on public health.

“Many working in public health recognize that burning fossil fuels and creating greenhouse gases also emits the air pollutants that we know so well: particulate air pollution, sulphur dioxide, mercury, etc. You don’t want to breathe that stuff,” Patz says. “Through efforts to curb climate change and greenhouse gas emissions, naturally we’re going to be reducing air pollution as well.”

Greener transportation is one major area where efforts to reduce pollution can make a big difference. Patz’s webinar will include data that shows the potential health benefits of taking cars off the road for one day a week in a number of Midwest cities, along with data on the health benefits and health cost savings of replacing travel by internal combustion engine with an active mode of transport like biking. In addition, the webinar will cover some of the air quality benefits of replacing diesel trucks, one of the top sources of particulate air pollution, with other modes of transport, such as freight trains.

“Thinking about climate change measures, many of the mitigating strategies for greenhouse gases could have some immediate health co-benefits,” Patz says. “Especially having greener transportation and greener energy production will reduce air pollution, which will greatly improve the health of our citizens.”

For more information and additional resources about how a changing climate could affect public health in the Great Lakes, visit changingclimate.osu.edu.