



CLIMATE CHANGE AND HEALTH IN OHIO

Human-induced global climate change is well-studied and documented. Average temperatures in the southern Great Lakes region have already increased by 1.3°F in the past 100 years and major impacts on human health have already occurred. As warming progresses, these impacts can be expected to increase. This document provides an overview of how climate change affects the health of Ohio residents. It has been reviewed by Harvard Medical School faculty who specialize in the health impacts of global environmental change and hold degrees in medicine and public health.

KEY FINDINGS FOR OHIO: CLIMATE CHANGE AND HEALTH

- 1) Heat waves will become ever more common and more lethal in Ohio as day and nighttime temperatures continue to rise. About 75 people already die each summer in Columbus, Cincinnati and Cleveland from the heat.
- 2) 13 counties, primarily around Cleveland and Cincinnati, where more than 15% of Ohioans live, have ozone levels that do not meet EPA standards. Climate change is expected both to stagnate air over the Midwest and stimulate production of ozone, a dangerous air pollutant for those with lung or heart disease (EPA Greenbook, Mickley 2004).
- 3) Ohio's groundwater, which 95% of the state's public water systems use, will be stressed due to increased usage, scarcity of supply and contamination.

CLIMATE CHANGE RESEARCH RELEVANT TO HEALTH OUTCOMES IN OHIO

Increased greenhouse gas concentrations in the atmosphere have already, and will continue to, change the climate in Ohio.

- » Temperatures have already risen across the state over the past 3 decades, with summer night time temperatures increasing in parts of the state by 3°F since the 1960s (Rogers 2007).
- » Without significant reductions in greenhouse gas emissions, average temperatures are projected to warm by an additional 7 to 12°F in winter and by 6 to 14°F in summer over this century. (UCS/ESA 2003)
- » Nighttime and winter temperatures are increasing twice as fast as daytime high temperatures.
- » Over the course of this century, average precipitation may increase in winter by roughly 15% but may not change in summer.

MAJOR HEALTH EFFECTS OF CLIMATE CHANGE IN OHIO

More respiratory disease, heart disease and death from heat waves are projected.

- » Heat waves are more deadly with climate change because there is less night-time cooling.
- » Without interventions to curb greenhouse gas emissions:
 - » By 2080, Cincinnati will experience 2 heat waves per summer, an increase of 50%, over today, which will last on average around 10 days, approximately 15% longer than those that occur today (Ebi/Pew 2007).
 - » By 2050, Cincinnati would have a heat wave comparable to the 1995 Chicago heat wave that killed around 600 people, every three years (UCS 2009).
 - » Cleveland may have 60 and Cincinnati around 90 summer days with highs above 90 by the end of this century (UCS 2009).

- » Heat stress can induce serious medical conditions, including heat stroke (which can result in permanent neurologic damage), and cause death, particularly among the elderly (13% of Ohio's population is over 65; 20% will be over 65 in 2030) and persons with chronic medical conditions.
- » Those with hypertension on diuretic medications (about 25% of Ohioans have high blood pressure), or who are obese (25% of the population), are particularly at risk (Ohio Dept. of Health).
- » Ozone levels may rise 5-10% across the state by 2045 as heat fuels ozone production (Mickley 2004).
 - » Roughly 10% of Ohioans live with asthma (Ohio Department of Health).
 - » Each year asthma leads to 18,000 hospitalizations and 63,000 emergency room visits and 160 deaths in Ohio (Ohio Dept. of Health).
 - » Ozone increases the chances of those who suffer from asthma and other respiratory diseases, such as chronic bronchitis or emphysema, to require emergency room care or hospitalization.
 - » Ozone may contribute to the onset of asthma in childhood (McConnell 2002).
- » Temperatures above 85°F and little rainfall have been associated with outbreaks of St. Louis encephalitis in the Great Lakes region (UCS 2003). This mosquito-borne disease kills between 5 and 30% of those infected.

Heavy rainfall events have become more common, and are associated with more frequent flooding and outbreaks of water borne diseases.

- » Between 1908 and 2000, there has been a steady increase in the number of days with very heavy rainfall (when the amount of rain is more than 99.7% of all recorded days with rainfall), making them twice as common today as they were in 1900. (Kunkel 1999, Groisman 2004).
- » Cincinnati may experience a 30% increase in heavy rainfalls within the next 30 years (UCS 2009).
- » Such heavy rains set the stage for outbreaks of *E. coli*, *Cryptosporidium* and other water-borne infections.
 - » In 2005, for example, more than ten billion gallons of sewage poured into the Lake Erie watershed after heavy rainfall overwhelmed storm sewer systems (Gomberg 2007).
 - » Each year in Cincinnati, more than 14 billion gallons of untreated sewage are discharged into the watershed (UCS 2009).
 - » Such discharges have caused Lake Erie to have one of the worst records in the nation for contamination with fecal bacteria in the past several years, resulting in summer beach closings nearly 1 in 5 days (Dorfman 2009).

Availability of safe freshwater supplies will become an increasing concern with climate change.

- » Although there will likely be more heavy rainfall events, this precipitation is not expected to sustain surface water supplies.
- » With climate change, Lake Erie's water level is projected to drop about 1 foot (UCS 2009).
- » With warmer average temperatures and increased evaporation, groundwater will be used more heavily and surface water supplies will become scarcer and more contaminated.
 - » Approximately 95% of public water systems in Ohio use ground water, at least in part, as their source of drinking water (Ground Water Protection Council 1999).
 - » Such a scenario, in which heavy rains are followed by drought that strains public drinking water supplies, already occurred in Ohio during the droughts of 1988 and 1991 (Rogers 1992)

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Full references are available at <http://chge.med.harvard.edu>, "Policymaker Education"