

Climate Change and Children's Environmental Health

In Kentucky and in most places throughout the world, the weather changes from hour-to-hour, day-to-day, and season-to-season. These weather changes can be related to temperature, precipitation, wind, humidity, cloudiness, and soil moisture. Climate is the average of these weather patterns over long periods of time in a given place. An easy way to remember the difference between climate and weather is to think of climate as what you expect and weather as what you get. For example, the weather on a summer day in Kentucky may be cloudy and mild, but the average weather, or climate, suggests that Kentucky summers are overall sunny and humid.



Changes in long-term weather patterns can be affected by greenhouse gases. Greenhouse gases, such as carbon dioxide, nitrous oxide, and methane, trap energy from the sun thereby keeping the Earth's surface warmer than it otherwise would be. Greenhouse gas emissions can result from natural processes, human activities, or a combination of both. For example, carbon dioxide is released during natural processes (during respiration, humans and animals exhale and give off carbon dioxide) and human activities (burning of coal, oil, and gas for electricity, industrial uses, and transportation). If greenhouse gases rise above historical levels the Earth could become warmer which may result in health and environmental problems. Precipitation and severe weather patterns could also be affected.

While additional research is needed to better understand the possible impacts, changes in long-term weather patterns (also known as climate change) could directly and indirectly affect human health. For example, more hot days per year could lead to heat-related health problems, such as heat stress, that directly affect human health. Increasing temperatures could indirectly affect human health by increasing the risks of some infectious diseases, or by altering food and water supplies. An increase in greenhouse gases and changes in climate could also result in decreasing air quality.



Disabilities accommodated with prior notification.



In Kentucky, warmer temperatures resulting from climate change may increase the number of extremely hot days. More hot days per year may result in increased occurrences of heat-related injury and death. Children are at greater risk from heat-related health effects than adults because they normally spend more time outdoors, need more fluid per pound of body weight, and because of their small body mass to surface area ratio. During extreme heat events, it is important for children to drink plenty of fluids, stay indoors during mid- and late-afternoon, and wear light-weight, light-colored clothing.

Increased temperatures and changes in precipitation may affect the amount and quality of food and water as well as the growth, survival, and transmission of vector-borne infectious diseases. For example, the occurrence of Lyme disease spread by ticks, and West Nile virus spread by mosquitoes, may increase due to increased populations of these pests. Children are especially vulnerable to ticks and mosquitoes because of the time they spend playing outdoors. As the frequency of Lyme disease, West Nile virus, and other infectious diseases increase, preventive measures should be taken to protect the health of children. Examples include using insect repellents, washing hands frequently, keeping immunizations up-to-date, preparing and handling food properly, and using antibiotics correctly. In addition, learning the symptoms of infectious diseases and seeing a doctor is vital. For more information on infectious diseases visit your local health department or go to the Center for Disease Control and Prevention website at <http://www.cdc.gov/>.



Changes in temperature and precipitation may result in lower yields for crop and livestock production, and could threaten the quantity and quality of drinking water. Increased temperatures can alter the growing season, and increase soil evaporation rates and the chances of severe drought. Changes in precipitation can affect soil erosion rates, soil moisture, and the severity of drought and flooding events. Children are at a greater risk from the potential

effects a changing climate may have on food and water supplies because they are still growing and their body systems are still developing. Lack of safe drinking water could also cause gastrointestinal diseases that can be fatal or significantly decrease children's health. A consistent supply of nutritious food and safe drinking water is needed for healthy growth and development.

Rising temperatures and an increase in greenhouse emissions associated with climate change may result in greater air pollution problems. Warmer temperatures may result in an increase in ground-level or "bad" ozone. Ground level ozone is formed when chemical reactions between nitrogen oxides and volatile organic compounds occur in the presence of sunlight. Ground-level ozone may lead to various adverse health effects in children, and is especially harmful to children with asthma. Children who spend time outdoors during high-level ozone days, especially with physical exertion, may be more vulnerable to ozone health effects.

Particulate matter (PM), also known as particle pollution, may indirectly be affected by climate change. Changes in long-term weather patterns may result in more wildfires and drier soils, and increased emissions of particulate matter. When inhaled, particulate matter—especially fine particles—can cause serious respiratory health problems such as coughing and difficulty breathing, decreased lung function, aggravated asthma, and development of chronic bronchitis.

Children take in more air per pound than adults, meaning they can take in more harmful substances in polluted air than adults. The Air Quality Index (AQI) is a standardized indicator of the air quality in a given location. The AQI uses a scale (from 0-500) to report daily air pollution concentrations of five pollutants. Ground-level ozone and particulate matter (PM10 and PM2.5) are two of the five pollutants that are of greatest concern to human health. The AQI helps alert individuals about how clean or polluted the air is and the potential health concerns associated with it. When the AQI reaches levels above 100, children and sensitive adults may experience respiratory symptoms and are advised to decrease physical activity outdoors. For local AQI information call 1-800-AIR-IN-KY or visit <http://epccapps.ky.gov/daq/>.



In addition to monitoring the AQI, it is important to know the symptoms of respiratory discomfort, such as coughing, wheezing, and breathing difficulty. If these symptoms occur, reduce exposure to air pollutants by decreasing physical activity. To help reduce the level of particulate matter indoors certain filters and room air cleaners can be installed. Not smoking indoors, and limiting the use of candles, wood-burning stoves, and fireplaces can also decrease particle levels inside.



As Kentucky's climate changes it is important to remember ways to safeguard children. Climate change impacts –either weather-, agricultural-, or economy-related– are greater for those who are more vulnerable. For more information on climate change visit the Environmental Protection Agency Climate Change website at www.epa.gov/climatechange/index.html.

Resources:

- Centers for Disease Control and Prevention Website, assessed July 30, 2008. <http://www.cdc.gov/>
- Children's Health Protection Advisory Committee Letter to EPA Administrator Stephen Johnson Regarding Children's Environmental Health and Climate Change, August, 2005. [http://yosemite.epa.gov/ochp/ochpweb.nsf/content/8302005.htm/\\$file/8302005.pdf](http://yosemite.epa.gov/ochp/ochpweb.nsf/content/8302005.htm/$file/8302005.pdf)
- Climate, Climate Forcings, Climate Sensitivity, and Transient Climate Change. National Academy of Science, 2001. <http://books.nap.edu/html/climatechange/1.html>
- Environmental Protection Agency Climate Change Website, assessed July 22, 2008. <http://www.epa.gov/climatechange/index.html>
- Environmental Protection Agency Children's Health Protection: Climate Change and the Health of Children Website, accessed July 22, 2008. <http://yosemite.epa.gov/ochp/ochpWeb.nsf/content/climate.htm>

Written by Ashley Osborne, Extension Associate for Environmental and Natural Resource Issues, University of Kentucky. July 2008.