Climate Change & Children's Health

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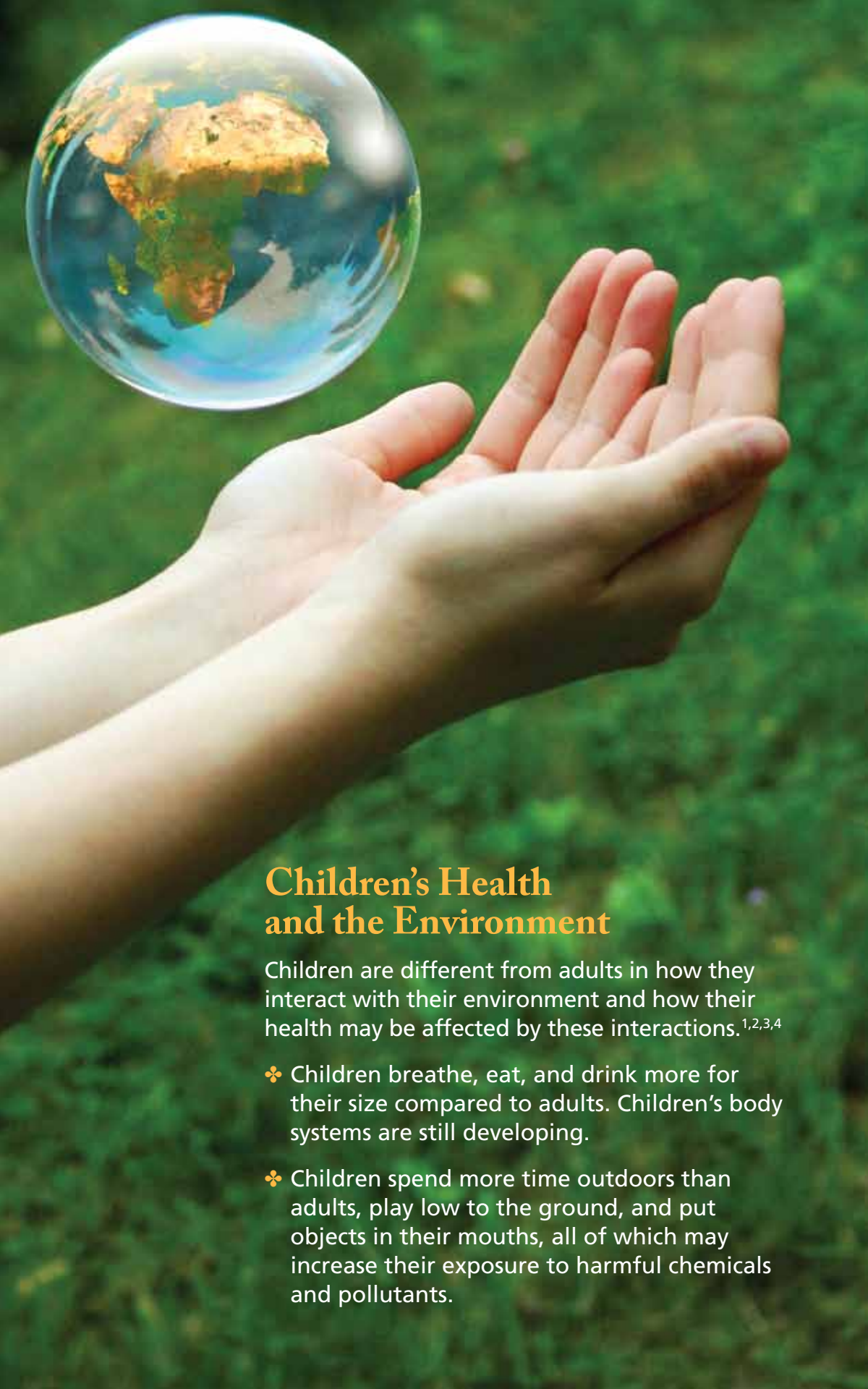

Children's Health and the Environment

Children are different from adults in how they interact with their environment and how their health may be affected by these interactions.[1,2,3,4]

- Children breathe, eat, and drink more for their size compared to adults. Children's body systems are still developing.
- Children spend more time outdoors than adults, play low to the ground, and put objects in their mouths, all of which may increase their exposure to harmful chemicals and pollutants.

How Does Climate Change Affect Children's Health?

Many common daily activities, such as driving automobiles, heating and cooling buildings, and using electricity require the burning of fossil fuels. These activities have increased levels of greenhouse gases, such as carbon dioxide (CO_2), in the atmosphere.[5,6] Currently, global atmospheric concentrations of CO_2 are 30 percent above pre-industrial levels. Burning fossil fuels such as coal, oil, and gas account for approximately 80 percent of U.S. CO_2 emissions.[6,7]

The increase of greenhouse gases in the atmosphere is changing the planet's climate. Greenhouse gases trap heat, and recent rates of warming are unprecedented. The changes in temperature, precipitation, sea level, and weather patterns the Earth is now experiencing could have unique effects on the health of children.[8,9] The good news is that all of us can take steps to both reduce the human contribution to climate change and protect children's health.

Declining Air Quality

Research conducted by both the Intergovernmental Panel on Climate Change and the U.S. Environmental Protection Agency projects declining air quality in cities.[10,11] In 2007, approximately 64 percent of children in the United States lived in counties in which the 8-hour ozone standard was exceeded on at least one day per year.[12] Rising temperatures may decrease air quality by increasing the formation of ground-level ozone, which is the main ingredient in urban smog. Ozone exposure may lead to a number of adverse health effects in children, such as shortness of breath, chest pain when inhaling deeply, wheezing and coughing, temporary decreases in lung function, and lower respiratory tract infections.[13,14]

In North America, wildfires are increasing in frequency and are likely to intensify in a warmer future. Forest fires emit fine particulate matter, which can contribute to respiratory illness, particularly in children.[11,15] Particulate matter (PM) is a generic term for a complex mixture of extremely small solid and liquid particles. Particles can originate from a variety of man-made or natural sources, and size directly determines a particle's potential for causing health problems. The smaller particles, those 10 micrometers and smaller (PM10 and PM2.5) can enter the respiratory system, and can penetrate deep into the lungs with possible serious health effects.[16]

In 2007, sixteen percent of children lived in counties that exceeded the annual fine particulate matter (PM2.5) standard.[12] Childhood exposure to particulate matter has been associated with respiratory symptoms, decreased lung function, worsening of asthma, and development of chronic bronchitis.[14,16,17]

Exposure to higher levels of ambient particulate matter and ozone may also result in increased school absences, emergency room visits, and hospital admissions of children for respiratory and asthma-related illnesses.

Extreme Weather

Climate change may alter the frequency, timing, intensity, and duration of weather events. Extreme weather includes heat waves, tropical storms and hurricanes, floods, and droughts.[9,11]

Children are more vulnerable than adults in disaster situations because they rely on others to care for them. They need specialized medical care during and after disasters because of their size and their differences in bodily systems and psychology.[9]

Water- and Food-borne Illness

Climate change may affect the growth and survival of disease-causing organisms related to water- and food-borne illness. The incidence of water- and food-borne illnesses, such as gastroenteritis and infectious diarrhea, is known to increase when outdoor temperature increases, or immediately following storms or floods.[8] Extreme weather can result in the breakdown of sanitation and sewer systems, a loss of power for refrigeration, or inadequate means to thoroughly cook food, increasing the likelihood of water- and food-borne illness.[9,11] Children are especially susceptible to water- and food-borne illness due to their developing immune systems.[8,9] In fact, infectious diarrhea is responsible for approximately 1.5 million child deaths per year globally, disproportionately affecting children of developing nations.[18]

Vector-borne Diseases

Climate change may also affect vector-borne diseases, which are diseases transmitted to humans or animals by vectors such as rodents, ticks, and mosquitoes. These organisms, and the pathogens they carry, are sensitive to temperature, humidity, and rainfall.[11] Warmer temperatures and an increase in humidity and rainfall could lead to more vector breeding grounds and larger vector and pathogen populations, resulting in increased disease transmission.[9]

One example is Lyme disease. Climate change will increase the geographical distribution of Lyme disease. Lyme disease is spread by blacklegged tick bites. A survey conducted from 1992 to 2006 indicates that the incidence of Lyme disease is increasing and rates are highest among children age 5–14 years. The number of reported cases of Lyme disease more than doubled during this time period.[19] Children are especially vulnerable to tick bites because they tend to play outside and close to the ground.

Heat

Climate change is projected to cause more, and more extreme, heat waves in the United States. These heat waves are likely to become more intense, may occur more often, and may last longer in a warming climate.[11]

Children, especially infants and the very young, are vulnerable to heat-related illnesses and mortality.[9]

Heat-related illness is also possible in children who play outside during heat waves, overexerting themselves and not staying properly hydrated.[9] By nature, these children may not be aware that they need to drink more water as a preventive measure.

Why Our Daily Behavior Matters

Small changes to our daily routine can reduce human contributions to global climate change.

Many modern day conveniences rely on the use of fossil fuels such as coal, oil, and natural gas. The burning of these fuels allows us to get to work and school, store and prepare our meals, and light our homes and communities.

Because fossil fuel-based energy sources produce a lot of heat-trapping pollution, our energy choices are critical to slowing global climate change. Renewable energy sources, such as solar, wind, and geothermal, emit little or no heat-trapping gases.

The average American household is responsible for 22,000 lbs of greenhouse gas emissions each year, twice as much as the average car. Energy-conscious families can reduce their household greenhouse gas emissions by 30 percent.[20] Energy efficiency is about using less energy to achieve the same results.

What You Can Do

Human behavior contributes to climate change, and human behavior can be changed to reduce our impact.

Know Your Carbon Footprint

Your carbon footprint is a measure of the greenhouse gases that you produce through activities that involve burning fossil fuels. Using less energy and reducing waste will reduce your carbon footprint.

Calculate the carbon footprint for your household by visiting: **www.epa.gov/climatechange/emissions/ind_calculator.html**

Reduce Your Carbon Footprint

We produce greenhouse gases as a result of using energy to drive, to light and heat our homes, and through other activities that support our quality of life like growing food, taking showers, and throwing away garbage. After estimating your personal or household carbon footprint, you can take actions to reduce emissions at home, work, school, and in your community. **www.epa.gov/climatechange/wycd/actionsteps.html**

Join EPA's *Climate for Action* Campaign

www.epa.gov/climateforaction

Become a Climate for Action Partner: Schools, organizations, government agencies, and businesses can become a Climate for Action Partner by getting the word out about climate change and children's health, recruiting climate ambassadors, and promoting and planning events that highlight efforts to address climate change and children's health. **www.epa.gov/climateforaction/lead/partner.htm**

Become a Climate Ambassador: Middle and high school students can motivate others to make a difference in reducing the human impact on climate change. Engage your peers, school, and community in activities to address climate change and reduce its effects on children's health! **www.epa.gov/climateforaction/lead/become.htm**

Learn More About Climate Change

U.S. Environmental Protection Agency (EPA)
Climate Change and the Health of Children:
http://yosemite.epa.gov/ochp/ochpweb.nsf/content/climate.htm

EPA Climate Change Web Site:
www.epa.gov/climatechange

Learn More About Children's Health

EPA Children's Health Web Site:
http://yosemite.epa.gov/ochp/ochpweb.nsf/content/homepage.htm

Pediatric Environmental Health Specialty Units:
www.pehsu.net

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