



**TESTIMONY OF DANA BEST, MD, MPH, FAAP
ON BEHALF OF THE AMERICAN ACADEMY OF
PEDIATRICS**

**SELECT COMMITTEE ON ENERGY INDEPENDENCE
AND GLOBAL WARMING**

**“Healthy Planet, Healthy People:
Global Warming and Public Health”**

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Good morning. I appreciate this opportunity to testify today before the Select Committee on Energy Independence and Global Warming on the impact of climate change on child health. My name is Dana Best, MD, MPH, FAAP, and I am proud to represent the American Academy of Pediatrics (AAP), a non-profit professional organization of 60,000 primary care pediatricians, pediatric medical sub-specialists, and pediatric surgical specialists dedicated to the health, safety, and well-being of infants, children, adolescents, and young adults. I am an Assistant Professor of Pediatrics at the George Washington University School of Medicine and an attending physician at Children's National Medical Center in Washington, D.C. I also serve on the AAP's Committee on Environmental Health.

There is strong consensus among expert scientists that Earth is undergoing rapid, global climate change.^{1,2} Human activities, primarily the burning of fossil fuels, are very likely (>90% probability) the main cause of this warming. In October 2007, the American Academy of Pediatrics issued a new policy statement and technical report, entitled, "Global Climate Change and Children's Health."^{3,4} This statement sounded a warning to pediatricians and policymakers alike that we should expect global climate change to have a disproportionately severe impact on the health of children everywhere.

Impact of Global Climate Change on Child Health

Human health is affected by the condition of the physical environment.⁵ Because of their physical, physiologic, and cognitive immaturity, children are often most vulnerable to

adverse health effects from environmental hazards.⁶ As the climate changes, environmental hazards will change and often increase, and children are likely to suffer disproportionately from these changes.⁷ Anticipated health threats from climate change include extreme weather events and weather disasters, increases in certain infectious diseases, air pollution, and thermal stress. Within all of these categories, children have increased vulnerability compared with other groups.

Extreme Weather Events and Weather Disasters: The health consequences associated with extreme weather events include death, injury, increases in infectious diseases, and posttraumatic mental health and behavior problems.⁸ Unfortunately, few studies have specifically examined such consequences in children.

Children everywhere are at risk of injury and death from storms and floods.⁹ In the developed world, infectious disease outbreaks follow natural disasters when sanitation, sewage treatment, and water-purification plants become damaged or overwhelmed, refrigeration and cooking facilities are disrupted, and people are unusually crowded in temporary shelter. These outbreaks are usually mild and well controlled, which is in contrast to the aftermath of similar catastrophes in developing nations, where disease outbreaks can be deadly.¹⁰ Mosquito-borne and other vector-borne illnesses may also be increased when storms or floods create large amounts of standing water suitable for breeding.

Mental and emotional distress documented for children and adolescents after weather disasters include posttraumatic stress disorder and high rates of sleep disturbance, aggressive behavior, sadness, and substance use and/or abuse.¹¹ Some studies have suggested that children have more persistent symptoms than adults who experience the same disaster,¹² but more studies specific to children's experience are required.¹³ Community support services¹⁴ and early therapeutic intervention and postdisaster counseling^{15,16} can significantly reduce the medium- and long-term mental health burden on children. Experiences with Hurricanes Katrina and Rita demonstrated the difficulties with tracking children's whereabouts, keeping children and caregivers together, and special needs of hospitalized infants and children during and after major natural disasters.

Infectious Diseases: Vector-borne infections are affected by climate change.¹⁷ Both the hosts (eg, rodents, insects, snails) and the pathogens (eg, bacteria, viruses, parasites) can be sensitive to climatic variables such as temperature, humidity, and rainfall. The ability to predict disease rates related to climate change is complicated by a large number of additional variables such as topography, land use, urbanization, human population distribution, level of economic development, and public health infrastructure.¹⁸ There is no easy formula that predicts climate change–related infection risk with confidence.

For example, malaria is a climate-sensitive vector-borne illness to which children are particularly vulnerable. Because they lack specific immunity, children experience disproportionately high levels of both sickness and death from malaria; 75% of malaria deaths occur in children younger than 5 years. The young are also more susceptible to

cerebral malaria, which can lead to lifelong brain damage in those who survive. Climate change is expanding the range of host mosquitoes to higher altitudes and higher latitudes, and warmer temperatures speed the development of the parasite within the host vector.¹⁹ Small children will be most affected by the expansion of malaria zones and the success or failure of societal response to this change.

Ambient Air Pollution: Children are especially vulnerable to both short-term illness and long-term damage from ambient air pollution, because their lungs are developing and growing, they breathe at a higher rate than adults, and they spend more time outdoors engaging in vigorous physical activity.²⁰ Air pollution (such as ozone and particulate matter) causes respiratory and asthma hospitalizations, school absences, increased respiratory symptoms, and decrements in lung function.¹⁷ Formation of ozone, in particular, is known to increase with increasing temperature, even without increases in the precursor primary pollutants (volatile organic hydrocarbons and oxides of nitrogen).²¹ Children who are active in outdoor sports in communities with high ozone are at increased risk of developing asthma.²² In addition, high levels of particulate matter and other pollutants affect the ability of children's lungs to grow regardless of history of asthma.²³ Rates of preterm births, low birth weight, and infant mortality are increased in communities with high levels of particulate air pollution.²⁴

A second change that is being observed is the temperature-related increases in pollen production and other allergens in some regions and some cities. Increased temperature causes increases in amounts of pollens produced by some plants²⁵ and can also affect

spatial distribution and density of plants, fungi, and molds that produce allergens.²⁶ To the extent that exposure to allergens contributes to the incidence, prevalence, and severity of asthma, allergic reactions, and other respiratory disease, climate change will affect the pattern of disease in children. Some investigators have argued that part of the current global increase in childhood asthma can be explained by increased exposure to aeroallergens driven by climate change.²⁷

Thermal Stress: For all organisms, there exists a range of ideal temperature above and below which mortality increases. Humans are no exception, although temperature-mortality relationships vary significantly by latitude, climatic zone, and level of socioeconomic development.²⁸ As ambient temperatures increase, the frequency of heat waves will increase. Populations that live in temperate climates, such as in the United States and Europe, are likely to be hard hit initially, because global warming is most dramatic in these latitudes and there has been little time for populations to acclimatize to changes in temperature.

Heat-related deaths and hospitalizations are most common in the elderly, especially if they are ill.^{29,30} One study has found that infants and young children may represent a second, albeit smaller, higher-risk group,³¹ but effects on children have not been studied adequately. In addition, children spend more time outside, especially playing sports in the heat of the afternoon, which puts them at increased risk of heat stroke and heat exhaustion.³² Increased outdoor time during hot weather may also put children at increased risk of UV radiation–related skin damage, including skin cancer.³³

Additional Long-Term and Indirect Impacts: Food availability may be affected as land and ocean food-productivity patterns shift.³⁴ Water availability may change and become much reduced in some regions, including during summer in the snow run-off–dependent American west coast.³⁵ Coastal populations could be forced to move because of rises in sea level, and massive forced migrations, driven by abrupt climate change, natural disaster, or political instability over resource availability, are conceivable.³⁶ In addition, world population is expected to grow by 50% to 9 billion by 2050, which would place additional stress on ecosystem services and increase the demand for energy, fresh water, and food.³⁷ As these changes evolve, social and political institutions will need to respond with aggressive mitigation strategies and flexible adaptation strategies to preserve and protect public health, particularly for children.

Recommendations

In addition to its recommendations to pediatricians for reducing their energy demands and incorporating sustainable practices into their personal and professional lives, the American Academy of Pediatrics calls upon government at all levels, from the smallest municipalities to the national and international levels, to implement aggressive policies to halt man-made contributions to climate change and to mitigate its impact on children's health. Policymakers should:

- Develop aggressive, long-term policies to reduce the major contributing factors to global climate change. For example, the Environmental Protection Agency

should set the National Ambient Air Quality Standard for ozone at 0.060 parts per million.³⁸

- Invest in prudent and vital preparations for our public health care systems, including immunization programs and disease surveillance, reporting, and tracking.
- Give specific attention to the needs of children in emergency management and disaster response.^{39,40}
- Support education and public awareness of the threats from climate change and their implications for public and children's health now and in the future.
- Fund interdisciplinary research to develop, implement, and measure outcomes of innovative strategies to both mitigate and adapt to climate change, particularly in areas with direct implications for children's health.

In conclusion, the American Academy of Pediatrics commends you, Mr. Chairman, for holding this hearing today to call attention to the potential impacts of global climate change on children's health. We look forward to working with Congress to prevent the adverse impacts on child health caused by global climate change and to plan for those that may be unavoidable. I appreciate this opportunity to testify, and I will be pleased to answer any questions you may have.

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