



POLICY STATEMENT

Global Climate Change and Children's Health

Committee on Environmental Health

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

ABSTRACT

There is broad scientific consensus that Earth's climate is warming rapidly and at an accelerating rate. Human activities, primarily the burning of fossil fuels, are very likely (>90% probability) to be the main cause of this warming. Climate-sensitive changes in ecosystems are already being observed, and fundamental, potentially irreversible, ecological changes may occur in the coming decades. Conservative environmental estimates of the impact of climate changes that are already in process indicate that they will result in numerous health effects to children. The nature and extent of these changes will be greatly affected by actions taken or not taken now at the global level.

Physicians have written on the projected effects of climate change on public health, but little has been written specifically on anticipated effects of climate change on children's health. Children represent a particularly vulnerable group that is likely to suffer disproportionately from both direct and indirect adverse health effects of climate change. Pediatric health care professionals should understand these threats, anticipate their effects on children's health, and participate as children's advocates for strong mitigation and adaptation strategies now. Any solutions that address climate change must be developed within the context of overall sustainability (the use of resources by the current generation to meet current needs while ensuring that future generations will be able to meet their needs). Pediatric health care professionals can be leaders in a move away from a traditional focus on disease prevention to a broad, integrated focus on sustainability as synonymous with health.

This policy statement is supported by a technical report that examines in some depth the nature of the problem of climate change, likely effects on children's health as a result of climate change, and the critical importance of responding promptly and aggressively to reduce activities that are contributing to this change.

BACKGROUND

"Warming of the climate system is unequivocal."¹ According to the National Climatic Data Center, all records indicate that during the past century, global surface temperatures have increased at a rate near 0.6°C per century (1.1°F per century); this trend has been 3 times larger since 1976.² Human activity, particularly the burning of fossil fuels, has very likely (>90% probability) driven this rise by greatly increasing atmospheric concentrations of carbon dioxide (CO₂) and other greenhouse gases (GHGs).¹

There is strong consensus among expert scientists that Earth is undergoing rapid, global climate change,^{1,3} although there remains uncertainty about how rapidly and extensively the climate will change in the future. Overall scientific predictions agree, however, that temperatures and sea level will continue to rise

www.pediatrics.org/cgi/doi/10.1542/peds.2007-2645

doi:10.1542/peds.2007-2645

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

Key Words

climate change, global warming, child, pediatric, health, sustainable development

Abbreviation

GHG—greenhouse gas

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275). Copyright © 2007 by the American Academy of Pediatrics

throughout the 21st century.^{1,4} Even if GHG emissions were abruptly reduced to zero, the planet would continue to warm for decades until the energy stored in the system equilibrates.⁵ The possibility of reaching a tipping point at which abrupt, large, and irreversible change could be superimposed on current trends adds both urgency and further ambiguity to the situation.⁶ Current human activities are accelerating these changes, and future human activities will affect their trajectories; the window of opportunity for successful mitigation, therefore, may be very short.⁷ Actions made in the coming decade will have a profound effect on global health and, in particular, on children's health.

DIRECT EFFECTS OF CLIMATE CHANGE ON CHILDREN'S HEALTH

Because of their physical, physiologic, and cognitive immaturity, children are often most vulnerable to adverse health effects from environmental hazards.⁸ As the climate changes, environmental hazards may shift and possibly increase (Fig 1), and children are likely to suffer disproportionately from these changes.⁹ Anticipated direct health consequences of climate change include injury and death from extreme weather events and natural disasters, increases in climate-sensitive infectious diseases, increases in air pollution-related illness, and more heat-related, poten-

tially fatal, illness. Within all of these categories, children have increased vulnerability compared with other groups (see the accompanying technical report¹⁰).

INDIRECT EFFECTS OF CLIMATE CHANGE AND IMPLICATIONS FOR FUTURE GENERATIONS

Additional effects of climate change, with profound implications for the health and welfare of future generations of children, are anticipated. Food availability could be reduced as land and ocean food productivity patterns shift and species diversity declines.¹¹ Water availability will change and become too abundant in some regions (flooding) and much reduced in others (drought).¹² Coastal populations will be forced to move because of the rising sea level. Large-scale, forced migrations are conceivable, driven by abrupt climate change, natural disaster, or political instability over resource availability.¹³

The speed with which global GHG emissions can be reduced will have a significant effect on the rate and degree of warming, but even the most optimistic scenarios describe continued warming into the next century.^{1,5} As climate change progresses, social and political institutions must respond with aggressive mitigation and flexible adaptation strategies to preserve and protect public health, particularly for children.

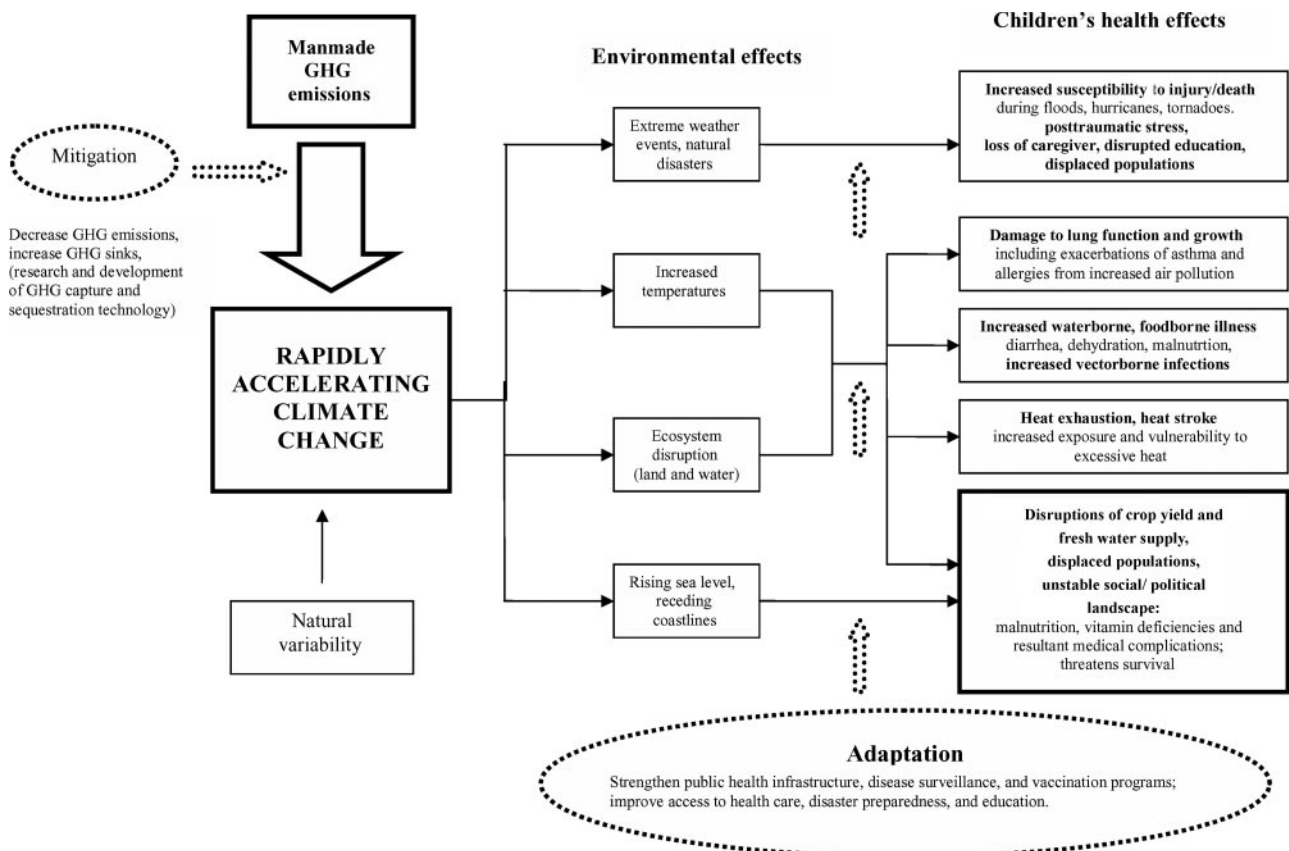


FIGURE 1 Potential effects of global climate change on child health. (Adapted from McMichael et al¹⁸ and Haines and Patz¹⁹.)

MITIGATION AND ADAPTATION STRATEGIES

Strategies to address the effects of climate change (mitigation and adaptation) are concepts that focus on both primary and secondary prevention strategies in pediatric health care (Fig 1). Mitigation (primary prevention) involves reducing GHG concentrations in the atmosphere with the goal of reducing climate change. Adaptation (secondary prevention) involves developing public health strategies to minimize and, in some cases, eliminate local and regional adverse health outcomes that are anticipated from climate change.

A wide variety of governmental and nongovernmental organizations have developed detailed lists of mitigation and adaptation strategies, from international conventions such as the Kyoto Protocol¹⁴ to individual actions such as reducing automobile use.¹⁵

However, any solutions that address climate change must be developed within the context of overall sustainable development (the use of resources by the current generation to meet current needs while ensuring that future generations will be able to meet their needs). Given the health implications of climate change for current and future generations of children, the disease-prevention role for pediatric health care professionals includes advocating for environmental sustainability.

RECOMMENDATIONS TO PEDIATRICIANS

Pediatricians are dedicated to the promotion and protection of children's health. Climate change threatens the health, welfare, and future of current and subsequent generations of children. Pediatricians can incorporate considerations of the effects of climate change on health into their professional practice and personal lives in many ways, including patient education, lifestyle practices, and political advocacy. Some possible approaches might include the following.

1. Recognize and educate yourself about the links between child health and climate change. Existing anticipatory guidance already incorporates many issues that can help mitigate climate change. For example, encouraging families and children to walk or ride bicycles more may reduce automobile emissions.
2. Advocate for comprehensive local and national policies that address climate change to improve the health of children now and in the future. Educate elected officials on the health risks to children from climate change; write letters to the editor, attend public meetings, or provide expert testimony. Work with local schools, child care centers, community organizations, and businesses on projects that will help reduce GHGs. Support policies to expand parks and green spaces, strengthen public transport, improve sidewalks and bicycle lanes, and create local award systems for energy-efficient businesses, buildings, organizations, and households.

3. Serve as a role model for practices that promote environmental sustainability. Emphasize energy conservation in your workplace, encourage and model reduced dependency on automobile travel, and consider the environmental and energy costs when making major purchases for your practice or institution.
4. Help to build and support coalitions across disciplines and institutions to search for novel, comprehensive approaches to mitigate and adapt to climate change in your community and region. Work with local and state health departments to strengthen public health infrastructure, disease surveillance and reporting, and disaster preparedness.
5. Work to ensure that concepts related to the pediatric health implications of climate change are part of pediatric training and curricula.

RECOMMENDATIONS TO GOVERNMENT

Government at all levels, from the smallest municipalities to the national and international levels, should implement aggressive policies to halt man-made contributions to climate change and to mitigate its impact on children's health.

1. Develop aggressive, long-term policies to reduce the major contributing factors to global climate change.
2. Invest in prudent and vital preparations for our public health care systems, including immunization programs and disease surveillance, reporting, and tracking.
3. Give specific attention to the needs of children in emergency management and disaster response.^{13,16}
4. 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.
5. 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.

COMMITTEE ON ENVIRONMENTAL HEALTH, 2006–2007

Michael W. Shannon, MD, MPH, Chairperson

Dana Best, MD, MPH

Helen J. Binns, MD, MPH

Joel A. Forman, MD

Christine L. Johnson, MD

Catherine J. Karr, MD, PhD

Janice J. Kim, MD, PhD, MPH

Lynnette J. Mazur, MD, MPH

James R. Roberts, MD, MPH

PAST COMMITTEE MEMBER

*Katherine M. Shea, MD, MPH

LIAISONS

Elizabeth Blackburn, RN

US Environmental Protection Agency

Mark Anderson, MD
Centers for Disease Control and Prevention/National
Center for Environmental Health
Sharon Savage, MD
National Cancer Institute
Walter Rogan, MD
National Institute of Environmental Health Sciences

STAFF

Paul Spire

*Lead author

REFERENCES

1. Intergovernmental Panel on Climate Change. Climate change 2007: the physical science basis—summary for policy makers. Available at: www.ipcc.ch/SPM2feb07.pdf. Accessed April 18, 2007
2. National Climatic Data Center. Climate of 2005 annual review: temperature trends. Available at: www.ncdc.noaa.gov/oa/climate/research/2005/ann/global.html#Ttrends. Accessed April 18, 2007
3. US Environmental Protection Agency. Climate change-science: state of knowledge. Available at: www.epa.gov/climatechange/science/stateofknowledge.html. Accessed April 18, 2007
4. Intergovernmental Panel on Climate Change. Climate change 2001: synthesis report—summary for policymakers. Available at: www.ipcc.ch/pub/un/syrenq/spm.pdf. Accessed April 18, 2007
5. Hansen J, Nazarenka L, Ruedy R, et al. Earth's energy imbalance: confirmation and implications. *Science*. 2005;308:1431–1435
6. Schiermeier Q. A sea change. *Nature*. 2006;439:256–260
7. Hansen J, Sato M, Ruedy R, Lo K, Lea DW, Medina-Elizade M. Global temperature change. *Proc Natl Acad Sci U S A*. 2006;103:14288–14293
8. Etzel RA, Balk SJ, eds. *Pediatric Environmental Health*. 2nd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003
9. Shea K. Global environmental change and children's health: understanding the challenges and finding solutions. *J Pediatr*. 2003;143:149–154
10. American Academy of Pediatrics, Committee on Environmental Health. Global climate change and children's health. *Pediatrics*. 2007;120(5). Available at: www.pediatrics.org/cgi/content/full/120/5/e1359
11. Slingo JM, Challinor AJ, Hoskins BJ, Wheeler TR. Introduction: food crops in a changing climate. *Philos Trans R Soc Lond B Biol Sci*. 2005;360:1983–1989
12. United Nations Environment Programme. Potential impacts of climate change: fresh water stress—current population at risk. Available at: www.grida.no/climate/vital/38.htm. Accessed April 18, 2007
13. McMichael A, Githek OA. Human health. In: McCarthy JT, Canziani OF, Leary NA, Dokken DJ, White KS, eds. *Climate Change 2001: Impacts, Adaptations, and Vulnerability*. Geneva, Switzerland: Intergovernmental Panel on Climate Change; 2001:453–485. Available at: www.grida.no/climate/ipcc_tar/wg2/pdf/wg2TARchap9.pdf. Accessed April 18, 2007
14. United Nations Framework Convention on Climate Change. Kyoto Protocol. Available at: http://unfccc.int/kyoto_protocol/items/2830.php. Accessed December 19, 2006
15. Earthday Network. Climate change solutions: what you can do right now. Available at: www.earthday.net/resources/2006materials/Top10.aspx. Accessed December 19, 2006
16. US Department of Health and Human Services, Agency for Healthcare Research and Quality. Pediatric terrorism and disaster preparedness: a resource guide for pediatricians. Available at: www.ahrq.gov/research/pedprep/resource.htm. Accessed April 18, 2007
17. Testimony of Steven Krug, MD, FAAP, on behalf of the American Academy of Pediatrics, before the House Homeland Security Subcommittee on Emergency Preparedness, Science and Technology, July 26, 2006. Available at: www.aap.org/advocacy/washing/ER_readiness.testimonyFINAL.pdf. Accessed April 18, 2007
18. McMichael AJ, Woodruff RE, Hales S. Climate change and human health: present and future risks. *Lancet*. 2006;367:859–869
19. Haines A, Patz JA. Health effects of climate change. *JAMA*. 2004;291:99–103