

Climate Change and Effects in Children

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The changing climate is causing physical, chemical, and ecological changes that are fundamentally altering the planet.



Extreme Events

- The unique health, behavioral, and psychosocial needs of children place them at unique risk from extreme weather events
- The greatest burden of these disasters will be borne by the world's poorest children, who are up to 10 times more likely to be affected by climate change–associated disasters than children in higher-income families.



Climate Change and Effects on Health in Children

Changes in the environment such as physical, chemical and ecological pose significant threats to human health, with children representing a uniquely vulnerable group.

Children in the world's poorest countries, where the disease burden is already disproportionately high, are most affected by climate change

According to the World Health Organization, more than 88% of the existing burden of disease attributable to climate change occurs in children younger than 5 years



Climate Change Risks to Health

| Risk Category | Causal Pathway |
|---------------|--|
| Primary | Mental and physical illness, injury, and death attributable to heat waves and extreme weather events |
| Secondary | Health effects mediated by ecological changes, including altered life cycle of infectious disease vectors and host animals, increased concentration of air pollutants and aeroallergens because of rising temperature or wildfires, altered crop yields, and rainfall patterns |
| Tertiary | Large-scale consequences of unchecked climate change. Includes depletion of basic resources such as food and water, ecological loss, population displacement, failing communities, resulting tensions, and increased risk of conflict |

Primary Direct Effects

- Extreme weather events directly harm children through injury and death. The most common injuries after hurricanes include lacerations, puncture wounds, and blunt trauma.



Primary Effects: Heat Related Illness

Extreme heat is the leading cause of environmental deaths in the United States, killing more people than hurricanes, lightning, tornadoes, and floods.

Research on the relationship between temperature and morbidity and mortality in children is limited.

Infants at higher risk because of immature thermoregulatory systems

Several studies confirm that during heat waves, there is an increase in heat-related ED visits and hospitalizations.

Student athletes are a high-risk group for exertional heat injury.

The Centers for Disease Control and Prevention report heat illness as a leading cause of death and disability in high school athletes- the number of deaths have doubled in the last decade.



Secondary Effects Ecological Air Quality

Ozone

- Asthma is the most common pediatric chronic disease, affecting 6.8 million, or 9.3% of American children in 2012.
- Climate change has been projected to increase childhood asthma via an associated rise in air pollutants, including ground-level ozone.
- Because of their higher minute ventilation and time spent outdoors during the summer, children are the group most vulnerable to ozone.
- Exposure has been associated with asthma exacerbations, increased ED visits and pediatric ICU admissions for asthma, and increased risk of developing asthma.



Secondary Ecological Effects

Air Quality

Wildfires

Exposed children, both asthmatic and nonasthmatic, have been shown to suffer substantial eye symptoms and upper and lower respiratory symptoms from smoke and the chemicals produced.

Increase in ED visits, hospitalizations related to respiratory illness

Pollen

Ragweed allergen production increases in response to increased levels of CO₂ and increased temperature.

Elevated pollen counts place a greater number of children at risk for allergy-associated asthma attacks.



Secondary Ecological Effects Infectious Disease

Determining the effects of climate change on infectious diseases is complex because of the confounding contributions of economic development and land use, changing ecosystems, international travel, and commerce.

Climatic contribution to range shifts of some climate-sensitive infections, emergence of novel diseases, and projected increases in diarrheal illness in vulnerable regions.

Diarrheal illness is a leading cause of child mortality across the world, with approximately 1.6 million deaths annually in children younger than 5 years old.

In general, cases of bacterial gastroenteritis, including *Salmonella*, *Campylobacter*, *Escherichia coli*, *Cryptosporidium*, and *Shigella*, increase when temperatures are higher

Secondary Ecological Effects Infectious Disease

Climate influences a number of vectorborne diseases that affect children across the world.

These include malaria, dengue fever, West Nile virus, Chikungunya, Lyme disease, Rocky Mountain spotted fever, plague, hantavirus pulmonary syndrome, and Chagas disease.

Of most concern: Dengue Fever - Climate, including temperature and humidity, has a strong direct and indirect influence on the dengue virus and vector. 22,000 deaths/year mostly children.

Emerging diseases: Coccidioidomycosis, or valley fever, is caused by the *Coccidioides* fungus, which resides in soil from the southwestern United States to South America. Amebic meningoencephalitis caused by *Naegleria fowleri*, an amoeba commonly found in warm freshwater lakes and rivers

Tertiary Indirect Effects

The indirect effects of weather disasters on children are far reaching. Children's biological and cognitive development occurs in the context of family, school, neighborhoods, and communities. Disasters can cause irrevocable harm to children through devastation of this broader social context.

After hurricanes Katrina and Rita, more than 5000 children were separated from their families. More than 34 000 calls were made to a special hotline that the National Center for Missing and Exploited Children established after the storms, and the last missing child was reunited with her family after 6 months.

It is estimated that 400 children and adolescents were rescued from flooded homes and that 11 000 children were placed in the New Orleans Convention Center and Superdome at some time. Between 200 000 and 300 000 children were evacuated and relocated, temporarily or permanently

Mental Health

- Mental Health - the social foundations of children's mental and physical health and well-being are threatened by climate change. PTSD, social isolation, caused by forced relocation and prolonged community disruption



Food Insecurity

- Currently, undernutrition underlies nearly 3.1 million deaths of children younger than 5 years old worldwide and is responsible for 45% of the disease burden in this age group.
- Studies have projected a 7% to 20% increase in the number of malnourished children globally because of climate change.
- The regions with the greatest risk of child malnutrition are also those most vulnerable to crop losses attributable to climate change.
- Compared with a future with no climate change, an additional 95 000 child deaths attributable to malnutrition and an additional 7.5 million moderately or severely growth-stunted children have been projected for the year 2030.



Conclusion

- A new public health movement is needed to educate, advocate, and collaborate with local and national leaders regarding the risks climate change poses to children and the major health benefits associated with mitigation policy.
- In addition, ongoing research into the links between climate and health outcomes and the development of medical and public health interventions to protect individuals and communities from inevitable changes is needed.



Thank you!



References

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