



Climate Change and Health

Human-caused climate changes lead to the deaths of at least 150,000 people around the world every year,¹ a figure which is likely to increase as global warming continues to exacerbate existing environmental health threats around the world. Children, the elderly, and those in disadvantaged communities are the most vulnerable to such exacerbations. The following expected health impacts of global climate change can be separated into direct and indirect effects. Direct impacts stem from extreme events such as heatwaves, floods, droughts, windstorms, and wildfires, while the indirect effects may arise from the disruption of natural systems, causing infectious disease, malnutrition, food and water-borne illness, and increased air pollution.

Heatwaves and UV Radiation

Heat already accounts for the greatest number of weather-related deaths in the United States. There has been a 50% increase in the number of unusually warm nights, which deprives the body of breaks from the heat.² The elderly and young children are most susceptible to the effects of heat stress. Most heat related deaths occur in cities, where what is known as the urban heat island effect can potentially amplify temperatures as much as 10° C. Low-income families are especially vulnerable to heat because they may have less access to adaptive features such as thorough insulation or air-conditioning.³

The stratospheric ozone layer absorbs most of the harmful UV radiation emitted from the sun, but that amount of absorption has decreased since ozone-depleting substances, which are also powerful greenhouse gases, caused the thinning of the ozone layer. Children burn from sun exposure easily, putting them at increased risk of skin damage from UV radiation.⁴ A study showed that children sunburned between the ages of 10 and 15 years have a threefold increase in the risk of later developing skin cancer.⁵

Floods, Droughts, & Wildfires

Sea level rise is already putting low-lying coastal populations at risk, and intense rainfall events are projected to increase with climate change. This increases the risk of flooding, which can introduce chemicals, pesticides, and heavy metals into water systems and increase the risk of water-borne disease outbreak. Droughts, which are expected to become more common in the United States, can destroy crops and grazing land, reduce the quantity and quality of water resources, and increase risk of fire. Furthermore, the increase in the frequency and intensity of wildfires that has occurred over the past few decades is very likely to continue. In addition to destroying homes and property, these

wildfires can cause eye and respiratory diseases. Strong tropical storms, like Hurricane Katrina in 2005, are also likely to become more common with climate change,² the trauma of which can lead to post-traumatic stress disorder, grief, depression, anxiety disorders, somatoform disorders, and drug and alcohol abuse.⁶

Air Pollution and Aeroallergens

Climate change is projected to cause more respiratory disease. Higher temperatures cause ground-level ozone to increase, and short term exposure to ozone increases the rate and severity of asthma attacks, causes nasal and eye irritation, coughs, bronchitis, and respiratory infections. In addition, long-term exposure may lead to the development of asthma. Children are more vulnerable to these effects because they take in more air per body weight than adults and have narrower airways. The severity of asthma is also affected by aeroallergens, concentrations of which are projected to increase with increasing temperature. For example, ragweed is a particularly important risk to human health: it has highly allergic pollen and is spreading in several parts of the world.⁷ Allergic reactions to poison ivy may also increase because these plants grow faster and become more potent when carbon dioxide levels are higher. Furthermore, algal blooms, which may cause respiratory irritation, are increasing on a global scale.⁸

Vector-borne Disease

Climate change may cause vector-borne diseases to shift in geographic distribution as well as changes in vector development, reproduction, behavior, and population dynamics.

- **Malaria:** By 2080, an estimated 260-320 million more people around the world will be affected by malaria as a result of climate change.⁹ Children are most at risk: 75% of malaria deaths occur in children under five.¹⁰
- **Dengue fever/DHS:** Children aged three to five have a greater risk of developing dengue hemorrhagic

fever, which has a death rate of 50%. By 2080, about 2.5 billion more people will be at risk of contracting dengue fever globally. The disease has shifted north and has already reached the borderlands of Mexico and the United States.¹¹

- **West Nile Virus, Rift Valley fever, and Chikungunya fever** have also demonstrated shifts related to higher temperatures and increased precipitation from climate change.
- **Tick-borne Disease:** Cases of Lyme disease have increased from less than 100 cases per year in 2000 to more than 500 in 2007, and may continue to expand its reach northward.¹² Ticks carrying encephalitis and Rocky Mountain spotted fever are also projected to shift from south to north as temperatures rise.¹³
- **Hantavirus:** Weather extremes increase the risk of hantavirus pulmonary syndrome, which is transmitted by rodents.¹⁴

Food and Water-borne Disease

Outbreaks of infectious diarrhea, *Cryptosporidium*, *Giardia*, *Salmonella*, *E. coli*, and rotavirus are projected to increase. These diseases occur as a result of the contamination of water supplies through the disruption of water and sanitation systems, which can be caused by toxic runoff from increased rainfall and flooding. Food contamination can result from lack of air-conditioning or refrigeration; for example, higher temperatures in Europe were found to contribute to an estimated increase of 30% in cases of *Salmonella*.^{15,16} Children are especially vulnerable to food and water borne-diseases because they are more likely to die from dehydration from diarrhea and vomiting. Minority children and children of lower socioeconomic status in areas that lack adequate capacity to provide food and water supplies are at the greatest risk.

Malnutrition and Resource Scarcity

Globally, approximately 800 million people are currently undernourished. Climate change is likely to further affect food production, distribution, and storage, especially in sub-Saharan Africa. In the United States, higher food prices are more likely to lead to food-insecurity than an actual shortage. In 2005 there were a reported 35 million food-insecure people in the United States, 12.4 million of them children, mostly of African-American or Hispanic descent.¹⁷ Water availability is also projected to decrease with climate change. According to the Millennium Ecosystem Assessment of 2005, 60% of global resources are already in decline or are being used in unsustainable ways.¹⁸ Resource scarcity coupled with population growth can lead to war, political instability, poverty, substance abuse, crop or catch failure, rising consumer prices, and the disruption of social structure.

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