

Chapter 30

Impacts on Public Health

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ABSTRACT

Many serious adverse public health impacts of climate change are already being felt around the globe, including record-breaking heat waves, severe air pollution, widespread water contamination that has brought a resurgence of cholera and has compromised clean drinking water and sanitation for more than one billion people worldwide, food scarcity and undernutrition from droughts and desertification, pandemics of vector-borne diseases, and increasingly frequent and severe natural hazards such as flooding, hurricanes, and earthquakes. Centralized, well-organized emergency preparedness planning is needed at the national, regional, and municipal levels to enable safe and efficient evacuations, and to minimize injuries and fatalities. In addition, effective planning to address the public health impacts of climate change is contingent on poverty reduction, and adequate access to education and healthcare for all. This chapter addresses the major public health impacts of global warming and the use of technologies in adapting to them.

INTRODUCTION

This chapter focuses on the public health impacts of global warming. Recommendations are made for adaptation strategies that use innovative technologies to prevent illness, injury, and loss of life and property from climate-change related events.

The public health impacts are discussed in order of the following seven categories (USGCRP, 2016):

- Temperature-related illness and death;
- Air pollution—indoor and outdoor;
- Food safety, nutrition, and availability;
- Water-borne diseases and sanitation;
- Vector-borne diseases;
- Natural hazards, and
- Mental health and well-being.

DOI: 10.4018/978-1-7998-8960-1.ch030

The public health impacts of climate change disproportionately affect vulnerable populations--lower-income individuals, communities of color, individuals with asthma and other respiratory diseases, pregnant women, young children, the elderly, and people with disabilities--who are most at risk of serious health consequences from the hazards posed by climate change (see Chapter 3).

TEMPERATURE-RELATED ILLNESS AND DEATH

One potentially life-threatening impact is an increase in the frequency and severity of heat waves. The elderly are particularly vulnerable to heat-related illness and fatalities during heat waves (Astrom et al., 2011). Young children also are at increased risk of heat-related morbidity (Xu et al., 2014). In 2003, a severe heat wave in Europe resulted in 15,000 deaths in France alone (CRED, 2015). Following this disastrous heat wave, several European countries developed heat wave early warning systems or national heat plans aimed at mitigating human health consequences of heat waves (Hagens & van Bruggen, 2015; Lowe et al., 2011).

In July, 1995, Chicago experienced an extreme heat wave that took the lives of about 739 people (Klinenberg, 2002). It was the deadliest weather event in Chicago history. The heat peaked on July 13, when O'Hare Airport showed a temperature of 104 degrees Fahrenheit, but the extreme humidity resulted in a heat index of 119 degrees Fahrenheit; at Midway Airport, on the south side of Chicago, the temperature was 103 degrees Fahrenheit but the heat index was a life-threatening 125 degrees Fahrenheit. The deadly effects of the heat wave were exacerbated by intense sunshine and trapped pollutants, taking the highest toll on poor city residents who did not have air conditioners or could not afford to turn on the air conditioners (National Centers for Environmental Information, 2016b). In addition, heat in inner city neighborhoods is intensified by the "heat island effect," whereby heat builds up in asphalt and buildings (US EPA, 2017a). Eric Klinenberg's book, *Heat Wave: A Social Autopsy of Disaster in Chicago* (2015), describes how unprepared Chicago was for the severity and length of the heat wave: meteorologists had warned Chicagoans that there would be a two-day heat wave. It lasted a week! By the time it was over, streets had buckled, power grids had failed, leaving residents without electricity for up to two days, and an estimated 739 people were dead, more than twice the number that died in the Great Chicago Fire of 1871 (Klinenberg, 2015).

More health education is needed about the dangers of heat waves, including how to stay cool and how to recognize signs of heat cramps, heat exhaustion, and heat stroke. Heat cramps are muscle spasms in the legs or abdomen that result from excessive water and salt loss, such as might occur among athletes during football practice outdoors on a very hot and humid day. Heat exhaustion is characterized by feelings of faintness, dizziness, and heavy sweating, whereas heat stroke is a life-threatening condition characterized by high fever, collapse, even convulsions or coma (American Red Cross, 2017). Heat exhaustion can progress to heat stroke without treatment, especially for the elderly, young children, and individuals with medical conditions. In addition, air conditioning needs to be provided for lower-income individuals who are living without it. After the Chicago heat wave of 1995, a heat wave emergency plan was put in place that provided warnings of impending heat waves and that provided free transportation to "cooling centers" for residents without air conditioning. In addition, community networks were set up to call upon isolated vulnerable elderly residents, to foster social cohesiveness. The heat wave emergency plan and social networking proved to be effective in mitigating the effects of a subsequent heat wave in 1999. (For more about the protective factors associated with social cohesiveness, see Chapter 7.)

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