

Potential Adaptation Strategies for Moderating Impacts of Climate Change on Human Health and Welfare



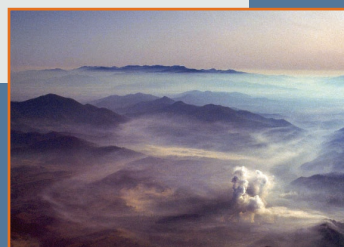
Climate Event	Examples of Possible Impacts on Health	Likelihood of Impacts Given Climate Event Occurs	Potential Adaptation Strategies
More heat waves and extreme high temperatures	Heat stress/stroke. Uncertain impacts on mortality	Very likely in Midwest and northeast urban centers	Early watch and warning systems and installation of cooling systems in buildings
Changes in precipitation, especially extreme precipitation	contaminated water and food supplies with associated gastrointestinal illnesses including salmonella and giardia	Likely in areas with out-dated or over-subscribed water treatment plans	Improve infrastructure to guard against combined sewer overflow; public health response to include "boil water" advisories
Hurricane and storm surge	Injuries from flying debris and drowning / exposure to contaminated flood waters and to mold and mildew / exposure to carbon monoxide poisoning from portable generators	Likely in coastal zones of the southeast Atlantic and the Gulf Coast	Increase knowledge and awareness of vulnerability to climate change; public health advisories in immediate aftermath of storm; coordinate storm relief efforts to insure that people receive necessary information for safeguarding their health
Temperature-related effects on ozone	Ozone concentrations more likely to increase than decrease; possible contribution to cardiovascular and pulmonary illnesses, including exacerbation of asthma and chronic obstructive pulmonary disorder (COPD) if current regulatory standards are not attained	Likely in urban centers in the mid-Atlantic and the northeast	Public warning via air quality action days; encourage public transit, walking and bicycling to decrease emissions
Wildfires	Degraded air quality, contributing to asthma and COPD aggravated	Likely in California, the Intermountain West, the southwest and the southeast	Public health air quality advisories

The information in this factsheet is drawn from CCSP's Synthesis and Assessment Products 4.6 (Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems) and 3.3 (Weather and Climate Extremes in a Changing Climate).

¹ This paragraph is drawn particularly from SAP 3.3
Middle image on front page from freeimages.co.uk, other front page images from NOAA's Portland OR forecast office

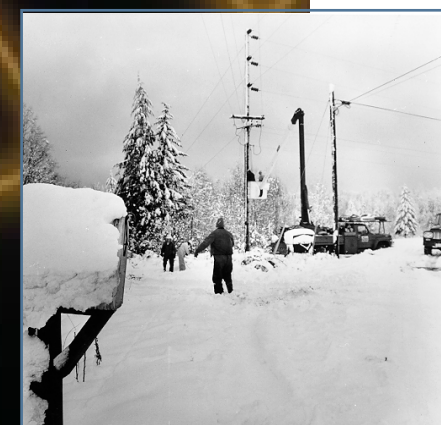


For further information and to access other CCSP information, go to www.climatechange.gov



Human Health and Welfare in a Changing Climate

Summary and Findings of the U.S. Climate Change Science Program



Climate variability and change challenge even the world's most advanced societies. At a very basic level, climate affects the costs of providing comfort in our homes and work places. A favorable climate can provide inputs for a good life: adequate fresh water supplies; products from the ranch, the farm, the forests, the rivers and the coasts; pleasure derived from tourist destinations and from nature, biodiversity, and outdoor recreation.

Climate not only supports the provision of many goods and services, but also affects the spread of some diseases and the prevalence of other health problems. It is also associated with threats from extreme events and natural disasters such as tropical storms, riverine and coastal flooding, wildfires, droughts, wind, hail, ice, heat, and cold.



Climate change will result in regional differences in impacts in the United States not only due to a regional pattern of changes in climate but the regional nature of our communities in adapting to these changes

How Will Climate Change Impact Human Health in the U.S.?

The United States is a highly developed country with a wide range of climates. While there may be fewer cases of illness and death associated with climate change in the United States than in the developing world, we nevertheless anticipate increased costs to human health and well being. Greater wealth and a more developed public health system and infrastructure (e.g., water treatment plants, sewers, and drinking water systems; roads, rails and bridges; flood control structures) will continue to enhance our capacity to respond to climate change. Similarly, governments' capacities for disaster planning and emergency response are key assets that should allow the United States to adapt to many of the health effects associated with climate change

Some Impacts of Climate Change on Health:

It is very likely that heat-related death and illness will increase over the coming decades.

According to the U.S. Census, the U.S. population is ag-

ing; Older adults, very young children, and persons with compromised immune systems are vulnerable to temperature extremes.

This suggests that temperature-related death and illness are likely to increase. Similarly, heat-related death affects poor and minority

populations disproportionately, in part due to lack of air conditioning.

There will likely be an increase in the spread of several food- and water-borne diseases among susceptible populations

The extent of this increase depends on the survival, persistence, habitat range and transmission of agents of disease (e.g. bacteria or viruses) under changing climate and environmental conditions. The primary climate-related factors that affect these agents, or pathogens, include temperature, precipitation, extreme weather events, and shifts in their ecological regimes. However, the impact of climate on food- and water-borne pathogens will seldom be the only factor determining the burden of human injuries, illness, and death.



United States Census Regions	Climate-Related Impacts								
	early snow-melt	Degraded Air quality	Urban Heat Island	Wildfires	Heat Waves	Drought	Tropical Storms	Extreme rainfall with Flooding	Sea Level Rise
New England ME VT NH MA RI CT	●	●	●		●	●		●	●
Middle-Atlantic NY PA NJ	●	●	●		●	●	●	●	●
East North Central WI MI IL IN OH	●	●	●		●	●		●	
West North Central ND MN SD IA NE KS MO	●		●		●	●		●	
South Atlantic WV VA MD NC SC GA FL DC		●	●	●	●	●	●	●	●
East South Central KY TN MS AL					●	●	●		●
West South Central TX OK AR LA		●	●	●	●	●	●	●	●
Mountain MT ID WY NV UT CO AZ NM	●	●	●	●	●	●			
Pacific AK CA WA OR HI	●	●	●	●	●	●	●	●	●



Health effects related to climate change will vary by region.

For the continental United States:

- the northern areas are likely to experience the largest increases in average temperatures; they will also bear the brunt of increases in ground-level ozone and other airborne pollutants.
- Because Midwestern and Northeastern cities are generally not as well adapted to the heat as Southern cities, their populations are likely to be disproportionately affected by heat related illnesses as heat waves increase in frequency, severity, and duration.
- The range of many vectors (eg. insects, rodents) is likely to extend northward and to higher elevations. For some vectors, such as rodents associated with Hantavirus, ranges are likely to expand, as the precipitation patterns under a warmer climate enhance the vegetation that controls the rodent population.
- Forest fires with their associated decrements to air quality and pulmonary effects are likely to increase in frequency, severity, distribution, and duration in the Southeast, the Intermountain West and the West.



How Is Human Welfare Related to Health And What Are The Impacts of Climate Change?

The terms human welfare, quality of life, and well-being are often used interchangeably. There is a shared understanding that all three terms refer to aspects of life

that improve living conditions and reduce chances of injury, stress, and loss.

Human well-being is typically defined and measured as a function of several dimensions:

- 1) economic conditions,
- 2) natural resources and amenities,
- 3) human health,
- 4) public and private infrastructure, including transportation systems,
- 5) government and public safety and
- 6) social and cultural resources.

Climate change is very likely to accentuate the disparities already evident in the American health care system. Many of the expected health effects are likely to fall disproportionately on the poor, the elderly, the disabled, and the uninsured. The most important adaptation to ameliorate health effects from climate change is to support and maintain the United States' public health infrastructure.

Climate change will likely have impacts across all of these dimensions – both positive and negative.

In addition, the positive and negative effects of climate change will affect broader communities, as networks of households, businesses, physical structures, and institutions are located together across space and time.

One of the most significant ways in which social,

economic, and natural systems are likely to experience climate change is through a change in weather and climate extremes. Changes in climate extremes (such as flooding rain events, heatwaves etc), are already observed to be having impacts. And while extremes can have positive or negative effects, on balance, because systems have adapted to their historical range of extremes, the majority of the impacts of events outside this range are expected to be negative.¹ The cost to human welfare in the case of extremes include such examples as increased extreme precipitation leading to local flooding and contamination of water supplies - considered a very likely outcome of global warming nationwide; fewer coldwaves are also expected to occur - conferring some benefits, including reduced snow removal, and at the same time also limiting snow- and cold-based recreation.

