



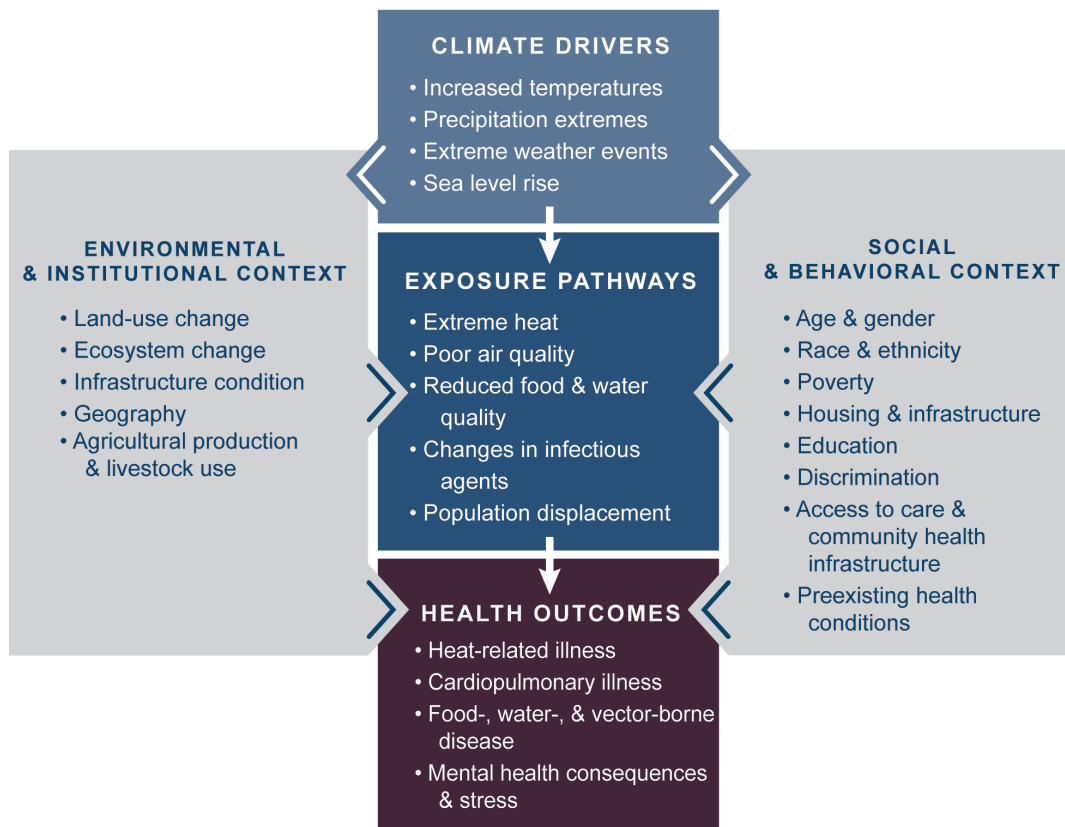
CLIMATE CHANGE AND HUMAN HEALTH

The influences of weather and climate on human health are significant and varied. Exposure to health hazards related to climate change affects different people and different communities to different degrees. While often assessed individually, exposure to multiple climate change threats can occur simultaneously, resulting in compounding or cascading health impacts.

With climate change, the frequency, severity, duration, and location of weather and climate phenomena—like rising temperatures, heavy rains and droughts, and some other kinds of severe weather—are changing. This means that areas already experiencing health-threatening weather and climate phenomena, such as severe heat or hurricanes, are likely to experience worsening impacts, such as higher temperatures and increased storm intensity, rainfall rates, and storm surge.








It also means that some locations will experience new climate-related health threats. For example, areas previously unaffected by toxic algal blooms or waterborne diseases because of cooler water temperatures may face these hazards in the future as increasing water temperatures allow the organisms that cause these health risks to thrive. Even areas that currently experience these health threats may see a shift in the timing of the seasons that pose the greatest risk to human health.

Climate change can therefore affect human health in two main ways: first, by changing the severity or frequency of health problems that are already affected by climate or weather factors; and second, by creating unprecedented or unanticipated health problems or health threats in places where they have not previously occurred.



Conceptual diagram illustrating the exposure pathways by which climate change affects human health. Here, the center boxes list some selected examples of the kinds of changes in climate drivers, exposure, and health outcomes explored in this report. Exposure pathways exist within the context of other factors that positively or negatively influence health outcomes (gray side boxes). Some of the key factors that influence vulnerability for individuals are shown in the right box, and include social determinants of health and behavioral choices. Some key factors that influence vulnerability at larger scales, such as natural and built environments, governance and management, and institutions, are shown in the left box. All of these influencing factors can affect an individual's or a community's vulnerability through changes in exposure, sensitivity, and adaptive capacity and may also be affected by climate change.

Examples of Climate Impacts on Human Health

	Climate Driver	Exposure	Health Outcome	Impact
 Extreme Heat	More frequent, severe, prolonged heat events	Elevated temperatures	Heat-related death and illness	Rising temperatures will lead to an increase in heat-related deaths and illnesses.
 Outdoor Air Quality	Increasing temperatures and changing precipitation patterns	Worsened air quality (ozone, particulate matter, and higher pollen counts)	Premature death, acute and chronic cardiovascular and respiratory illnesses	Rising temperatures and wildfires and decreasing precipitation will lead to increases in ozone and particulate matter, elevating the risks of cardiovascular and respiratory illnesses and death.
 Flooding	Rising sea level and more frequent or intense extreme precipitation, hurricanes, and storm surge events	Contaminated water, debris, and disruptions to essential infrastructure	Drowning, injuries, mental health consequences, gastrointestinal and other illness	Increased coastal and inland flooding exposes populations to a range of negative health impacts before, during, and after events.
 Vector-Borne Infection (Lyme Disease)	Changes in temperature extremes and seasonal weather patterns	Earlier and geographically expanded tick activity	Lyme disease	Ticks will show earlier seasonal activity and a generally northward range expansion, increasing risk of human exposure to Lyme disease-causing bacteria.
 Water-Related Infection (<i>Vibrio vulnificus</i>)	Rising sea surface temperature, changes in precipitation and runoff affecting coastal salinity	Recreational water or shellfish contaminated with <i>Vibrio vulnificus</i>	<i>Vibrio vulnificus</i> induced diarrhea & intestinal illness, wound and bloodstream infections, death	Increases in water temperatures will alter timing and location of <i>Vibrio vulnificus</i> growth, increasing exposure and risk of water-borne illness.
 Food-Related Infection (<i>Salmonella</i>)	Increases in temperature, humidity, and season length	Increased growth of pathogens, seasonal shifts in incidence of <i>Salmonella</i> exposure	<i>Salmonella</i> infection, gastrointestinal outbreaks	Rising temperatures increase <i>Salmonella</i> prevalence in food; longer seasons and warming winters increase risk of exposure and infection.
 Mental Health and Well-Being	Climate change impacts, especially extreme weather	Level of exposure to traumatic events, like disasters	Distress, grief, behavioral health disorders, social impacts, resilience	Changes in exposure to climate- or weather-related disasters cause or exacerbate stress and mental health consequences, with greater risk for certain populations.

The diagram shows specific examples of how climate change can affect human health, now and in the future. These effects could occur at local, regional, or national scales. The examples listed in the first column are those described in each underlying chapter's exposure pathway diagram. Moving from left to right along one health impact row, the three middle columns show how climate drivers affect an individual's or a community's exposure to a health threat and the resulting change in health outcome. The overall climate impact is summarized in the final gray column. For a more comprehensive look at how climate change affects health, and to see the environmental, institutional, social, and behavioral factors that play an interactive role in determining health outcomes, see the exposure pathway diagrams in chapters 2–8 in the full report.

