CLIMATE AND HEALTH
USGCRP CLIMATE AND HEALTH ASSESSMENT

THE IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH IN THE UNITED STATES
A Scientific Assessment

U.S. Global Change Research Program
CLIMATE CHANGE IS ONE OF MANY DETERMINANTS OF HEALTH
VULNERABILITY OF HEALTH TO CLIMATE CHANGE

**EXPOSURE**
Exposure is contact between a person and one or more biological, psychosocial, chemical, or physical stressors, including stressors affected by climate change.

**SENSITIVITY**
Sensitivity is the degree to which people or communities are affected, either adversely or beneficially, by climate variability or change.

**ADAPTIVE CAPACITY**
Adaptive capacity is the ability of communities, institutions, or people to adjust to potential hazards, to take advantage of opportunities, or to respond to consequences.

**VULNERABILITY of Human Health to Climate Change**

**HEALTH IMPACTS**
Injury, acute and chronic illness (including mental health and stress-related illness), developmental issues, and death
CLIMATE CHANGE AND HEALTH

1. Temperature-related death and illness
2. Air quality impacts
3. Impacts of extreme events on health
4. Temperature-related death and illness
5. Climate impacts on water-related illness
6. Food safety, nutrition, and distribution
7. Mental health and well-being
TEMPERATURE-RELATED DEATH AND ILLNESS

Projected Changes in Deaths in U.S. Cities by Season

GFDL-CM3

MIROC5

Change in Deaths

Heat
Cold
Net Change

Year
2030  2050  2100  2030  2050  2100

Change in Deaths

-20,000
-10,000
0
10,000
20,000
30,000
AIR QUALITY IMPACTS

Projected Change in Temperature, Ozone, and Ozone-Related Premature Deaths in 2030

- Change in Average Daily Maximum Temperature
- Change in Daily 8-hr Maximum Ozone
- Excess Ozone-Related Deaths

Change in Temperature (°F)
- Decreases
- Increases

Climate-Atributable Change in Summer Season Daily 8-hr Maximum Ozone (ppb)
- Decreases
- Increases

Climate-Atributable Change in Ozone-Related Premature Deaths by County
- Decreases
- Increases

Maps show projected changes across different regions of the United States for temperature, ozone levels, and excess deaths.
IMPACTS OF EXTREME EVENTS ON HEALTH
VECTOR-BORNE DISEASES
FOOD SAFETY, NUTRITION, AND DISTRIBUTION

Farm to Table
The Potential Interactions of Rising CO₂ and Climate Change on Food Safety

- Temperature and precipitation extremes (like flooding) can increase pathogen load.
- Rising carbon dioxide can directly influence nutritional content of foods.
- Climate can also alter weed, insect, and fungal populations and increase pesticide use.
- Warmer temperatures can result in greater food spoilage.
- Extreme climate events can disrupt food distribution.
MENTAL HEALTH AND WELL-BEING

The Impact of Climate Change on Physical, Mental, and Community Health

**Medical and Physical Health**
- Changes in fitness and activity level
- Heat-related illness
- Allergies
- Increased exposure to waterborne and vector-borne illness

**Mental Health**
- Stress, anxiety, depression, grief, sense of loss
- Strains on social relationships
- Substance abuse
- Post-traumatic stress disorder

**Community Health**
- Increased interpersonal aggression
- Increased violence and crime
- Increased social instability
- Decreased community cohesion
CAMBRIDGE’S CLIMATE CHANGE VULNERABILITY ASSESSMENT

Step I: Climate Scenarios
Step II: Vulnerability and Risk Assessment
Step III: Preparedness Plan
EXTREME HEAT

Number of Summer Days Above 90°F

Low Scenario
High Scenario

Number of Days
0 10 20 30 40 50 60 70 80 90

Short Term: 2015 Medium Term: 2030 Long Term: 2070
PRECIPITATION-DRIVEN FLOODING

![Bar chart showing precipitation projections for different time periods and storm intensities.](chart_image)
<table>
<thead>
<tr>
<th>Policy Approach</th>
<th>Description</th>
<th>Public Health Benefits</th>
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<tr>
<td>Information Provision</td>
<td>Aimed at public outreach to share information on how to remain safe during a climate emergency. Potential activities include public awareness campaigns on the link between climate change and health or a mobile alert system during emergencies.</td>
<td>Discourages community members from engaging in hazardous activities, preventing unnecessary injuries.</td>
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<td>Notifies community members with chronic illnesses of health advisories during extreme climate events</td>
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<td>Provides information on protecting health during extreme heat and flooding</td>
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<td>Emergency Preparedness</td>
<td>Focused on improving response time and services to help people in need during climate-related emergencies. Activities include evacuation drills, organizing emergency medical response teams, and emergency responder trainings for current public health staff, first responders, and neighborhood residents.</td>
<td>Reduces length of time for emergency response by health care providers, reducing the number of deaths.</td>
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<td>Helps first responders identify climate-related health risks and know how to respond effectively.</td>
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<td>Trains residents on how to assist their neighbors and communicate urgent medical needs to first responders, insuring that those in most need are helped first.</td>
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<td>Resource Allocation</td>
<td>Ensures that city officials have the funding and capacity to address short-term emergencies and long-term public health impacts of climate change. Activities include hiring consultant and program coordinators, and supporting climate adaptation programs.</td>
<td>Provides ongoing research into viable policy solutions for climate-related illnesses</td>
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<td>Facilitates coordination between various city agencies to implement policies that prevent climate-related illness, providing wide-scale health benefits.</td>
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<td>Creates long-term strategy for city to manage public health issues of climate change.</td>
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<td>Rules and Regulations</td>
<td>Enforces and adds legislation and regulations to ensure the safety of city infrastructure during extreme weather events. Includes changes to building codes and zoning laws. Places requirements on private property.</td>
<td>Reduces risk of personal injury within the home or workplace during flooding.</td>
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<td>Cool design and green infrastructure reduces heat index within and surrounding buildings, limiting heat stroke and dehydration.</td>
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<td>Reduces risk of water damage to buildings and improves indoor air quality, reducing risk of worsening respiratory illnesses</td>
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