



THE IMPACTS OF CLIMATE CHANGE ON

HUMAN HEALTH

IN THE UNITED STATES:
A SCIENTIFIC ASSESSMENT

Allison Crimmins

U.S. Environmental Protection Agency

PNW Tribal Climate Change Call– 08/17/2016



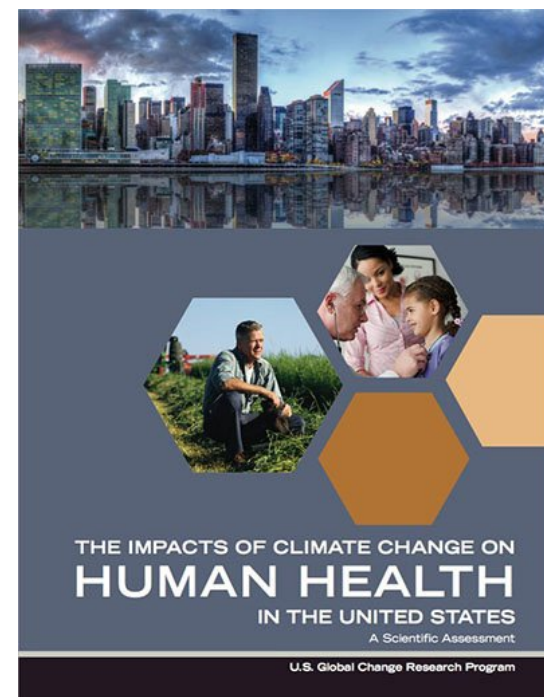
U.S. Global Change
Research Program

Health2016.globalchange.gov

Process and People

What was the process for development?


- Driven by the USGCRP Interagency Crosscutting Group on Climate Change and Human Health (CCHHG)
- Coordinated by the EPA
- Written by a team of ~100 Federal employees, contractors, and grantees from eight U.S. Federal agencies: HHS (NIH, CDC, NIOSH, ASPR, FDA, SAMHSA), NOAA, EPA, USDA, NASA, USGS, DOD (USUHS), VA
- Extensively reviewed by the public and experts, including a committee of the National Academies of Sciences and the 13 Federal agencies of the USGCRP; draws from a large body of scientific peer-reviewed research

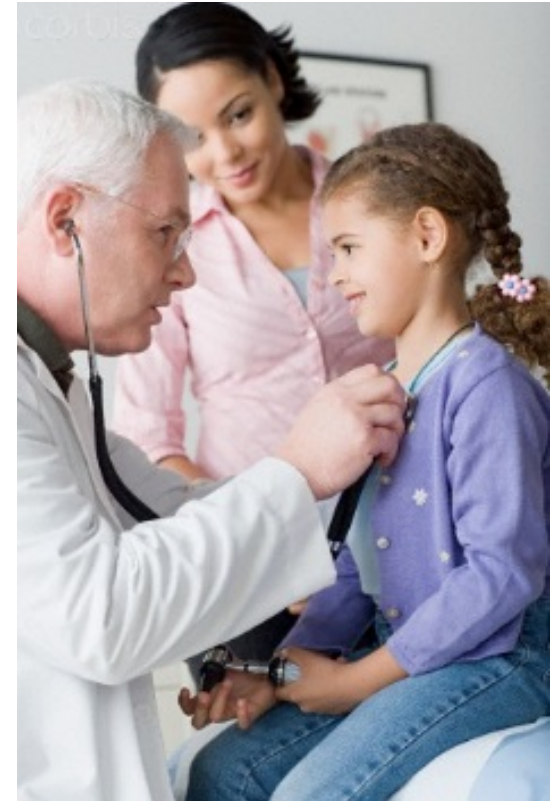


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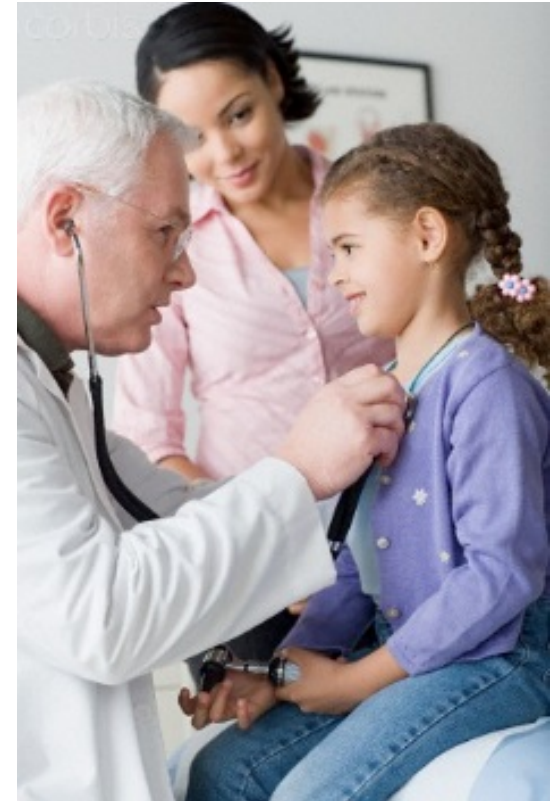
Top Line Messages of the Report

- 
- Climate change is a significant threat to the health of the American people.
 - This assessment significantly advances what we know about the impacts of climate change on public health, and the confidence with which we know it.
 - Climate change exacerbates some existing health threats and creates new public health challenges.
 - Every American is vulnerable to the health impacts associated with climate change.



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Scope of the Climate and Health Assessment



TABLE OF CONTENTS

CHAPTERS

Executive Summary	1
1. Introduction: Climate Change and Human Health	25
2. Temperature-Related Death and Illness	43
3. Air Quality Impacts	69
4. Impacts of Extreme Events on Human Health	99
5. Vector-Borne Diseases	129
6. Climate Impacts on Water-Related Illness	157
7. Food Safety, Nutrition, and Distribution	189
8. Mental Health and Well-Being	217
9. Populations of Concern	247

Scientific Advancements

1. Improved quantification of projected illnesses or deaths
2. Better described the connections between climate impacts on exposure and risk
3. Highlight some well-studied but not well-known impacts



Chapter 2: Temperature- Related Death and Illness

Key Finding 1: Future Increases in Temperature-Related Deaths

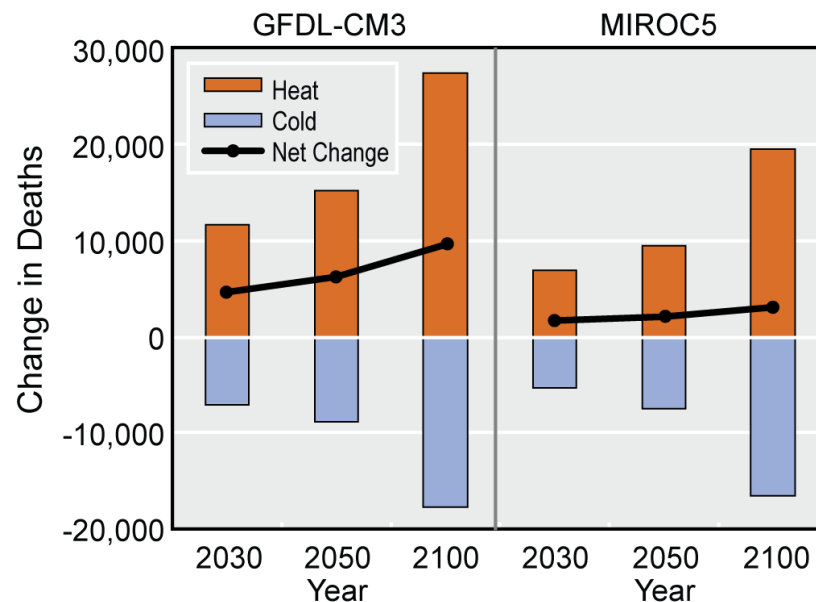
Based on present-day sensitivity to heat, an increase of thousands to tens of thousands of premature heat-related deaths in the summer are projected each year as a result of climate change by the end of the century.

KF2: Even Small Differences from Seasonal Average Temperatures Result in Illness and Death

KF3: Changing Tolerance to Extreme Heat

KF4: Some Populations at Greater Risk

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



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TABLE OF CONTENTS

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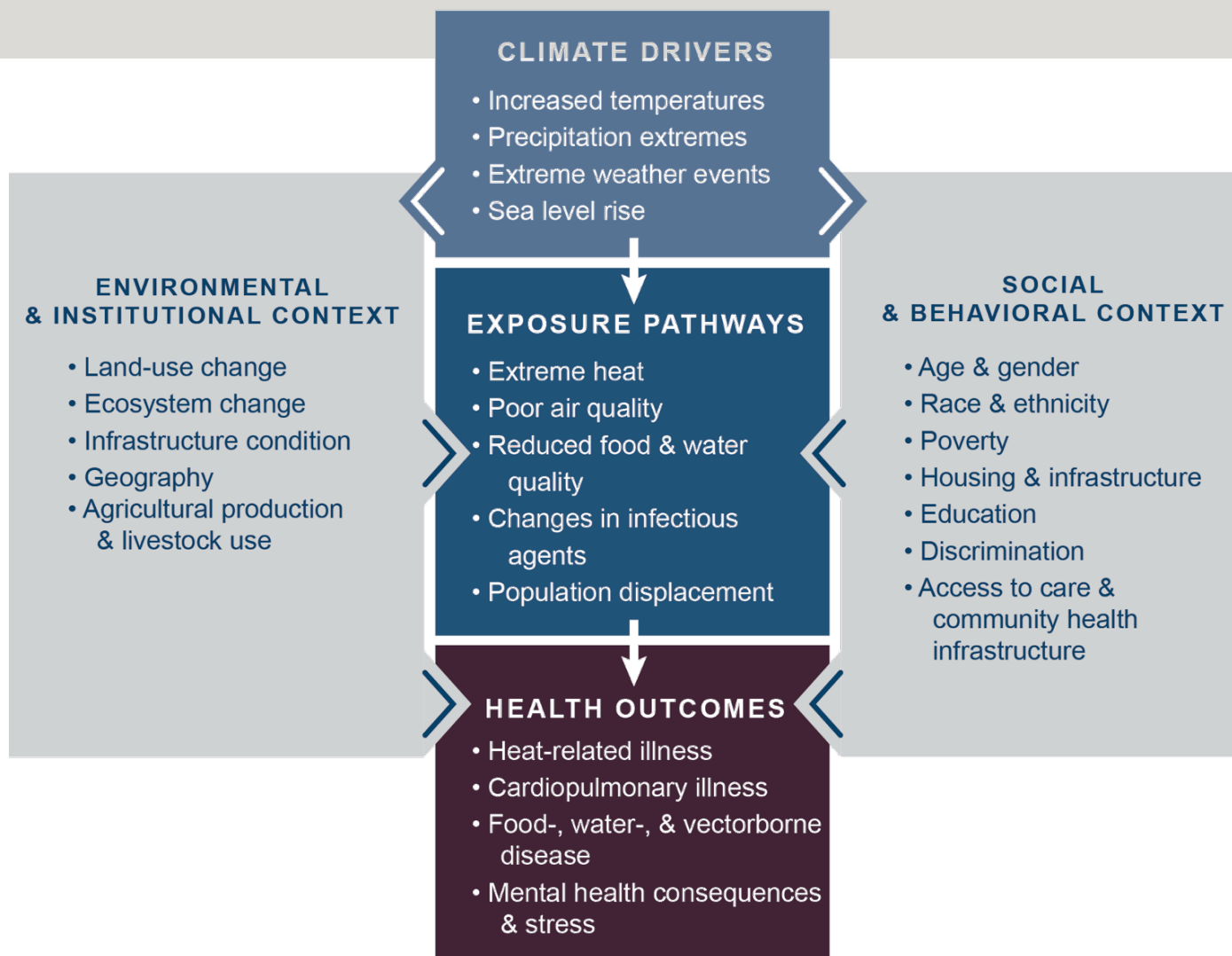
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Climate and Health Exposure Pathways



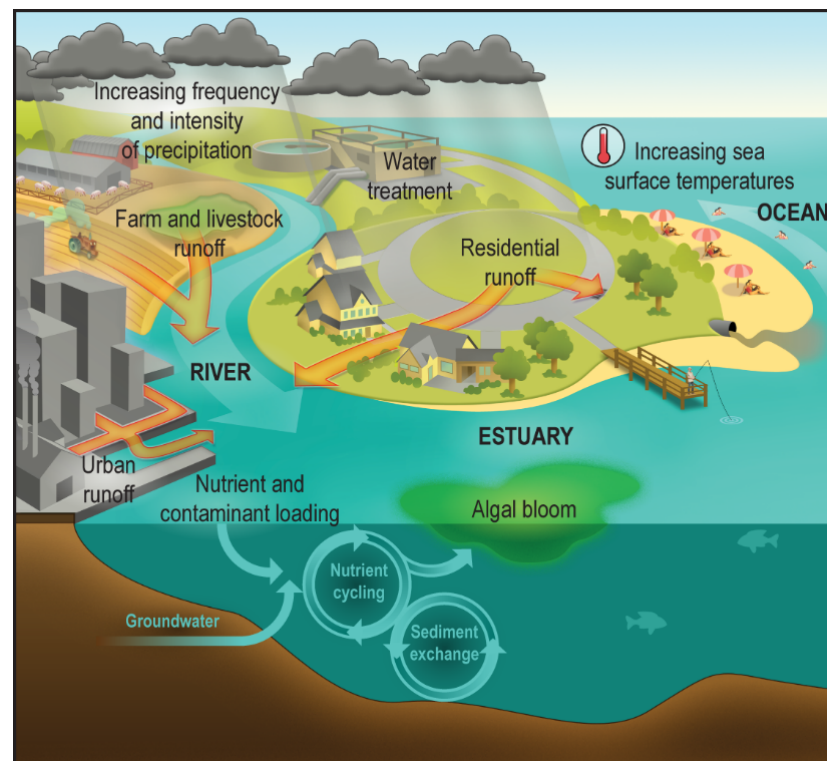
Chapter 6: Water-Related Illnesses

Key Finding 1: Seasonal and Geographic Changes in Waterborne Illness Risk

*Increases in water temperatures associated with climate change will change the seasonal windows of growth and the habitat range for freshwater and marine toxin-producing algae as well as certain naturally occurring *Vibrio* bacteria. These changes will increase the risk of exposure to waterborne pathogens and toxins that can cause a variety of illnesses.*

KF2: Runoff from Extreme Precipitation Increases Exposure Risk

KF3: Water Infrastructure Failure



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Chapter 7: Food Safety, Nutrition, and Distribution

KF1: Increased Risk of Foodborne Illness

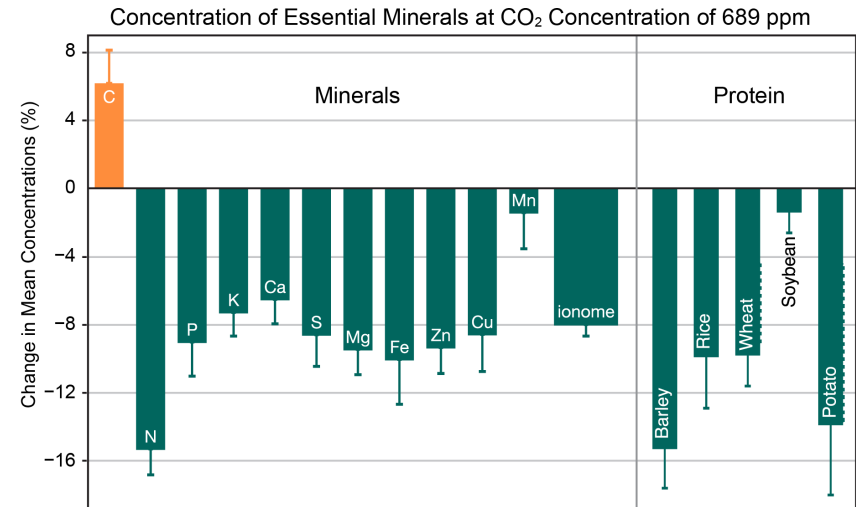
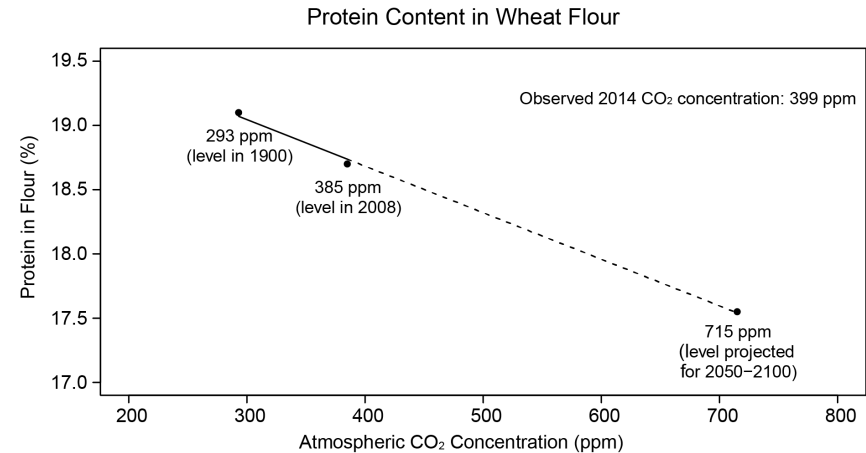
KF2: Chemical Contaminants in the Food Chain

Key Finding 3: Rising Carbon Dioxide Lowers Nutritional Value of Food

The nutritional value of agriculturally important food crops, such as wheat and rice, will decrease as rising levels of atmospheric carbon dioxide continue to reduce the concentrations of protein and essential minerals in most plant species.

KF4: Extreme Weather Limits Access to Safe Foods

Effects of Carbon Dioxide on Protein and Minerals



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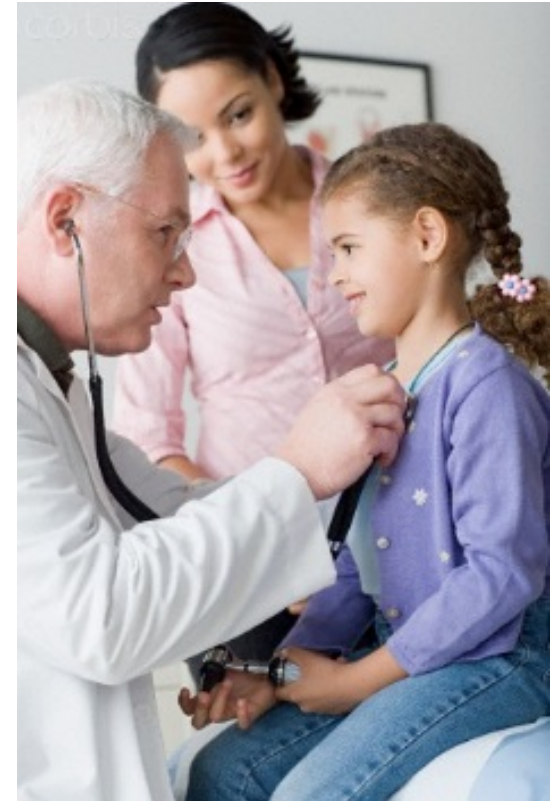
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“Climate and health impacts do not occur in isolation, and an individual or community could face multiple threats at the same time, at different stages in one’s life, or accumulating over the course of one’s life.”



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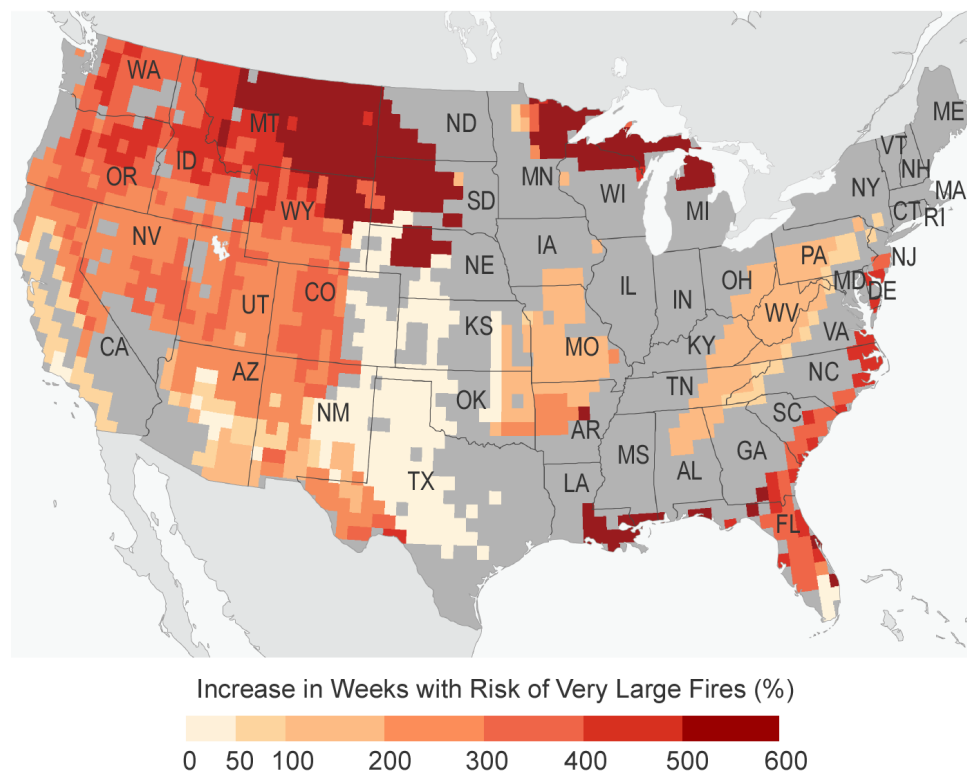


Examples of where climate change **exacerbates** existing health threats

Climate change is projected to increase the frequency and intensity of large wildfires, with associated health risks projected to increase in many regions

- Exposure to smoke (carbon monoxide, ozone, toxic chemicals, fine and coarse particulate matter)
 - Acute and exacerbated respiratory problems, such as shortness of breath, asthma, and COPD
 - Risk of cardiovascular disease and premature death
 - Low infant birth weight
- Motor vehicle deaths and injuries
- Burns and injuries to first responders
- Post-traumatic stress disorder (PTSD), depression, and general anxiety

Projected Increase in Risk of Very Large Fires by Mid-Century

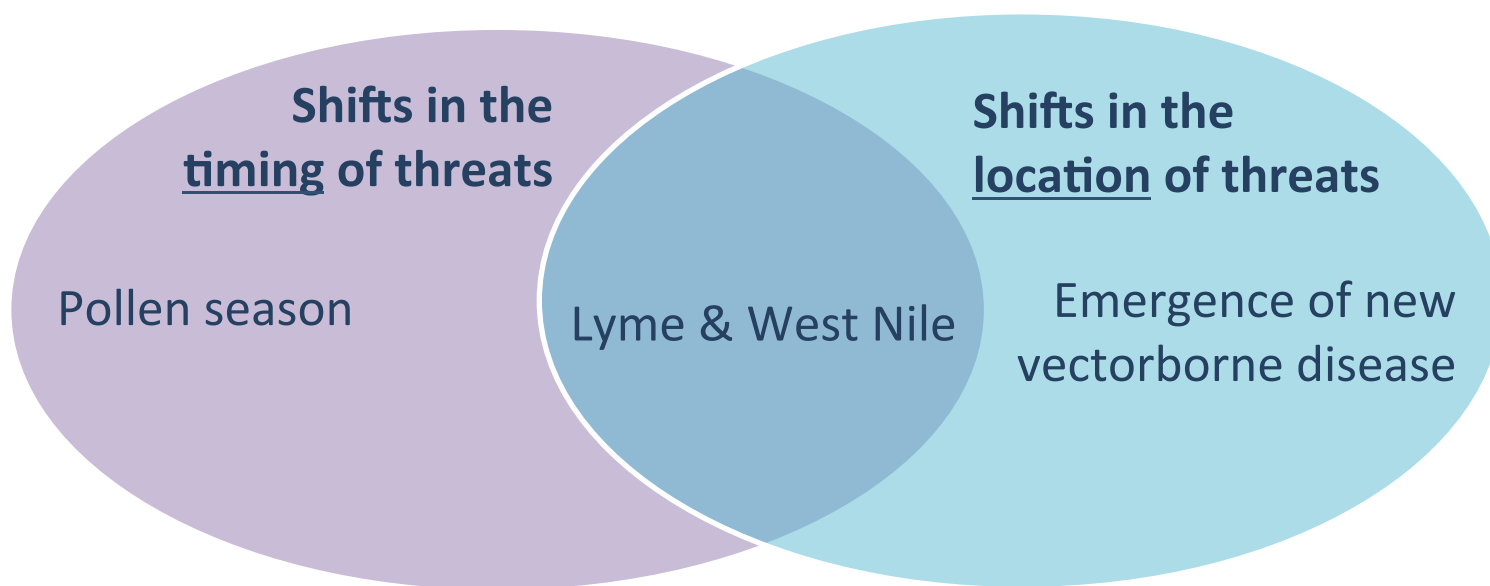


Projected percentage increases in weeks with risk of very large fires by mid-century (2041-2070) compared to the recent past (1971-2000)



Examples of where climate change creates **new** public health challenges

Climate change creates “unprecedented or unanticipated health problems or health threats in places where they have not previously occurred... Some of these health threats will occur over longer time periods, or at unprecedented times of the year; some people will be exposed to threats not previously experienced in their locations.”



Examples of where climate change creates **new** public health challenges

Shifts in the timing of threats

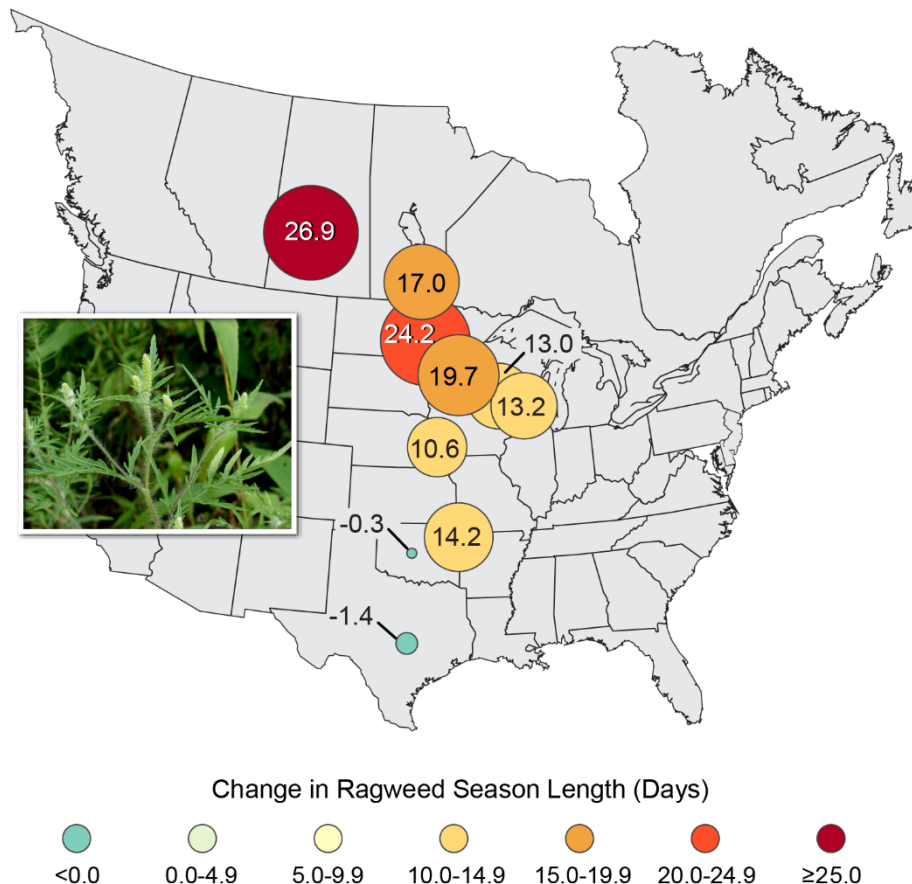
Between 1995 and 2011, the duration of the ragweed pollen season length has increased by as much as 11 to 27 days

Increases in temperature and CO₂ result in earlier flowering, but also greater floral numbers, greater pollen production, and increased allergenicity

Aeroallergen exposure contributes to:

- Asthma episodes
- Allergic rhinitis, sinusitis, conjunctivitis
- Urticaria (hives)
- Atopic dermatitis or eczema
- Anaphylaxis

Ragweed Pollen Season Lengthens

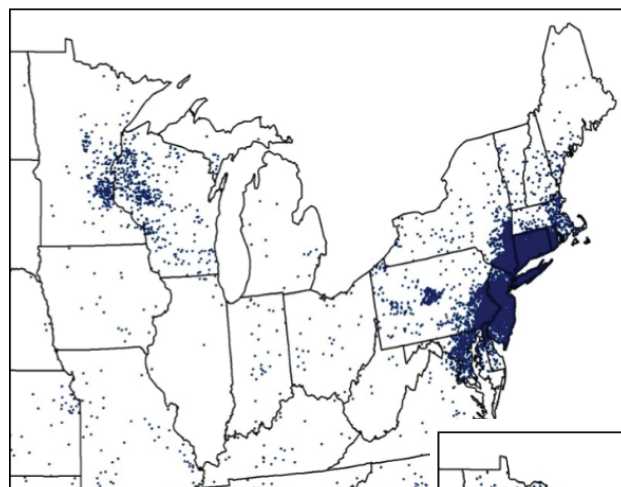


Examples of where climate change creates **new** public health challenges

Shifts in the location of threats

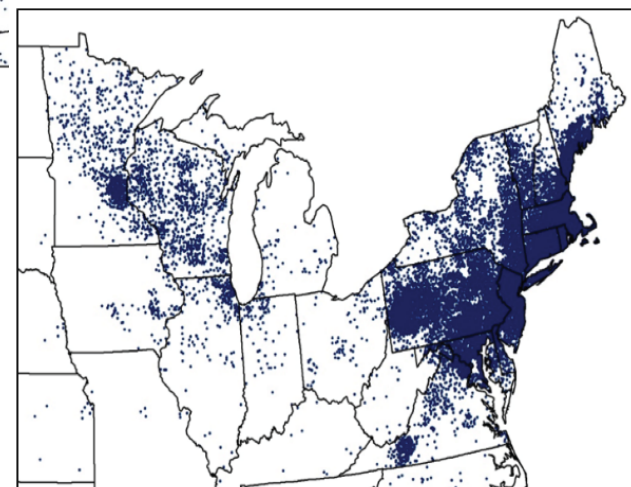
Weather-related variables can determine geographic distributions of ticks

- Low minimum temperatures can limit tick population survival
- Declines in rainfall and humidity can also limit geographic distribution of blacklegged ticks



2001

Changes in Lyme Disease Case Report Distribution




2014

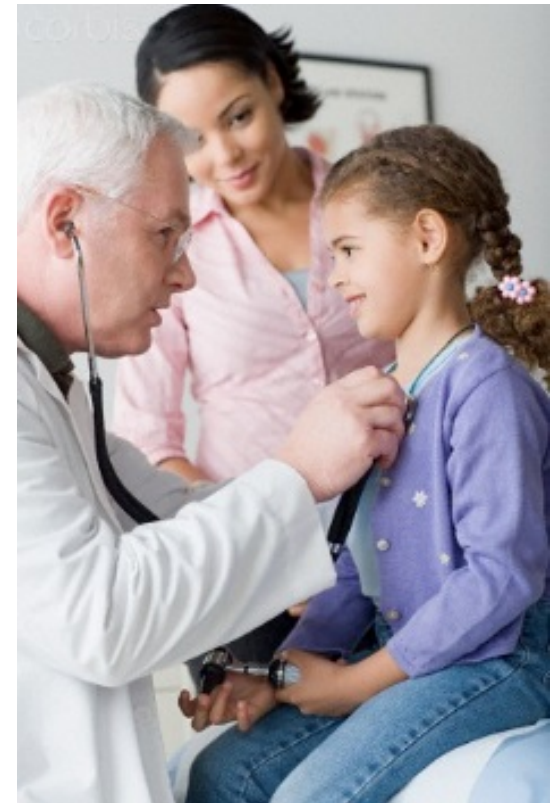
Shifts in the timing of threats

The onset of the Lyme disease season is projected to arrive a few days earlier by mid-century and approximately 1-2 weeks earlier by the end of the century



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Populations of Concern

Children and pregnant women

Older adults/elderly

Communities of Color, Low Income, Immigrants, and Limited English Proficiency Groups

Indigenous peoples

Occupational groups

People with disabilities

People with pre-existing medical conditions



What Makes Us Vulnerable?

EXPOSURE



Low-income populations may be exposed to climate change threats because of socioeconomic factors. For example, people who cannot afford air conditioning are more likely to suffer from unsafe indoor air temperatures.

SENSITIVITY



Pregnant women are sensitive to health risks from extreme weather such as hurricanes and floods. These events can affect their mental health and the health of their unborn babies by contributing to low birthweight or preterm birth.

ABILITY TO ADAPT



Older adults may have limited ability to cope with extreme weather if, for example, they have difficulty accessing cooling centers or other support services during a heat wave. Heat-related deaths are most commonly reported among adults aged 65 and over.

Social determinants of health, such as those related to socioeconomic factors and health disparities, may amplify or otherwise influence climate-related health effects



Resources: health2016.globalchange.gov

Quick links to downloads and chapters ↘

GlobalChange.gov
U.S. Global Change Research Program

Climate and Health Assessment

HOME DOWNLOADS MENU

The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment

Climate change is a significant threat to the health of the American people. This scientific assessment examines how climate change is already affecting human health and the changes that may occur in the future.

VIEW SUMMARY



Resources: health2016.globalchange.gov

Download page has report,
chapters, citations, figures,
PowerPoint presentations,
and 2-pg summaries

Download page has report, chapters, citations, figures, PowerPoint presentations, and 2-pg summaries

10MB

25MB

The PDF is the official version of the Climate and Health Assessment.

	Screen	Print	Citation	Figures	Presentation	Brochure
Climate and Health Assessment	39MB	98MB	738B	-	-	-
Front Matter	3MB	7MB	-	-	-	-
Executive Summary	9MB	9MB	682B	2MB	4MB	-
Ch. 1. Climate Change and Human Health	3MB	7MB	546B	1MB	3MB	600KB
Ch. 2. Temperature-Related Death and Illness	2MB	4MB	572B	614KB	2MB	2MB

Spanish translated Executive Summary also available

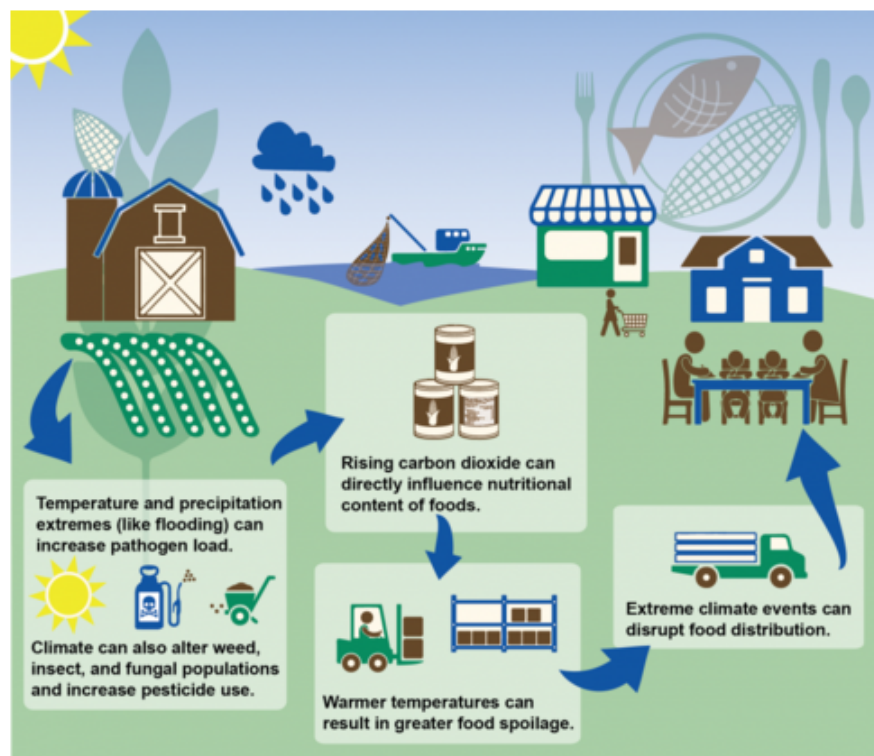
Spanish
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Executive
Summary also
/ available

Resources: health2016.globalchange.gov

Figure 7.1: Farm to Table: The Potential Interactions of Rising CO₂ and Climate Change on Food Safety and Nutrition



Icons let you download figures, view metadata, and share through social media




EPA Resources

www.epa.gov/climatechange/impacts/

Climate Change En Español [Contact Us](#) [Share](#)

You are here: EPA Home » Climate Change » Impacts


Climate Change Impacts



The changing climate impacts society and ecosystems in a broad variety of ways. For example climate change can increase or decrease rainfall, influence agricultural crop yields, affect human health, cause changes to forests and other ecosystems, or even impact our energy supply. Climate-related impacts are occurring across regions of the country and across many sectors of our economy.

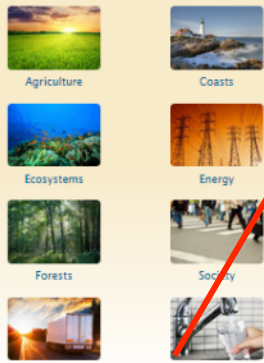
Explore the impacts of climate change by region or by sector.

Impacts by Region




Alaska | Islands | Northeast | Northwest | Southeast | Southwest | Midwest | Great Plains | International

Impacts by Sector



Agriculture | Coasts | Ecosystems | Energy | Forests | Society | Transportation | Water Resources

Related Links



Preparing for Change - Adaptation Resources | National Climate Assessment | USCRP Climate and Health Assessment

Human Health Impacts

Learn about the health impacts of climate change

Quiz: How much do you know about the Health Impacts of Climate Change?

Factsheets: Climate Change, Health, and Populations of Concern

How Will Climate Change Affect My Health? (PDF, 1 pp, 1 MB) (Text version (PDF, 2 pp, 551 KB))

or search for: “EPA climate impacts health”

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EPA Resources

10- question online quiz with social media sharing options

Quiz: How Much Do You Know About the Health Impacts of Climate Change?

Understanding the threats that climate change pose to human health can help us work together to lower risks and be prepared. Take this quiz to see how much you know about the health impacts of climate change.

4

Which illness does NOT increase in frequency along with higher temperatures?


☐ A. Dehydration

☐ B. Arthritis

☐ C. Kidney stones

☐ D. Legionnaires' disease

SUBMIT



Source: Impacts of Climate Change on Human Health in the United States: A Scientific Assessment

4/10

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<https://www.epa.gov/climatechange/impacts/health-assessment-quiz.html>

EPA Resources

A **clickable map** with examples of state impacts and resources to prepare and respond to climate threats

EPA United States Environmental Protection Agency

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Advanced Search A-Z Index

Climate Change

You are here: EPA Home > Climate Change > Impacts > Climate Change and Human Health Risks in Your State

Climate Change and Human Health Risks in Your State

Climate change poses risks to human health. Already in the United States, we are seeing rising temperatures, increased frequency and intensity of some types of extreme weather, sea level rise, and other changes in weather and climate patterns.

We are all vulnerable to the health impacts associated with climate change. However, these climate and health risks vary across the country. Click on the map below or use the drop-down menu to learn about examples of climate-related health risks in your state and actions you can take to reduce these risks. Find additional resources for your area below the map.

Select a state:

Alaska
U.S. Islands
Southwest
Southeast
Northeast
Northwest
Midwest
Great Plains
International
Human Health
Ecosystems
Forests
Transportation
Energy
Coasts
Agriculture and Food
Society
Water Resources
Adaptation
What EPA is Doing
What You Can Do
Newsroom
Glossary
Students' Site

Indiana

District of Columbia

Puerto Rico
Virgin Islands

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<https://www.epa.gov/climatechange/impacts/health-assessment.html>

EPA Resources

Eight factsheets covering issues related to populations especially vulnerable to the health impacts of climate change



1. Indigenous/tribal
2. Environmental justice (e.g., low income, minority, immigrants)
3. Occupational groups
4. Older adults/elderly
5. Children
6. Pregnant women
7. People with disabilities
8. People with pre-existing medical conditions

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EPA Resources

Graphic on how climate change can affect your health at different stages of your life



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Allison Crimmins

crimmins.allison@epa.gov

Lesley Jantarasami

jantarasami.Lesley@epa.gov

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