Climate Extremes and Your Health

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Major U.S. Climate Trends

Rising Temperatures
U.S. average temperature has increased by 1.3°F to 1.9°F since record keeping began in 1895. Warming has been the greatest in North and West while some parts of the Southeast have experienced little change.

Wildfires
Wildfires in the West start earlier in the spring, last later into the fall, and burn more acreage.

Heat Waves
Heat waves have become more frequent and intense, especially in the West.

Drought
Drought has increased in the West. Over the last decade, the Southwest has experienced the most persistent droughts on record.

Cold Waves and Winter Storms
Cold waves have become less frequent and intense across the Nation. Winter storms have increased in frequency and intensity since the 1950s and their tracks have shifted northward.

Extreme Precipitation
Heavy downpours are increasing nationally, especially over the last three to five decades. The largest increases are in the Midwest and Northeast.

Floods
Floods have been increasing in parts of the Midwest and Northeast.

Hurricanes
The intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest (category 4 and 5) hurricanes, have all increased since the early 1980s.

Sea Level
Sea levels along the Mid-Atlantic and parts of the Gulf Coast have risen by about 8 inches over the last half century.
Projected Changes in the
Hottest/Coldest and Wettest/Driest Day of the Year

Coldest Night of Year

Hottest Day of Year

Temperature Change (°F)

Temperature Change (°F)

Wettest Day of Year

Annual Longest Dry Spell

Precipitation Change (%)

Change in Number of Days
Billion-Dollar Disasters are Increasing
Total Cost = $306 Billion; Deaths = 3,278
Percentage of disaster-deaths worldwide according to each category of climate-related hazard, (1900-2013)
Drought Impacts

Estimated Deaths and Billion Dollar Losses from Extreme Events in the U.S., 2004–2013

Billion Dollar Losses from Disasters (2004-2013)

- $392 Billion Hurricanes
- $78 Billion Heat Waves/Droughts
- $46 Billion Tornadoes/Severe Storms
- $30 Billion Flooding/Severe Storms
Climate is Affecting Your Health

- **Direct**
  - Affecting Health Directly
    - Extreme Heat
    - Air Pollution
    - Extreme Weather

- **Indirect**
  - Spreading Disease
    - Diseases Spread by Insects, Ticks, and Rodents
    - Contaminated Water
    - Contaminated Food
  - Destroying & Disrupting Food Supplies
    - Hunger and Malnutrition
  - Disrupting Well-Being
    - Mental Health Problems
    - Conflict and Displacement
Climate Change and Health
THE IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH IN THE UNITED STATES
A Scientific Assessment

U.S. Global Change Research Program

IMPACTS OF EXTREME EVENTS ON HUMAN HEALTH

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Executive Summary

Climate change is a significant threat to the health of the American people.

Climate change threatens human health and well-being in the United States. The U.S. Global Change Research Program (USGCRP) Climate and Health Assessment has been developed to enhance understanding and inform decisions about this growing threat. This scientific assessment, called for under the President’s Climate Action Plan, is a major report of the sustained National Climate Assessment (NCA) process. The report responds to the 1990 Congressional mandate to assist the Nation in understanding, assessing, predicting, and responding to human-induced and natural processes of global change. The agencies of the USGCRP identified human health impacts as a high-priority topic for scientific assessment.

The purpose of this assessment is to provide a comprehensive, evidence-based, and, where possible, quantitative estimation of observed and projected climate change related health impacts in the United States. The USGCRP Climate and Health Assessment has been developed to inform public health officials, urban and disaster response planners, decision makers, and other stakeholders within and outside of government who are interested in better understanding the risks climate change presents to human health.
Figure from CDC’s Climate and Health Program
Climate Change and Health

CLIMATE DRIVERS
- Increased temperatures
- Precipitation extremes
- Extreme weather events
- Sea level rise

ENVIRONMENTAL & INSTITUTIONAL CONTEXT
- Land-use change
- Ecosystem change
- Infrastructure condition
- Geography
- Agricultural production & livestock use

EXPOSURE PATHWAYS
- Extreme heat
- Poor air quality
- Reduced food & water quality
- Changes in infectious agents
- Population displacement

SOCIAL & BEHAVIORAL CONTEXT
- Age & gender
- Race & ethnicity
- Poverty
- Housing & infrastructure
- Education
- Discrimination
- Access to care & community health infrastructure
- Preexisting health conditions

HEALTH OUTCOMES
- Heat-related illness
- Cardiopulmonary illness
- Food-, water-, & vector-borne disease
- Mental health consequences & stress
1980-2018* NOAA Billion-Dollar Drought Disasters (CPI-Adjusted)

25 Events
$241 Billion Lost
2,993 Deaths

Local

Kansas farmer on alarming suicide rate: 'Nothing gets farmers more down than a drought'

By: Emily Younger  
Posted: May 21, 2016 09:14 PM CDT  
Updated: May 21, 2016 11:14 PM CDT

Farmer’s recovery from depression which led to two suicide attempts shows cost of drought at family level

STEVE Germon left a suicide note on the porch and set about putting down calves he couldn’t feed before turning the gun on himself. Then a ute screamed towards him, his 17-year-old daughter at the wheel.

JACK MORPHET

DAIRY farmer Steve Germon knows what it’s like to be on the brink of suicide. He has been there twice in the past three years.

...
Causal Process Diagram

Valley Fever

Relating Coccioidiomycosis (Valley Fever) Incidence to Soil Moisture Conditions

Abstract
Coccioidiomycosis, also called Valley Fever, is caused by a soil-dwelling fungus, Coccioides spp., and regions of the southwestern United States. Though some who develop infections from this fungus remain asymptomatic, others develop respiratory disease as a consequence. Less commonly, severe illness and death can occur when the infection spreads to other regions of the body. Previous analyses have attempted to connect the incidence of coccioidiomycosis to broadly available climatic measurements, such as precipitation or temperature. However, with the limited availability of long-term, in-situ soil moisture datasets, it has not been feasible to perform a direct analysis of the relationship between soil moisture levels and coccioidiomycosis incidence on a larger temporal and spatial scale. Utilizing in-situ soil moisture gauges throughout the southwestern United States, the authors find a strong and statistically significant relationship between soil moisture and coccioidiomycosis cases. Specifically, the work connects periods of higher and lower soil moisture in Arizona and California between 2002 and 2014 to the reported incidence of coccioidiomycosis. The results indicate that in both states, coccioidiomycosis incidence is related to soil moisture levels from previous summers and falls. Stated differently, a higher number of coccioidiomycosis cases are likely to be reported if previousrends of months have been abnormally wet or dry, depending on the location. This article is protected by copyright. All rights reserved.
NATIONAL DROUGHT & PUBLIC HEALTH SUMMIT
June 17-19, 2019 | Atlanta, GA

Thank you to our Summit Planning Partners:
Centers for Disease Control and Prevention (CDC)
National Integrated Heat Health Information System (NIHHIS)
Environmental Protection Agency (EPA)
Natural Resources Defense Council (NRDC)
UNL National Drought Mitigation Center (NDMC)
• Climate Change is a Significant Health Threat
• All people are vulnerable… some more than others
• Costs are Increasing
• Multiple relationships between climate and health
• Lots to be gained by combining expertise
• Multiple opportunities to address this issue
Email: jesse.bell@unmc.edu
Twitter: @JesseEugeneBell
Future Needs:

- Still much to be learned about drought and public health
  - What do public health departments need?
  - Who else should be at the table?
- Research is needed in many different areas:
  - Analysis of surveillance data
  - Improved environmental monitoring
  - Role of public health departments
  - Economic impact of drought on public health
  - Lessons learned and best practices
Drought and Public Health in the U.S.

Why drought matters

When droughts affect a community, it can have devastating consequences, including decreased food and water availability, decreased water quality, and increased risk of illness and injury.

Droughts can be classified as:
- Droughts of record
- Severe droughts
- Exceptional droughts

Impact on health

Plants, animals, and the environment impact public health. During drought:
- Water and food sources may be contaminated with bacteria, viruses, and parasites.
- Water scarcity can increase the risk of waterborne and vector-borne diseases.
- Air pollution can increase the risk of respiratory disease.

Preparation for the Effects of Drought

A resource guide for public health professionals

- Identification of at-risk populations living within the affected area,
- Development of strategies to address the needs of these populations
- Implementation of preparedness strategies

CDC Features

Data & Statistics
Diseases & Conditions
Emergency Preparedness & Response
Environmental Health
Drought and Your Health
Healthy Living
Injury, Violence & Safety
Life Stages & Populations
Travelers' Health
Workplace Safety & Health

Features Media

Sign up for Features
Drought Data on CDC’s National Environmental Public Health Tracking Network

• Data released on Tracking Network Download Datasets earlier this year:
  • https://ephtracking.cdc.gov/download
EXPOSURE
Exposure is contact between a person and one or more biological, psychosocial, chemical, or physical stressor, including stressors affected by drought and climate variability.

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

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 Drought

HEALTH IMPACTS
Injury, acute and chronic illness (including mental health and stress-related illness), and death
Health Outcomes

Exposure Pathways
- Increase in Dust and dust Storms
- More Frequent and More Intense Heat Waves
- Decrease in Water Quality and Quantity
- More Frequent Wildfires
- Change in Vector Habitat and Range
- Loss of Agriculture and Food Security

Health Outcomes
- Respiratory Issues
- Allergy-related Illnesses
- Injuries
- Infectious Disease
- Hunger/Famine
- Heat Illnesses
- Gastrointestinal Illnesses
- Mental Health Consequences

Social & Behavioral Context
- Social Determinants of Health
- Occupation
- Rural/Urban
- Race/Literacy/Age
- Dependence on Caregivers and Medication

Environmental & Institutional Context
- Water Supply
- Local Environmental Conditions
- Preparedness of Health Departments
- Agricultural Management Practices
- Power, Transportation, Communication and Healthcare Infrastructure

Drought Types
- Meteorological Drought
- Agricultural Drought
- Hydrological Drought
- Socio-economical Drought

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