Climate Change and Public Health: CDC’s Role

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Climate Change Science: Key Findings

- Climate change is altering both the average (mean) global temperature and the global frequency of extremely hot temperatures (variance).

- The impacts of climate change will vary significantly by region; some places are warming faster than others.
Summer Temperatures
1951–1980

Summer Temperatures 1981–1991

Frequency of Occurrence

Deviation from Mean

0 1 2 3 4 5
-1 -2 -3 -4 -5

Cooler than average
Average
Warmer than average
Extremely hot

Baseline (1951 - 1980) mean

Summer Temperatures
1991–2001

Frequency of Occurrence

Deviation from Mean

0 1 2 3 4 5
-1 -2 -3 -4 -5

Cooler than average
Average
Warmer than average
Extremely hot

Baseline (1951 - 1980) mean

Summer Temperatures
2001–2011

The “extreme” temperature events used to cover 0.1% of the Earth. Now they cover 10%.

Heat Waves Impact Human Health

European Heat Wave of 2003

Excess Mortality

<table>
<thead>
<tr>
<th>Country</th>
<th>Excess Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>2,091</td>
</tr>
<tr>
<td>Italy</td>
<td>3,134</td>
</tr>
<tr>
<td>France</td>
<td>14,802</td>
</tr>
<tr>
<td>Portugal</td>
<td>1,854</td>
</tr>
<tr>
<td>Spain</td>
<td>4,151</td>
</tr>
<tr>
<td>Switzerland</td>
<td>975</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1,400-2,200</td>
</tr>
<tr>
<td>Germany</td>
<td>1,410</td>
</tr>
<tr>
<td>TOTAL</td>
<td>29,817-30,617</td>
</tr>
</tbody>
</table>

Haines et al. *Public Health* 2006;120:585-96.
Impact of Increased Ozone: Projected Increase in Pediatric ED Visits for Asthma in 2020

Projected Climate Change Worsens Asthma

Climate Change Impacts Air Quality: Pollen

- **Ragweed**
  - ↑ CO₂ and temperature
  - ↑ Pollen counts, longer growing season

**Something in the Air**
Researchers at the U.S. Dept. of Agriculture planted ragweed in and around Baltimore in 2001 to test how the plant responds to different concentrations of CO₂. The results:

<table>
<thead>
<tr>
<th>Area</th>
<th>Urban Period of Collection</th>
<th>Suburban Period of Collection</th>
<th>Rural Period of Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average CO₂ level, parts per million in the air</td>
<td>July 30–Sept. 7</td>
<td>Aug. 6–Sept. 10</td>
<td>Aug. 15–Sept. 17</td>
</tr>
<tr>
<td>Pollen count, grains per cubic meter of air</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>12,138</td>
<td>3,262</td>
<td>2,294</td>
</tr>
</tbody>
</table>

Pollen and Health

- **Seasonal Allergic Rhinitis** affects 15%-20% of adults (Grammer, Greenberger, 2009)

- **Ragweed pollen seasons** are lengthening in the northern latitudes (Ziska et al., 2012)

- **Increased CO2 concentrations and warmer temperature** were associated with increased ragweed pollen production and an earlier pollen season. (Ziska et al., 2003)
67% of waterborne disease outbreaks preceded by precipitation above 80th percentile (across 50 year climate record)

Heavy precipitation events projected to occur more frequently

Source: Walsh et al. 2013: Draft NCA Report, Chapter 2
Heavy Precipitation and Water-borne Disease:

**Milwaukee 1993**

Cryptosporidiosis epidemic
405,000 cases, 54 deaths

Preceded by heaviest rainfall in 50 years (Curriero et al., 2001)

$31.7 million in medical costs
$64.6 million in lost productivity (Corso et al., 2003).
Impact of Climate Change on Human Health

- Injuries, fatalities, mental health impacts
- Asthma, cardiovascular disease
- Heat-related illness and death, cardiovascular failure
- Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus
- Forced migration, civil conflict, mental health impacts
- Respiratory allergies, asthma
- Extreme Heat
- More Extreme Weather
- Changes in Vector Ecology
- Increasing Allergens
- Increasing 
- CO2 Levels
- Sea Levels
- Water and Food Supply Impacts
- Water Quality Impacts
- Cholera, cryptosporidiosis, campylobacter, leptospirosis, harmful algal blooms
- Malnutrition, diarrheal disease
What is CDC doing to prepare for health effects of climate change?

- CDC helps states and cities prepare for health challenges of climate change by
  - Providing scientific guidance
  - Developing decision support tools
  - Ensuring public health concerns are considered in climate change adaptation and mitigation strategies
  - Creating partnerships between public health and other sectors

- CDC’s Climate and Health Program – only Federal investment in climate change preparedness for public health sector
Climate-Ready States and Cities Initiative

- CDC effort to enhance capacity of state and local health agencies to deal with health challenges associated with climate change

- CDC accomplishes this by
  - Funding 18 state and local health departments
  - Providing a framework and tools for planning, implementing, and evaluating climate adaptation strategies
    - Tools to identify populations and places vulnerable to climate impacts
    - Materials to help communicate climate and health issues to public health partners (e.g., extreme heat toolkit)
CDC Climate Ready States and Cities Initiative

- States funded in 2010: OR, CA, AZ, MI, WI, MN
- States funded in 2012: NY, MD, NC

Key locations:
- San Francisco
- New York City
BRACE
Building Resilience Against Climate Effects

01 Forecasting Climate Impacts and Assessing Vulnerabilities

02 Projecting the Disease Burden

03 Assessing Public Health Interventions

04 Developing and Implementing a Climate and Health Adaptation Plan

05 Evaluating Impact and Improving Quality of Activities
For more information please contact Centers for Disease Control and Prevention

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E-mail: cdcinfo@cdc.gov    Web: http://www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.