Building Resilience in the Public Health Sector: The Development of an Evidence-Based Framework for Climate change Adaptation Planning

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2014: Two Major Reports

- Climate Change Impacts in the United States
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

Summer Temperatures
1991–2001

Summer Temperatures 2001–2011

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

Warming has varied significantly by region (observed record)

Rising Temperatures
1991-2012 average temperature compared with 1901-1960 average

May 6, 2014

Hibbing, Minn. +3.1 degrees
Grand Junction, Colo. +3.2
Okmulgee, Okla. -0.6
Troy, Ala. -0.6

Source: National Climatic Data Center
Climate Change and Health: Key Findings

Climate change threatens health in many ways... Some of these impacts are already underway in the US.

Climate change will amplify existing health threats. Certain people and communities are especially vulnerable, including children, the elderly, the sick, the poor, and some communities of color.

Public health actions, especially preparedness and prevention, can do much to protect people from some of the impacts of climate change. Early action provides the largest health benefits.
What are we preparing for?
Key Health Threats

“Morbidity and Mortality by a thousand cuts”
Impacts add to the cumulative stresses currently faced by vulnerable populations and in locations most vulnerable to extreme events & ongoing, persistent climate-related threats
Impact of Increased Ozone: Projected Increase in ED Visits for Asthma in 2020

Climate Change Impacts Air Quality: Pollen

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

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**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</th>
<th>Suburban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of collection</td>
<td>July 30-Sept. 7</td>
<td>Aug. 6-Sept. 10</td>
<td>Aug. 15-Sept. 17</td>
</tr>
<tr>
<td>Average CO₂ level, parts per million in the air</td>
<td><img src="chart1.png" alt="Graph" /></td>
<td><img src="chart2.png" alt="Graph" /></td>
<td><img src="chart3.png" alt="Graph" /></td>
</tr>
<tr>
<td>Pollen count, grains per cubic meter of air</td>
<td>12,138</td>
<td>3,262</td>
<td>2,294</td>
</tr>
</tbody>
</table>

“Disaster within a disaster”

Extreme events increase the probability of “complex emergencies” where multiple system failures can occur which can exceed response capacity.
Heat Waves Impact Human Health

European Heat Wave of 2003

<table>
<thead>
<tr>
<th>Country</th>
<th>Confirmed 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><strong>TOTAL</strong></td>
<td><strong>29,817-30,617</strong></td>
</tr>
</tbody>
</table>

Haines et al. *Public Health* 2006;120:585-96.
NY Power Outage and All-Cause Mortality

Accidental Deaths ↑120%
Nonaccidental Deaths ↑25%

Anderson and Bell (2012)
Katrina Diaspora
What are we modeling?
Key Health Threats

Novel threats
Large scale ecological perturbations facilitate disease emergence and redistribution.
Precipitation, Humidity, and Temperature Changes Impact Human Health. Example: Lyme Disease

- Spread of Lyme disease factors
  - Climate
  - Ecological
  - Social

Range of suitable conditions for *Ixodes scapularis*, the Lyme disease tick

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 [BRACE] 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)
The Path Forward: Shifting the Coping Range
How to Shift a Coping Range?

- Return to the risk equation
  - Reduce hazard probability
  - Reduce hazard exposure
  - Reduce vulnerability

- It is an iterative process

- Requires modeling, learning, and adaptive management
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
BRACE Technical Guidance

Climate Models and the Use of Climate Projections: A Brief Overview for Health Departments

Assessing Health Vulnerability to Climate Change: A Guide for Health Departments

Projecting Climate-Related Disease Burden: A Guide for Health Departments
In Modeling Health Risk, Scale is Critical in Several Key Ways

Spatial
- Global to neighborhood

Temporal
- Multi-decade to hours

Administrative
- International to city

Planning horizons
- Budgets annual
- Infrastructure multi-decade
NEW YORK CITY: Creating Resilient Communities

“The recent years and the past few years show the serious public health threats New York City’s 8.1 million residents already face from extreme weather events like heat waves and coastal storms. With climate change, the severity of these will increase. It is imperative that citywide climate adaptation and mitigation measures include health-focused strategies.”

Andrews Asahian
Director, Community Health Promotion, New York City Health & Hospitals Corporation

ARIZONA: Ready for Extremes

“Arizona is a beautiful place to live, where extreme heat, drought, mainstream, and dust storms are the norm. Our program helps residents learn to respect and adapt to these extremes.”

Matthews Beath
Director, Arizona Office of Homeland Security and Public Health Preparedness, Arizona Department of Health Services

ADAPTATION IN ACTION:

• The Climate and Health Program has conducted health impact assessments and produced recommendations for improving health and climate adaptation plans. The program has developed a heat wave action plan, a flood plan, and a wildfire response plan.

THE THREAT TO HEALTH:

• Arizona’s future health is threatened by extreme heat, flooding, and wildfires. Extreme heat-related deaths have increased, and emergency department visits related to heat-related conditions have risen. Flooding and wildfires have led to significant health impacts, including respiratory and allergic reactions.

MICHIGAN: Responding to Local Needs

“Climate change is a global and national issue, but its impacts are felt at the local level, affecting the health and well-being of people in every community. Public health needs to engage with community partners, emergency responders, and citizens to advocate for the protection of the vulnerable and to promote tailored and adaptive strategies that make our community healthier, resilient, and more sustainable.”

Lauranne Cameron
Office of the Michigan Governor, Children’s Environmental Health Initiative

ADAPTATION IN ACTION:

• The Michigan Climate and Health Program is implementing a heat action plan, which aims to reduce heat-related deaths and illnesses. The program is working with local health departments to develop heat action plans and conduct heat risk assessments.

THE THREAT TO HEALTH:

• Michigan is experiencing changes in its climate, with more frequent and severe heat waves, droughts, and storms. These changes are impacting public health, with increased cases of heat-related illnesses, allergies, and respiratory conditions.

To learn more about the Arizona Climate and Health program, visit www.arizonacctg.com. To learn more about the Michigan Climate and Health program, visit www.michigan.gov/climatechange.
Climate Ready Tribes and Territories Initiative

- New 2016 funding will be awarded later this year
- Will support climate and health adaptation activities within tribal groups and territories
- Will work with partners to identify vulnerable areas and populations
- Approximately 3 tribes and 2 territories will be funded

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.