Climate Change and Human Health

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October 17, 2012
Climate Change Health Effects

- **Heat**
  - Heat stress, cardiovascular failure

- **Air quality**
  - Asthma, cardiovascular disease, respiratory allergies

- **Coastal flooding**
  - Injuries, fatalities

- **Civil conflict**
  - Forced migration, civil conflict
  - Anxiety, despair, depression

- **Food & water**
  - Malnutrition, diarrhea, harmful algal blooms
  - Dengue, hantavirus, coccidioidomycosis
  - Cholera, cryptosporidiosis, leptospirosis

- **Infectious Dz**
  - *Excludes major impacts on biodiversity and ecosystems*
Some Recent Health Events

- 138 people died as a result of extreme heat in 2010 (10-year average of 115 annual heat mortalities)
- 2011 outbreaks of dengue hemorrhagic fever in Florida and Arizona
- Cryptococcus gattii has emerged in Washington and Oregon
- In NYC each single degree (Celsius) increase in surface temperature linked with:
  - 3% increase in same-day hospitalizations from respiratory diseases
  - 3.6% increase in hospitalizations due to cardiovascular diseases

Sources: CDC, National Weather Service; Lin et al 2009
Now the bad news

Despite existing breadth of organizations and sectors with initiatives on climate change...

Despite the likelihood of anticipated health effects of climate change...

Public health effects of climate change remain largely unaddressed
CDC’s Climate & Health Program

- CDC’s climate and health framework established in 2006
- Formally constituted as a Program in March 2009 with congressional appropriation
The Climate & Health Program’s 3 critical roles:

(1) **analyze and translate** climate science to our public health partners;

(2) apply findings to **decision support tools** to aid state and local public health response (vulnerability maps, surveillance tools, communications tools)

(3) **provide leadership** to ensure that public health concerns are represented in climate change adaptation strategies; create linkages between public health and other sectors
CHP Science Activities

- Translation of science for public health applications
- Epidemiological tool development
- Vulnerability assessment tool development
- Monitoring and analysis of climate and health science
- Expert consultation on climate and health to third parties (other federal agencies, health departments)
- Scientific technical assistance
CHP Policy & Program Activities

- Cooperative agreements with State and Local Health Departments (CRSCI)
- External partnership development
- Public health practice guidance
- Policy development
- Program communications, marketing and outreach
- Coordination of technical assistance
BUILDING RESILIENCE AGAINST CLIMATE EFFECTS (BRACE)
1. Forecasting Climate Impacts and Assessing Vulnerabilities

2. Projecting the Disease Burden

3. Assessing Public Health Interventions

4. Developing and Implementing a Climate and Health Adaptation Plan

5. Evaluating Impact and Improving Quality of Activities

BRACE

Climate and Health Program, National Center for Environmental Health
Step 1. Forecasting Climate Impacts & Assessing Vulnerabilities

Goal: Identify the range of climate impacts, associated potential health outcomes, & vulnerable populations and locations within a jurisdiction

- Determine the geographic and temporal scope of the assessment
- Assess localized forecasted climate impacts
- Assess health outcomes sensitive to these climate impacts
Step 2: Projecting the Disease Burden

Goal: Estimate/quantify the additional burden of health outcomes due to Climate Change

• Identify data sources for climate related mortality/morbidity assessment

• Employ qualitative and quantitative approaches to assessing the data

• Quantify potential magnitude of individual health risks (absolute or relative)
Step 3: Assessing Public Health Interventions

Goal: Identify the most suitable health interventions

- List the range of health interventions available for each health outcome
- Assess capacity to deliver each intervention
- Prioritize health interventions deemed most suitable for the jurisdiction
Step 4: Developing and Implementing a Climate and Health Adaptation Plan

Goal: Develop and implement a plan that introduces health system program changes that address the health impacts of climate change

• Apply agency procedures to developing a unified plan of action

• Disseminate the plan to stakeholders that play a part in executing the interventions

• Incorporate adaptations into executing the interventions
Step 5. Evaluating Impact and Improving Quality of Activities

- **Process evaluation goal**: Periodic review to ensure that the projections continue to be sound and the adaptations are still suitable.

- **Outcome evaluation goal**: Ensure that climate change is considered in broader PH planning and implementation activities.
NEW TOOLS AND DEVELOPMENTAL PROJECTS
Using NASA Data and Models to Improve Heat Watch Warning Systems for Decision Support

- Augment current Heat Watch/Warning System (HWWS) with NASA data and models
- Development of “Extreme Heat Vulnerability Index” (includes socioeconomic and mortality data)

Will model surface temperatures during extreme heat events in 3 U.S. cities using:

- The MODerate resolution Imaging Spectroradiometer (MODIS)
- Landsat Enhanced Thematic Mapper (ETM+)
- Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)
- The Visible/Infrared Imager/Radiometer (VIIRS) system
Extreme Heat Media Toolkit

- Suite of communications materials
  - websites, public service announcements, press releases, downloadable/customizable materials
- Supplement existing emergency management plans
- Targets vulnerable populations to reduce deaths during Extreme Heat Events
Environmental Public Health Tracking Portal

- System of integrated health, exposure, and hazard information and data from national, state, and local sources
- Maps, tables, charts
  - Environmental exposure
  - Health outcomes
Environmental Public Health Tracking Portal

- **Heat Vulnerabilities** - Measures that put people at greater risk for heat-related health effects (diabetes, CVD, age, race, poverty, social isolation, access to green space, etc)
- **Heat-Related Mortality** - Data from death certificates; heat as underlying or contributing cause
- **Temperature Distribution** - Daily temperature and heat index county
- **On the horizon:**
  - Refined heat indicators
  - Pollen indicator
Metadata Access Tool for Climate & Health

• Online, searchable clearinghouse of federal metadata related to climate change and human health

• Includes NASA metadata
Southeast Regional Workshop

- Feb 13-14, 2012. Charleston, SC
- Sponsored by CDC, NOAA, NIH, and the USGCRP
- Climate change experts, public health experts, climate/health stakeholders
  - Inform the 2013 U.S. NCA report
  - Increase understanding of climate and health science in the region
  - Raise awareness of ongoing climate and health activities in the region
  - Improve tools for public health decision making
  - Serve as a pilot for ongoing assessment process
- Synthesis report and presentations available online: www.joss.ucar.edu/ohhi/se_nca_health_sector_feb12
Summary

• Climate change impacts human health
• Projected increase in negative human health effects
• Adaptation measures are needed
• CDC is working to predict and adapt to the health effects of climate change
Thank you

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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.