Planning for Michigan’s Public Health Response to Climate Change

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Climate Change: The Public Health Response

There is scientific consensus that the global climate is changing, with rising surface temperatures, melting ice and snow, rising sea levels, and increasing climate variability. These changes are expected to have substantial impacts on human health. There are known, effective public health responses for many of these impacts, but the scope, timeline, and complexity of climate change are unprecedented. We propose a public health approach to climate change, based on the essential public health services, that extends to both clinical and population health services and emphasizes the coordination of government agencies (federal, state, and local level) and nongovernmental organizations.

Weather and climate have been known to affect human health since the time of Hippocrates. Hot weather can increase motor vehicle accidents, and cold weather can aggravate chronic illnesses such as asthma. Evidence links climate change to increased rates of respiratory and cardiovascular diseases such as asthma and heart disease. The increasing frequency and intensity of extreme weather events such as hurricanes and floods are expected to increase the risk of infectious diseases and the spread of vector-borne diseases such as malaria. The effects of climate change on human health are complex and multifactorial, and the effects of climate change on human health are not yet fully understood.

PUBLIC HEALTH PERSPECTIVES ON CLIMATE CHANGE

Scientists, clinicians, and public health professionals have called for attention to climate change on both local and global levels. Several well-established principles point to a vigorous, proactive public health approach to climate change. One such principle is prevention. Primary prevention aims to prevent the onset of injury or illness; clinical examples include immunization, smoking cessation, and the use of bicycle technologies. Secondary prevention is aimed at diagnosing disease early in its course and reducing the resulting health burden; clinical examples include screening for hypertension, hyperlipidemia, and breast cancer. Tertiary prevention occurs once disease is diagnosed; it aims to reduce mortality, avoid complications, and maintain function.

There are clear analogies in the approach to climate change. Primary prevention corresponds to mitigation—efforts to slow, stabilize, or reverse climate change by reducing greenhouse gas emissions. Secondary and tertiary prevention corresponds to adaptation—efforts to adapt to and prepare for the effects of climate change and to reduce the associated health burden. Mitigation efforts will occur mainly in sectors other than health, such as energy, transportation, and architecture, although the health sector can contribute useful information regarding the choice of safe, healthful technologies. Adaptation efforts, on the other hand, correspond closely to conventional medical and public health practice.
Anticipated Health Impacts from Climate Change
(adapted from Frumkin et al 2008, Balbus et al 2008)

- **Extreme Weather Events**
  - **hazards:** Heat waves, storms or floods, droughts, wild fires
  - **health impacts:**
    - Injuries, heat-related illnesses, hypothermia, death
    - Anxiety, depression, other mental health conditions
    - Disruption of health care services
    - Housing displacement

- **Environmental / Infrastructure Degradation**
  - **hazards:** Quality/quantity of drinking water; air quality; sewage/septic breakdown; food safety, security
  - **health impacts**
    - Vector-borne infectious diseases
    - Water- or food-borne diseases

Need to identify vulnerable populations
Confronting Climate Change in the U.S. Midwest

July 2009

MICHIGAN

From its diverse farmlands and boreal forests to its many inland lakes and thousands of miles of shoreline, Michigan has been strongly shaped by its climate. However, that climate is changing due to global warming, and unless we make deep and swift cuts in our heat-trapping emissions, the changes ahead could be dramatic. This report presents new projections showing some of the potential impacts of global warming on Michigan, including severe summer heat, more dangerous storms and floods, and new threats to agricultural production.

GLOBAL WARMING AND THE MIDWEST

Global warming is caused by an increase of pollutants in the atmosphere, including carbon dioxide produced by human activities such as the burning of fossil fuels and the clearing of forests. Carbon dioxide acts like a blanket that traps heat in our atmosphere and warms our climate; oceans, forests, and land can absorb some of this carbon, but not as fast as we are creating it. As a result, heat-trapping emissions are building up in our atmosphere to levels that could produce severe effects including extreme heat, prolonged droughts, intense storms, corrosive ocean acidification, and dangerous sea-level rise.

The climate of the Midwest has already changed measurably over the last half century (Do Gaetano 2002; Kunkel et al. 1999). Average annual temperatures have risen, accompanied by a number of major heat waves in the last few years. There have been fewer cold snaps, and ice and snow are melting sooner in the spring and arriving later in the fall. Heavy rains are occurring about twice as frequently as they did a century ago, increasing the risk of flooding.

Michigan’s Climate Migrates South

Changes in average summer “heat index”—a measure of how hot it actually feels based on a specific combination of temperature and humidity—could strongly affect Midwesterners’ quality of life in the future. For example, the red outlines track what summers in Michigan could feel like over the course of the century under the higher-emissions scenario; the yellow outlines track what summers could feel like under the lower-emissions scenario.
Increasing numbers of Heat Events

UCS, 2009
Increased amounts of Allergens in the air

**ANNUAL ALLERGENIC TREE POLLEN POTENTIAL**

Current Tree Habitat Distribution

Allergenic Level
- Very low
- Low
- Moderate
- High
- Very high

2100 Tree Habitat Distribution—Low Emissions Scenario

Allergen Hotspots
- States with a risk of large increases in allergenic tree pollen: Iowa
- States with a risk of moderate increases in allergenic tree pollen: Illinois, Minnesota, Wisconsin

2100 Tree Habitat Distribution—High Emissions Scenario

Allergen Hotspots
- States with a risk of large increases in allergenic tree pollen: Arkansas, Iowa, Maine, Minnesota, New Hampshire, New York, Pennsylvania, Vermont, West Virginia
- States with a risk of moderate increases in allergenic tree pollen: Connecticut, Illinois, Kentucky, Massachusetts, Mississippi, Tennessee, Wisconsin

Choices we make now about global warming pollution can make a big difference in the future potential for allergenic tree pollen. These maps show the annual allergenic potential from tree pollen for the current distribution of tree species habitat and for projected distributions of tree species habitat under two future climate scenarios—one in which greenhouse gas emissions are higher and one with lower emissions. Following the lower emissions pathway will help curb the possibility of expanding the range of trees, like oaks and Hickories, that are known to produce highly allergenic pollen.

How the Maps Were Made:

The potential tree habitat distributions for 134 species are from the USDA Forest Service's Climate Change Tree Atlas, available at http://www.nrs.fs.fed.us/atlas/tree. Future distributions based on the average of three global climate models, each run for two emissions scenarios (low carbon dioxide increases to 550 ppm by 2000; high carbon dioxide increases to 970 ppm by 2000). The Tree Atlas calculates Importance Values (IV) for each species for each 20 km by 20 km grid box in the Eastern half of the United States. We scaled these Importance Values by how allergenic the pollen from each species is, as indicated in the Researchers Allergy and Botany Library available at http://www.pollenlibrary.com (highly allergenic = IV*3, moderately allergenic = IV*2, low allergenic = IV*, not allergenic = IV**0). Then, we summed the contributions from all 134 species to calculate the total annual allergenic potential for each grid box. Note that the actual future distribution of trees and annual allergenic potential will also depend on many factors that this model does not consider, such as fragmentation of landscapes and competition with other species.

Extreme Allergies and Global Warming
NWF 2010
What might be expected for Michigan?

- Warmer, drier climate => fires, particulates
- More frequent severe storms => injuries
- More flooding => water contamination
- Increased insects => insect-borne diseases (eg West Nile)
- Heat events => hospitalizations, death
- Ozone, Aeroallergens => asthma
How can we in Michigan prepare for these potential health effects?

The role of the state Public Health System
What do we mean by Public Health?
Public Health

- Prevention of Disease & Injury, Promotion of Health
- Acting at the level of the Community
- A System of organizations, entities
The Public Health System

More than just “The Health Department”

• All public, private, and voluntary entities that contribute to public health in a given area.

• The entities have differing roles, relationships, and interactions.

▲ All entities contribute to the health and well-being of the community.
A system of partnerships that includes, but is not limited to . . .

- Federal DHHS
- State Health Department
- Local Health Departments
- Tribal Health
- Churches
- Schools
- Business
- Healthcare Providers
- Environmental Health
- Transportation
- Community Services
- Mental Health
- Philanthropy
- Community Coalitions
- Justice & Law Enforcement
Impetus for Michigan Public Health plan development

• National level recognition of public health impacts of global warming (CDC, NIH, EPA)
• Documented needs and gaps in state/local health departments, surveys by:
  – **ASTHO** (Association of State and Territorial Health Officials), &
  – **NACCHO** (National Association of County and City Health Officials)
• Funding to CDC from Congress
• Funding to ASTHO from CDC for one-year state planning grants
ASTHO survey of state health officials from 41 states

- **60%** aware of CC activities in other state agencies; **33%** involved
- **77%**: CC *not* one of their top ten priorities
- **72%**: Their jurisdiction will experience serious public health problems in next 20 years because of CC
- Conclusion: Interest and concern is there but way forward not clear.
ASTHO planning grant awards to states

• 1 year CC planning grants to:
  – Conduct public health needs assessment: knowledge and capacity gaps
  – Create a strategic plan for addressing gaps
  – Provide training to public health practitioners
  – Raise awareness

• 5 state health departments funded,
  – Including Michigan Dept. Community Health
MDCH Plan Goals & Objectives

- Identify key concerns and issues using 10 Essential Public Health Services, Core Public Health Functions, and selected health impacts.
- Develop 5 year strategic plan to establish a MI program with priority activities in each core public health functional areas.
- Provide training to MI public health practitioners.
- Evaluate strategic planning process, identify key elements necessary for establishing program.
10 Essential Public Health Services: under 3 Main Functions

- Monitor Health
- Diagnose & Investigate
- System Management
- Research
- Inform, Educate, Empower
- Mobilize Community Partnerships
- Develop Policies
- Enforce Laws
- Link to/Provide Care
- Assure Competent Workforce
- Evaluate

Policy Development
Assurance
Assessment
Plan’s Building Blocks

• Michigan Climate Action Plan (Mar 2009)
  – Addresses mitigation; adaptation next step
• Nationally recognized academic researchers
  – MSU: T Dietz, J Rose
  – UM: D Scavia, H Hu, M O’Neill
• Strong network of Local Health Depts
  – Coordinate w/ State on preparedness planning, communicable disease surveillance (MDSS)
• UM Office of Public Health Practice:
  – Web-based PH training, evaluation support
Public Health System partners

- Michigan’s 45 Local Public Health Depts.
- Key parts of Community Health:
  - Environmental Health
  - Office of Public Health Preparedness
  - Communicable, Chronic Diseases
- Other state gov’t. partners
  - Agriculture, Environment (DNRE), State Police
- Academia: U of Mich, MSU, Wayne State U
- Non-gov’t orgs: MPHA, MI Environ Council, Red Cross, Sierra Club, Ecology Center, Assoc. of City Planners, etc.
Needs Assessment

- **34** Local Health Dept. staff interviewed in person or via web-based tool
- **15** other Public Health Partners rec’d in-person key informant interviews
- Local Public Health Emergency Response plans reviewed
- Surveillance data systems identified and reviewed
- Interviews based on ASTHO survey items (Balbus et al 2008)
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Need to identify vulnerable populations
Local Health Dept. survey results: knowledge and priorities

- “I am knowledgeable about CC”: 79%
- “My jurisdiction will experience PH/CC in next 20 years”: 38% (vs. 72% ASTHO)
- “CC is one of the top 10 priorities in my agency”: 4% (N=1) (vs 33% ASTHO)
- “My agency has the resources to address PH/CC”: 30%
Percent of LHDs reporting activities addressing climate related effects

- Heat: 43%
- Storms/floods: 61%
- Drought/wildfires: 9%
- Vector-borne: 100%
- Water/foodborne: 100%
- Mental Health: 9%
- Water quality/quant: 96%
- Air quality: 26%
- Health services: 57%
- Sewage/septic: 96%
- Food safety: 96%
- Emergency housing: 17%

*traditional LHD functions
LHD survey results: Will Climate Change make these conditions more severe?"
Key Partners’ Interviews
Types of organization (N=15)

- 3 Academic
- 2 Non-governmental
- 4 State health department
- 6 State non-health agencies

All have activities related to health or the environment
All rec’ld open-ended survey similar to ASTHO / LHD survey
Activities Reported by Key Partners (N=15)

No. reporting climate change activity

- heat
- storm
- drought
- vector borne
- water/food borne
- mental hlth
- drinking water
- air pollution
- health care
- sewage
- food safety
- housing
- vulnerable pop

Activities:  
- Health related
- Other

Bar chart showing the number of reporting climate change activities for various topics, categorized as health related and other.
Key Partner Interview Conclusions

• Respondents interested in topic, want to learn more, meet and engage with other organizations
• All organizations had activities in areas impacted by climate change
• No consensus on which issue is most important
• All felt their organization could contribute to response by educating partners and public, and by incorporating climate change into current activities
Review: LHD emergency response plans

• Driven by MDCH requirements:
  Each component to include communications, surveillance, lab, community containment, medical management, data management, recovery

• Required components (related to CC/PH)
  • Food contamination incident
  • Tornado/Flood/Snow weather events
  • Contact info for special needs populations

• Conclusion: Current requirements don’t cover CC impacts on public health
Strategic Planning Meetings

• Two meetings, March 23 & April 23
• Approximately 40 LHD and Key Partners
• Results from Day 1 meeting:
  • 3 goals, related principles and issues
• Results from Day 2 meeting: Priority focus and activities to reach the goals (not yet finalized)
Goal 1

Climate change is recognized as a public health issue & integrated into public health practice.

Principle: Coordinated efforts on all levels of government and partners must occur for long term success

Issue: CC and its public health impacts not understood or appreciated.
Goal 2

• Public health agencies will have the tools, resources, and activities to respond to climate change impacts within existing programs.

• Principle: Our work must be sustainable within our organizations’ and community’s resources.

• Issues: Many of these health impacts are part of public health “portfolio”, but CC emphasis and integration lacking. No new programs without new resources.
Goal 3

• Vulnerable populations must be explicitly considered in programs and policies addressing Climate Change impacts.
• Principle: Our work must acknowledge the need for environmental justice, recognizing that the most vulnerable populations experience the greatest impacts from environmental and health events.
• Issue: Public Health systems not sufficiently prepared to identify and respond to disproportionate impacts on vulnerable populations
Next Steps

• Writing the plan, w/ partner’s review
• Education: Webinar June 16: noon-1:30 edt
  Public Health Grand Rounds: Climate Change and Public Health
  https://practice.sph.umich.edu/practice/
• Evaluation of the Process: July
• Final report: August
• Implementation!
We invite you to be our Partner

How can your organization contribute?

– Raising awareness of the issue
– Advocating for resources
– Research (per NIEHS, CDC, EPA)
  to measure health impacts
  to validate associations between CC & health
  to develop response tools

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