Indicators for Extreme Weather and Health: What is Needed for Better Surveillance

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Outline

• Need for indicators
• Direct and indirect health effects of extreme weather
• Review of indicator work
• Vulnerability Indicators
• Gaps in Surveillance Indicators
• Recommendations for Future Work
Why are indicators needed?

• Where are health events occurring?
• Who is vulnerable? (vulnerability assessments)
• Are trends increasing/decreasing?
• Program/policy evaluation
• Predicting future disease burdens
• Communication tools
Health Burden associated w/ extreme events

- Heat Wave deaths and illnesses (associated with greatest mortality of all extreme events in U.S.) 40-60K Dead in Europe 2003; 55K dead in Russia 2010
- Deaths and injuries from storms, hurricanes, extreme precipitation
- Direct and Indirect effects of extreme events
Extreme Weather Events are associated with direct and indirect effects on public health

**Direct:** Deaths, Illnesses, and Injuries (e.g. 971 direct deaths from Katrina)

**Indirect:** Population displacement, mental illness, health care disruption, exacerbation of pre-existing illness, water contamination (infectious and chemical)
Previous work

• WHO/Europe (2009)
• National Research Council ("Monitoring Climate Change Impacts, 2010")
• Council of State and Territorial Epidemiologists (2009)
• National Environmental Public Health Tracking Program CDC
• National Climate Assessment Indicators
• WHO: focus on food, water, and vector-borne disease: indirect effects of extreme events such as flooding

• NRC: focus on vulnerability factors:
  – Living in vulnerable areas; Migration; Elderly living alone; Infant Mortality

• CSTE:
  – Mortality/Morbidity due to Heat;
  – Deaths and Injuries due to extreme weather
  – Vulnerability Indicators
National Env Public Health Tracking
http://ephtracking.cdc.gov/showClimateChangeLanding.action

• By U.S. County:
  – Daily Estimates of max/min temp, heat index, excessive heat days
  – Heat related-mortality
  – Vulnerability Maps

• Morbidity data at State Portals:
Vulnerability Indicators Vary by Climate Health Threat

Heat:
- Elderly, Medical compromised, Social Isolation, Children, low income, occupational

Flooding/Extreme events:
- Elderly, low-income, homeless, disabled, lack of transportation, obese, co-morbidities

Drought:
- Dialysis patients, elderly, pregnant and nursing women, infants, immunocompromised individuals
Gaps in Surveillance: Heat

1) No agreed-upon definitions for extreme heat and heat waves

2) No national hospitalization/ER database (HIE/HIT?)

3) Use of death certificates and hospitalization and ER records result in undercounts

4) Estimating excess mortality/morbidity from heat waves not straightforward
NWS heat products

• No comprehensive evaluation has been conducted to determine if heat products adequately protect human health

• Evaluation of heat products in San Francisco/Los Angeles in 2008-09 found most products responsive to emergency room visits for heat but two excessive heat events missed.
Deaths and Injuries from Extreme Storm Events

• Local storm reports (preliminary data)
• Service assessments (internal assessments of events)
• NWS Storm data

Data collected: age, gender, location, whether fatality was direct or indirect result of event (often hard to determine)

Source: Ken Harding, Meterologist, NWS
NWS Storm Data

• From: “county, state and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, the insurance industry and the general public.” Includes responders such as Red Cross

• “information from these sources may be unverified by the NWS”
Recommendations

• More heat products in different geographic locations should be evaluated for sensitivity to morbidity

• Temperature data should be analyzed separately
  – use relative temperature thresholds (e.g. 95% of temps for that date/location based on 30 yrs historical data)
  – see if heat products are issued and if morbidity occurs
Recommendations

• Criteria should be established for heat products by pooling evidence from national, multi-city analyses. This would provide a basis for evidence-based standards that vary by local climate and other factors.

• Estimates of excess mortality/morbidity from heat waves to provide the best estimates of public health burdens from heat.
Recommendations

• NWS, Red Cross, Local/state Health Depts., Insurance industry (?) should work together to obtain the most accurate verifiable data on deaths and injuries from storms (Note: CSTE Disaster Epi Meeting May 8/9, Atlanta)

• More attention needs to be given to collect data and develop indicators on indirect effects of storms on public health