Climate Change: The Public Health Response

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Opportunities for Public Health Intervention

Vulnerability Assessment

- Exposure to climate change
  - Varies by geography
  - Requires “downscaling” to local communities
- Sensitivity to climate change
  - Varies by individual
    - Age, pre-existing illness
    - Fair skin and sun damage with reduced stratospheric ozone
  - Varies by community
    - Urban, housing stock, infrastructure
- Preparedness and response capacity
  - Varies by individual and community ability to minimize adverse consequences
    - Social network, access to services
- Health impacts

Heat and Urban Heat Islands

- Estimate 70,000 deaths Europe 2003
- Estimate 655 excess deaths California summer 2006

OEHHA Studies: Direct Health Effects of Higher Temperature

- Higher temperature and mortality (Epidemiol, 2008)
- Examining mortality susceptible subgroups (Am J Epidemiol, 2008)
- The mortality effects of the 2006 heat wave (Environ Research, 2009)
- Higher temperature and hospital admissions (Int J Pub Health, forthcoming)
Climate Change and Pesticides

Climate change may have impacts on pest pressures:
• Increased pest pressure may increase pesticide use (for both agricultural and home-use pesticides)
• Invasive pests may establish more easily therefore the need for controlling those pests with pesticide products may increase.
• Weather changes impact seasonality of infectious disease vectors (mosquitoes, ticks, fleas, etc) and the use of pesticides to control those vectors may increase.

Public Health Adaptation Strategies

- Promote community resilience to reduce vulnerability
- Educate, empower, engage to take action
- Promote mitigation/adaptation with PH co-benefits
- Robust rapid surveillance systems
- Improve PH preparedness & response capacity
- Lead by example
- Cross-sectoral partnerships
- Research
- Multi-level policy change
- Resources – staff & funding

Promote community resilience

- Promote built environments that mitigate climate change and/or reduce impact of climate change on health
  • Smart growth
  • Open space & parks
  • Buildings designed to weather wildfire
  • Reduce urban heat islands
    - Trees, cool roofs/green roofs, cool pavement
  • Reduce flood risk
    - Permeable surfaces, modernize sewage systems
- Reduce baseline exposures to toxic air and water pollutants
- Promote sustainable local food systems
- Promote strong social support networks
- Enhance public health infrastructure

Environmental Justice – Global and Local

- Global equity
  • US = 1/20 world population but 28% GHGs in atmosphere
  • Natural debt per capita: US 135 tons C vs India 4 tons
  • Climate change impacts most severe in low income countries
    - Billions of poor lack basics (e.g. electricity, adequate protein intake)
- Contraction and convergence
- Local environmental justice
  • Climate impacts likely to most impact low-income, communities of color

Promote mitigation/adaptation with co-benefits

- Health Impact Assessments on proposed mitigation and adaptation strategies
  • Impacts on vulnerable populations
  • Cumulative health impacts
- Health and public health participation in policy discussions
Key Mitigation Technologies & Practices

Transport
- Fuel efficiency
- Hybrids
- Road to rail
- Public transport
- Non-motorized transport
- Land-use planning

Buildings
- Green building
- Energy efficiency
- Daylighting
- Improved cook stoves
- Solar heating & cooling

Agriculture
- Crop & land management
- Livestock & manure management
- Improved N fertilizer use

Industry
- Energy efficiency
- Heat & power recovery

Energy supply
- Coal to gas
- Nuclear power
- Renewable energy

Transportation Sector Mitigation Strategies & Co-Benefits

Mitigation strategies
- Fuel efficiency
- Hybrids
- Biofuels

Public transport
- Active transport
- Land-use planning
- Reduce speed

Effects
- Reduced:
  - GHG emissions
  - Air pollution

Health Co-Benefits
- Reductions in:
  - Respiratory disease
  - Heart disease

- Noise
- Community Severance

Increased:
- Physical Activity
- Social Capital

Co-Benefits of Adaptation Strategies

- Reducing Urban Heat Islands
- Cool roofs, cool paving, urban trees
- Urban trees also
- Reduce electricity consumption (shading)
- Improve air quality
- Absorb polluting gases
- Attach PM to leaves
- Reduce ozone levels (with cooling)
- Improve quality of life – reduce stress

Robust surveillance

- Environmental conditions
  - Heat
  - Air pollution
  - Vectors
  - Water contamination

- Climate-related illness
  - Real-time
  - Post-disaster

- Vulnerabilities and protective factors
  - Chronic disease
  - Social support networks

- Adaptive capacities
  - Access to cooling centers

Environmental Health Indicators of Climate Change

(CSTE – P English)

- Quantitative summary measures to track changes over time
  - assess climate change determinants of health
  - identify areas for intervention and prevention
  - evaluate the outcomes of specific policies or programs
  - project the impacts of climate change on human health

- Holistic approach
  - environmental, health outcome, vulnerability, public policy indicators

Environmental Health Climate Change Indicators

- Environmental indicators
  - GHG emissions, ozone, air mass stagnation events, max/min temps, heat index, pollen counts, ragweed, wildfire frequency/distribution/duration, droughts – precipitation index, surface water supply index, harmful algae blooms, shellfish poisonings

- Health outcomes indicators
  - Excess M/M due to heat, HM extreme weather events, human cases infectious disease/positive tests reservoirs/sentinels, respiratory/allergic disease of air pollution & pollens

- Population vulnerability indicators
  - Heat flooding: Elderly, poverty, children, people w/disabilities
  - Sea-level rise

- Mitigation indicators: energy efficiencies, use renewables, VMTs
- Adaptation indicators: access cooling centers, heat warning systems, heat island mitigation plans, relevant surveillance systems, PH workforce

- Policy indicators
  - Cities covered by Kyoto, participating in climate change initiatives
OEHHA: Indicators of Climate Change

- **CLIMATE CHANGE DRIVERS**
  - GHG emissions, Atmospheric CO2 concentrations

- **CHANGES IN CLIMATE**
  - Temperature, State, Regional Air Temp, Air Temp by County Population
  - Extreme heat events
  - Accumulated winter chill hours
  - Precipitation, annual state/regional

- **IMPACTS OF CLIMATE CHANGE**
  - Impacts on physical systems:
    - snowmelt runoff, snow water content, glacier change, sea level rise, Lake Tahoe water temp, Delta water temp, ocean temp, CO2 concentrations CA.
  - Impacts on biological systems
    - Humans: mosquito-borne diseases, heat-related M/M
  - Impacts on vegetation
    - Tree mortality, large wildfires, forest vegetation patterns, alpine/subalpine plant changes, wine grape bloom
  - Impacts on animals
    - Migrating bird arrivals, small mammal migration, spring flight of CV butterflies, copepod pops, Cassin’s auklet pops