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 (Env 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

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
- **Agriculture**
  - Crop & land management
  - Livestock & manure management
  - Improved N fertilizer use
- **Industry**
  - Energy efficiency
  - Heat & power recovery
  - Energy supply
  - Coal to gas
- **Buildings**
  - Green building
  - Energy efficiency
  - Daylighting
  - Improved cook stoves
  - Solar heating & cooling
- **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
      - Noise
      - Community Severance
    - Increased:
      - Physical Activity
      - Social Capital
  - **Health Co-Benefits**
    - Reductions in:
      - Respiratory disease
      - Heart disease
      - Traffic injuries
      - Depression
      - Osteoporosis
      - Diabetes
      - Cancer
      - Stress

**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
- **Policy indicators**
  - Cities covered by Kyoto, participating in climate change initiatives

**Environmental Health Indicators of Climate Change**

- 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 count, exposure, wildlife frequency, severity/duration, droughts – precipitation index, surface water supply index, harmful algae blooms, shellfish poisonings
- **Health outcomes indicators**
  - Excess M/M due to heat, M/M extreme weather events, human cases infectious diseases at reservoirs, sentinel, respiratory/allergic disease of air pollution & pollen
- **Population vulnerability indicators**
  - Heat flooding: Elderly, poverty, children, people with disabilities
  - Sea level rise
- **Mitigation indicators**: energy efficiencies, use renewables, VMT
- **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:
    - Streamflow runoff, snow HO2 content, glacier change, sea level rise, Lake Tahoe HO2 temp, Delta HO2 temp, ocean temp, CO2 concentrations Ca.
  - Impacts on biological systems:
    - Humans: mosquito-borne diseases, heat-related MM
  - 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, Cassini’s auklet pops