“Climate change is the biggest global health threat of the 21st century... The impacts will be felt all around the world – and not just in some distant future but in our lifetimes and those of our children.”

The Lancet
Why aren’t we doing more?

- No funding, no resources
- No mandate, not our job, silos
- Lack capacity
  - Funding, resources, knowledge, expertise
- Lack leadership
- Competing priorities
  - Tyranny of the urgent
- Unclear exactly how this relates to what we do now
- Unclear what exactly we can do
Physical Environments
Services Environments
Social Environments
Economic Environments
Place Matters
What are Health Inequities?

Differences in health that are unnecessary, avoidable, unfair, and unjust.
Climate Change and Health: A Framework for Action

Health Processes and Strategies

- Living Conditions
- Health Risks and Exposures
- Health Behaviors
- Health & Inequities Impacts

Social Inequities

Systems

Institutional Power

Disability and Death

Health and Social Costs

Developed by the Public Health Institute's Center for Climate Change & Health. © Public Health Institute 2014
Mitigation Policies for Reduction of Greenhouse Gas Emissions
- Energy Efficiency
- Use of Renewable Energy Sources
- Forest Preservation

Moderating Influences
- Population Density and Growth
- Level of Technological Development
- Standard of Living and Local Environmental Condition
- Pre-existing Health Status
- Quality and Access to Health Care
- Public Health Infrastructure

Adaptation Measures
- Vaccination Programs
- Disease Surveillance
- Protective Technologies
- Weather Forecasting and Warning Systems
- Emergency Management and Disaster Preparedness
- Public Health Education and Prevention
- Legislation and Administration

Adverse Health Effects
- Heat-Related Illnesses and Deaths
- Extreme Weather-Related Health Effects
- Air Pollution-Related Health Effects
- Allergic Diseases
- Infectious Diseases
- Water- and Food-Borne Diseases
- Vector- and Rodent-Borne Diseases
- Malnutrition
- Storm Surge-Related Drowning and Injuries
- Health Problems of Displaced Populations

Changes in Intermediate Factors
- Air Pollution Concentration and Distribution
- Pollen Production
- Microbial Contamination and Transmission
- Crop Yield
- Coastal Flooding
- Coastal Aquifer Salinity

Change in Sea Level
- Regional and Local Weather Change
  - Extreme Weather Temperature Precipitation

Climate Variability and Change
- Natural and Human Influences on Climate

Mitigation Policies
Natural and Human Influences on Climate
Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future

6” by 2030, 12” by 2050, 36” by 2100
Temperature

2012 WAS THE SECOND MOST EXTREME YEAR ON RECORD FOR THE NATION

RECORD HEAT ACROSS THE U.S.
STATE-BY-STATE TEMPERATURES IN 2012

356
RECORD HIGH TEMPERATURES TIED OR BROKEN

UCLA LARC 2012
Direct Health Effects

Changes in Intermediate Factors

- Air Pollution Concentration and Distribution
- Pollen Production
- Microbial Contamination and Transmission
- Crop Yield
- Coastal Flooding
- Coastal Aquifer Salinity

Natural and Human Influences on Climate
Climate Variability and Change
Regional and Local Weather Change
Extreme Weather
Temperature
Precipitation
Change in Sea Level
Higher Temperatures Worsen Air Pollution

Ozone versus Temperature

Riverside, 2003-2005

Frasno, 2003-2005

Photo: Tudor Van Hampton / ENR
# Health-Care Costs of Climate Events

<table>
<thead>
<tr>
<th>Climate-related health stressor</th>
<th>Premature Deaths</th>
<th>Hospitalizations</th>
<th>Total Health-care Costs $$ (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone pollution</td>
<td>795</td>
<td>4,150</td>
<td>6,534,642</td>
</tr>
<tr>
<td>Heat wave</td>
<td>655</td>
<td>1,620</td>
<td>5,353,425</td>
</tr>
<tr>
<td>Hurricane</td>
<td>144</td>
<td>2,197</td>
<td>1,392,833</td>
</tr>
<tr>
<td>Infectious disease</td>
<td>24</td>
<td>204</td>
<td>207,447</td>
</tr>
<tr>
<td>River flooding</td>
<td>2</td>
<td>43</td>
<td>20,357</td>
</tr>
<tr>
<td>Wildfires</td>
<td>69</td>
<td>778</td>
<td>578,640</td>
</tr>
<tr>
<td>Total</td>
<td>1,699</td>
<td>8,992</td>
<td>$14,087,344</td>
</tr>
</tbody>
</table>

Knowlton, Health Affairs, 2011
Mitigation to cut GHG emissions
- Clean renewable energy
- Fuel/energy efficiency
- Reduce VMTs
- Low carbon fuels
- Forest preservation
- Reduced meat consumption

Moderating influences
- PH infrastructure
- Health services
- Population health status
- Level of development
- Population density

Adaptation measures to reduce impacts of climate change
- Infrastructure
- Warnings, surveillance
- Preparedness/recovery
- Sustainable agriculture
- Urban greening

Climate Change and Health: A Framework for Action

Climate Processes and Strategies

- Social Inequities
- Systems
- Institutional Power

- Climate Behaviors
- Greenhouse Gas Emissions
- Global Climate Impacts
- Local Climate Impacts
- Intermediate Factors
- Climate Change Health & Inequities Impacts

Disability and Death
Health and Social Costs

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Climate Change and Health: A Framework for Action

Climate Processes and Strategies

- Greenhouse Gas Emissions
- Global Climate Impacts
- Local Climate Impacts
- Intermediate Factors
- Climate Change, Health & Inequities Impacts

Intervention strategies

- Social Inequities
- Systems
- Mitigation
- Climate Behaviors
- Geo-engineering
- Adaptation
- Climate Preparedness
- Disaster Recovery

Community Capacity Building
Community Engagement
Partnerships
Advocacy
Communications
Surveillance and Monitoring
Institutional Power

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Climate Change and Health: A Framework for Action

Climate Processes and Strategies

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Vulnerability & Resilience

- **Vulnerability**
  - the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of ecological or climate change
  - human populations at higher risk, due to both environmental and individual factors

- **Resilience**
  - the capacity of an ecosystem to respond to a disturbance – for example a flood or drought or pest invasion - by resisting damage and recovering
  - the capacity of an individual, community, or institution to dynamically and effectively respond to shifting climate impact circumstances while continuing to function and prosper

- **Characteristics of resilience or vulnerability** co-exist at the same time in any community or individual.

- Together, the intersection of resources, including social connection, coping mechanisms, exposures, and susceptibility that will determine the extent to which climate change impacts health and well-being.
Individual & Community Climate Vulnerability & Resilience

- Population health status
- Public health infrastructure
- Government function
  - Health, social services
- Food systems
- Infrastructure
  - Transportation, housing
- Economic status
- Social support
- Population density
The Climate Gap
Active Transportation Co-Benefits

• Reductions
  • Air pollution
  • Noise
  • Infrastructure costs
  • Community severance
  • GHG emissions

• Increases
  • Physical activity
  • Social capital

□ Reductions
  ■ Respiratory disease
  ■ Cardiovascular disease
  ■ Diabetes
  ■ Depression
  ■ Osteoporosis
  ■ Cancer Stress

□ Avoidable increases
  ■ Bike/ped injuries
Co-benefits of Sustainable, Local Food Systems

- **Reductions**
  - GHG emissions
  - Pesticide use
  - Synthetic fertilizer use
  - Food miles
  - Antibiotic use
  - Water pollution
  - Soil erosion
  - Biodiversity loss
  - Meat consumption
  - Unsustainable H2O consumption

- **Increases**
  - Access affordable healthy food
  - Rural community strength
  - Agricultural land preservation

- **Reductions**
  - Obesity
  - Cardiovascular disease
  - Cancer (breast, prostate, colorectal)
  - Type II Diabetes
  - Antibiotic resistance
  - Pesticide illness
Heat Resilience Co-Benefits

- Urban greening
  - Places to be active
  - Healthy food access
  - Reduce storm water run-off
  - Decrease flooding risk
  - Replenish groundwater
  - Improve aesthetics
  - Reduce crime

- Reduce heat island effect
  - Reduce heat illness risk
  - Decrease energy consumption
  - Lower energy costs
  - Reduce air pollution
Climate Change and Health

- Climate change has direct impacts on health & well-being
- Climate change is a threat multiplier
  - Climate change exacerbates existing health challenges
- Climate change effects the systems on which human life depends – air, water, food, shelter, security.
- Climate change disproportionately impacts vulnerable populations and disadvantaged communities
- Co-benefits offer many opportunities to simultaneously improve health and address climate change
Mitigation - IPCC 5th Report

- Human-caused CAPS continue to increase (1970-2010);
- Current actions are not consistent with keeping temperature increase to less than $2^0C$
- Without additional measures, project 3.7 to 4.8$^0C$ increase in global mean temperature in 2100 (*high confidence*)
- Require substantial cuts in emissions by mid-century through large-scale changes in energy systems and possibly land use
- Delaying more robust GHG emissions reductions through 2030 will substantially increase difficulty of transition, costs, and narrow options

http://www.ipcc.ch
Public believes climate change is happening & wants government to act now

- There is scientific consensus for climate change 62%
  - Republicans 69%
  - Tea Party supporters 58%
  - African-Americans 86%
- Effects happening now 54%
- Willing to assume costs to address climate change 88%
- Believe climate change preparedness create jobs 60%
- **Local government and states should act** 82%

• Climate change is a public health emergency
• It is our professional and moral responsibility to act now.
Climate Change and Health: A Framework for Action

- Healthy Communities Strategies
  - Social Inequities
  - Community Capacity Building
  - Community Engagement
  - Partnerships
  - Advocacy
  - Communications
  - Surveillance and Monitoring

- Systems
  - Policy, Systems, and Environmental Change
  - Institutional Power

-Mitigation
  - Greenhouse Gas Emissions
  - Global Climate Impacts
  - Local Climate Impacts

- Climate Education
  - Climate Impact Mitigation
  - Intermediate Factors

- Climate Behaviors
  - Climate Change Health & Inequities Impacts

- Geo-engineering
  - Adaptation
  - Climate Preparedness

- Other Environmental Impacts
  - Health Processes and Strategies
    - Living Conditions
    - Health Education
    - Health Risks and Exposures
    - Medical Care / Case Management
    - Public Health Preparedness
    - Health & Inequities Impacts

Health Co-Benefits or Adverse Health Consequences

- Disability and Death
- Health and Social Costs

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Thank you.

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