Climate Change is a Threat to Health

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How are climate and health entwined?
Learning Objectives

• Discuss the link between climate and health
• Outline the impact of climate change on human health
• Commit to one personal change to make a difference in reversing this tide
The Weather and Health

- Climate or weather
Key Points

The planet is getting warmer

• Climate change will
  • Increase frequency and strength of extreme events: floods, droughts, storms

• Warmer climate:
  • Increase risk of heat-related illness/death
  • Allow some diseases to spread more easily
Impact of Extreme Events

Climate change is expected to increase frequency and strength of extreme events:
• floods, droughts, storms

Consequences:
• Threats to human safety
  • Interrupt communications
• Threats to human health
  • Threats to crops
    food shortages: famine, malnutrition
  • Threats to water
    Water-borne, vector-borne illnesses
  • Increase in CO poisoning
    from use of electric generators used during and after storms
• Mental health impact: increased depression and PTSD
Heat Related Illness/Death

- Most common cause of weather related deaths: heat stroke and dehydration
  - Annual heat related deaths are expected to increase 2-7x by the end of the 21st century
- Urban areas are typically warmer than rural: “heat islands”
  - Increase demand for electricity
  - Increase air pollution
  - Increase greenhouse effects
Heat Wave

- Increase risk of heat related illness, dehydration, stress
- Crop loss
- Increase ozone: respiratory harm.
- Most vulnerable:
  - elderly, infants and children, and those with chronic illness as their bodies are less capable of coping with the excess heat
Ozone

Diagram showing the ozone layer in the stratosphere, between 10 to 50 km above the Earth's surface, and the troposphere, between 0 to 10 km above the Earth's surface.
Ozone

• Ozone is the result of pollutants exposed to each other in sunlight
• Component of smog
• If emissions are unchanged, by 2050 unhealthy days in 50 largest US cities would increase by 68%
Increases in Ozone--worse smog!

- Clinically: Damage lung tissue, reduce lung function, inflame airways, increased risk for infection; aggravate asthma, emphysema, chronic lung disease
- Increase need to use health care system
- Especially harmful to children, older adults, outdoor workers
<table>
<thead>
<tr>
<th>Index Values (Conc. Range)</th>
<th>Air Quality Descriptors</th>
<th>Cautionary Statements for Ozone</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 50 (0-60 ppb)</td>
<td>Good</td>
<td>No health impacts are expected when air quality is in this range.</td>
</tr>
<tr>
<td>51 – 100 (61-75 ppb)</td>
<td>Moderate</td>
<td>Unusually sensitive people should consider limiting prolonged outdoor exertion.</td>
</tr>
<tr>
<td>101 – 150 (76-104 ppb)</td>
<td>Unhealthy for Sensitive Groups</td>
<td>Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.</td>
</tr>
<tr>
<td>151 – 200 (105-115 ppb)</td>
<td>Unhealthy</td>
<td>Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children should limit prolonged outdoor exertion.</td>
</tr>
<tr>
<td>201 – 300 (116-374 ppb)</td>
<td>Very Unhealthy</td>
<td>Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.</td>
</tr>
</tbody>
</table>
Climate Sensitive Diseases

• Food borne
• Water borne
• Vector borne
Food Borne Diseases

• Some bacteria grow more rapidly in warm environments: salmonella
  • Cause diarrhea, dehydration, death
• Floods and heavy rains: overflow from sewage treatment into fresh water sources
  • Contaminate food crops
Water-Borne Diseases

- Microbes can spread to humans through contaminated water
- May result from improper disposal of human waste
- Climate changes promotes disease spread
  - Rainfall: helps spread infectious agent
  - Floods: may lead to overflow of sewage
  - Rise in sea level: may contaminate water sources
  - Higher temperatures: promote growth of infectious agent
Water-Borne illness

Examples

• Cholera
• Norovirus
• Naegleria Fowleri
  • “brain eating amoeba”

Prevention

• Improve quality and quantity of drinking water
• Empty standing water
• Chlorinate water
• Hand washing
• Separate human waste from drinking water
  • Proper use of latrines
Vector-Borne Diseases

• What is a vector?
  • Mosquitoes, ticks, fleas, black flies, sandflies
• What does a vector do?
  • Carry disease: protozoa, bacteria, virus
• Climate change promotes vector borne diseases
  • Temperature is warmer
  • Increased precipitation
  • Increased humidity
Why mosquitoes will thrive

- Breed in the standing water that results from the more frequent downpours and flooding associated with climate change.
- Reproduce more rapidly, bite more often and transmit diseases more efficiently at higher temperatures
- Extended range and longer infection seasons
- More vulnerable: developing world
# Vector-Borne Diseases

**Examples**
- Malaria
- Dengue fever
- West Nile Virus
- Bubonic plague
- Lyme disease

**Prevention**
- Avoid areas with outbreaks
- Be aware of peak exposure times and places
- Wear long sleeves and pants
- Check for ticks
- Use bed nets, repellents
What about Arizona?

- Temperatures are rising faster
- Rapid urbanization: heat islands
- Increased number of days with high summertime temperatures and high night time temperatures
- Less precipitation, low river flows
- More ozone/smog-wildfires
Allergens

- Earlier and longer pollen season
- May promote spread of ragweed
  - Highly allergenic
Factors that impact outcome

• Community’s public health readiness
• The characteristics of the at risk population:
  • Age (extremes of age)
    • Currently 12% of the population is over 65 yo
    • 2050: estimate 21% of the population over 65yo
  • gender, socioeconomic status, health status
  • Geographic region/population sensitivity
  • Extent and length of exposure
  • Society’s ability to adapt
EPA Report

• Adaptation will not be enough
What can we do?
<table>
<thead>
<tr>
<th>Action</th>
<th>How to do it</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reduce solid wastes</td>
<td>• Use cloth bags, reuse, recycle, reduce junk mail</td>
</tr>
<tr>
<td>• Reduce hot water used to shower</td>
<td>• Low-flow showerhead</td>
</tr>
<tr>
<td>• Washing and drying clothes efficiently</td>
<td>• Change from hot to cold, lessen # of dryer loads</td>
</tr>
<tr>
<td>• Reduce vehicle miles travelled</td>
<td>• Reduce vehicle miles by 20%</td>
</tr>
</tbody>
</table>
## Go on a Low Carbon Diet

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<th>Action</th>
<th>How to do it</th>
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<tr>
<td>• Fuel efficient driving</td>
<td>• Remove unnecessary weight, do not idle more than 30 sec. keep tires inflated</td>
</tr>
<tr>
<td>• Cut beef consumption</td>
<td>• Eating lower on the food chain, helps you and your footprint</td>
</tr>
<tr>
<td>• Reduce air leaks in your house</td>
<td>• Seal leaks with weather stripping, insulator, sweeps</td>
</tr>
</tbody>
</table>
Go on a Low Carbon Diet

Action
• Convert to energy efficiency lighting
• Maximum energy efficiency in your home
• Use green energy

How to do it
• Install compact fluorescent bulbs, use LED low watt lights
• Insulate walls, floors, attics. Install high efficiency windows
• Call electric co. and ask for clean, green power
Questions?