Health impacts of climate change and
Health benefits of climate change mitigation and adaptation

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“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
Concentrations of Greenhouse Gases from 0 to 2005

Source: IPCC, 2007

- Carbon Dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
Unprecedented Warming

Global Average Near-Surface Temperatures 1850–Apr 2008

Temperature Difference (°C) with respect to the end of the 19th Century

Source: Hadley Centre for Climate Change, Metoffice.gov.uk

Based on Brohan et al. (2008)
World Primary Energy Supply 1850-2000:
The world energy system is increasingly dominated by oil and gas.

- Gas
- Oil
- Coal
- Nuclear
- Hydro +

Hydro + means hydro power plus renewables besides biomass.
Health impacts of climate change

Climate Change:
- Temperature rise
- Sea level rise
- Hydrologic extremes

- Heat
- Severe weather
- Air pollution
- Allergies
- Vector-borne diseases
- Water-borne diseases
- Water and food supply
- Mental health
- Environmental

- Heat stress, cardiovascular failure
- Injuries, fatalities
- Asthma, cardiovascular disease
- Respiratory allergies, poison ivy
- Malaria, dengue, encephalitis, hantavirus, Rift Valley fever
- Cholera, cryptosporidiosis, campylobacter, leptospirosis
- Malnutrition, diarrhea, harmful algal blooms
- Anxiety, despair, depression, post-traumatic stress
- Forced migration, civil

Adapted from J. Patz
Heat Wave Examples

2006 California heat wave
- Daytime temperatures > 100 degrees for 2 weeks
- Record nighttime highs
- > 1 million people lost electricity
- Death toll: 150-450
- Excess ER visits: 16,000
- Excess hospitalizations: 1000

2003 European heat wave
- Death toll > 45,000

1995 Chicago heat wave
- Death toll: 900
Increase in Wildfires

Contributor and a consequence of climate change

Frequency is expected to increase

Increased air pollutants, fine particulates (PM 10 and PM 2.5) and ground-level ozone

Most vulnerable: elderly, children, people with respiratory illnesses
Increased Ozone and Poor Air Quality

Increased risk of ER visits and hospital admissions

Increased risk of **asthma** onset and exacerbations, cardiac **arrhythmias**, **myocardial infarction** and total mortality
Increased temperatures and ground-level CO2 will increase pollen production, longer and earlier pollen seasons.

Increase in allergic rhinitis, asthma and chronic obstructive pulmonary disease.
Zoonotic and Vector-borne Diseases

- Introduction and spread of new diseases
- Increased geographical range and risk of current diseases
- Re-emergence of formerly prevalent diseases
- Prolonged transmission cycles
- Examples: Lyme disease, West Nile Virus, Dengue Fever, Malaria, Chikungunya, Tularemia, Rabies
Water- and Food-Borne Diseases

- Increased air and water temperatures increase the replication, persistence, survival, transmission and range of some pathogens.
- Heavy rainfall and flooding facilitates rapid transportation of pathogens to water supplies.

Source: Living Water International / Flickr
www.water.cc
Deaths Attributed to Climate Change: 150,000 per year
The climate equity gap

Figure 2: Percentage Households Within 6 Miles of any Facility by Income and Race/Ethnicity, California