Climate change and health

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• Climate change is happening

• Climate change affects health

• Action is needed “now”
The Intergovernmental Panel of Climate Change (IPCC) (and Nobel Piece price winner)

- 2500 scientific expert reviewers
- 900 contributing authors
- 450 lead authors from 130 countries
- 6 years
- 1 report
- 4 governmental approval sessions
Global temperature breaks record
Temperature increases everywhere
Extreme weather events increase

Changes in systems are evident

IPCC 2007
Not just warmer, but more variable
IPCC scenarios

IPCC scenarios foresee warming
## Likelihood of extremes increasing

<table>
<thead>
<tr>
<th>Phenomenon, increase of</th>
<th>Likelihood that trend occurred post 1960</th>
<th>Likelihood of continuation of trend based on projections for 21st century using SRES scenarios.</th>
</tr>
</thead>
<tbody>
<tr>
<td>days / nights with low temperatures</td>
<td>Very likely</td>
<td>Very likely</td>
</tr>
<tr>
<td>days / nights with high temperatures</td>
<td>Very likely</td>
<td>Very likely</td>
</tr>
<tr>
<td>warm spells / heat waves</td>
<td>Likely</td>
<td>Very likely</td>
</tr>
<tr>
<td>heavy precipitation events</td>
<td>Likely</td>
<td>Very likely</td>
</tr>
<tr>
<td>area affected by droughts</td>
<td>Likely in many regions since 1970s</td>
<td>Likely</td>
</tr>
<tr>
<td>number of intense tropical cyclones</td>
<td>Likely, since 1970</td>
<td>Likely</td>
</tr>
<tr>
<td>mid- &amp; high-latitude cyclones</td>
<td>Likely</td>
<td>Likely</td>
</tr>
<tr>
<td>incidence of extreme high sea level</td>
<td>Likely</td>
<td>Likely</td>
</tr>
</tbody>
</table>
Projected exposures

- **Water:** By 2050, water availability is projected to decrease by 10-30% over some dry regions at mid-latitudes and in the dry tropics.

- **Food:** At lower latitudes, especially seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1-2°C), which would increase risk of hunger.

- **Air quality:** Future climate change may cause significant air quality degradation by changing the dispersion rate of pollutants, the chemical environment for ozone and aerosol generation and the strength of emissions from the biosphere, fires and dust.

IPCC, wg II SPM, 2007
Climate change will affect, in profoundly adverse ways, some of the most fundamental determinants of health: food, air, water.

Margaret Chan, Director General, WHO
CO$_2$ increases due to fossil fuel burning are the dominant cause of global warming.
Greenhouse gas emission increases
• Climate change is happening
• Climate change affects health
• Action needed
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Health topics in AR4

- Effect of heat and cold
- Windstorms and floods
- Drought, food security
- Vectorborne and other infectious disease
- Occupational health
- UV radiation
- Migration, refugees
- Food quality
- Water and health
- Air quality
Pathways of climate change influencing human health

IPCC 2007
Complexity: different types of evidence for health impacts

- Health impacts of single extreme weather events (heatwaves, floods, storms, droughts);
- Spatial (ecological) studies with climate as explaining factor for distribution of diseases or their vectors
- Cohort studies,
  - Variability from year to year,
  - Short-term weather changes
  - Long-term climate changes.
- Experiments in the field or the lab
Health impacts have already been observed

... gradually through INDIRECT impacts: Infectious diseases, allergies, food, water,....

Allergies:
Earlier, longer, more intensive

Ticks in higher latitudes and altitude
Some examples for indirect health impacts

Sandfly and leishmaniasis

©Lindgren & Naucke
Some examples for indirect health impacts

Diarrhea diseases

Source: Checkley et al, Lancet, 2000
Some examples for indirect health impacts

Schistosoma japonicum

Source: Yang, Vounatsou, et al. 2005
Some examples for indirect health impacts: Food safety

- Temperature influences the transmission of salmonella in 35% of the cases in UK, Poland, the Netherlands, Czech Republic, Switzerland and Spain (Kovats et al).

- In some countries the total number of cases in decrease: prevention measures are effective!

% increase in salmonella cases per degree increase in ambient temperature in Wales
“Direct” effect: temperature

- Average temperature
- Total mortality

Optimum temperature
“Direct” effect: temperature

Time series: Maximum Apparent Temperature lag 03, All natural deaths - Summer analysis
The heatwave 2003

Graphique n°1 : Nombre de décès journaliers à Paris et températures minimales et maximales entre le 25 juin et le 19 août 2003
Other extreme weather events
Main causes of deaths globally are climate sensitive

- Each year people are killed:
  - 3.7 million from malnutrition
  - 1.8 million from diarrhoea
  - 1.1 million from malaria

These diseases react to changes in temperature and precipitation
Contribution of climate change to morbidity and mortality by 2000

150,000 deaths and more than 5 million DALYs

Direction and magnitude of change in the future

<table>
<thead>
<tr>
<th>Negative Impact</th>
<th>Positive Impact</th>
</tr>
</thead>
</table>
| Very High Confidence  
*Malaria: Contraction and expansion, changes in transmission season* |  |
| High Confidence  
*Increase in malnutrition* |  |
| Increase in the number of people suffering from deaths, disease and injuries from extreme weather events |  |
| Increase in the frequency of cardio-respiratory diseases from changes in air quality |  |
| Change in the range of infectious disease vectors |  |
| Reduction of cold-related deaths |  |
| Medium Confidence  
*Increase in the burden of diarrheal diseases* |  |
Health impacts of climate change

Density equalling cartogram. WHO regions scaled according to estimated mortality (per million people) in the year 2000, attributable to the climate change that occurred from 1970s to 2000. Gibbs et al, in prep.
• Climate change is happening

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Key messages

• Health models and scenarios show: the Age of diseases from man made climate change has arrived

• Besides sustainable mitigation, adaptation is necessary everywhere;
  – education
  – health system development, access to health services, water and sanitation
  – information, surveillance, early warning
  – new partnerships
Find the mix of mitigation and adaptation

(Holdridge diagram)
Health protection and Mitigation

**BUILDINGS**
- Indoor air pollution
- Heat and cold protection

**TRANSPORT**
- Air pollution
- Traffic injuries
- Physical inactivity

**ENERGY-SUPPLY**
- Occupational risks; Construction and transport

**AGRICULTURE**
- Nutrition
- Water / vector-borne disease

**WASTE**
- Occupational, chemical

**INDUSTRY**
- Occupational risks, mining and transport
Mitigation has positive “side effects”

Health options for energy and transport do not only reduce greenhouse gas emission, but could help avoiding some of the

- 800,000 deaths per year from urban air pollution,
- 1.5 million deaths per year from indoor air pollution
- 1.2 million deaths per year from accidents,
- 1.9 million deaths from lack of physical activity
Adaptation to direct and indirect threats

Climate sensitive infectious diseases:

- Surveillance and monitoring
- Microbiological risk assessment
- Risk management
- Risk communication

Extreme events:

**Anticipation:** Early warning systems
**Early detection:** Real time health information
**Prevention:** National plans, structural and non structural measures, etc
**Response:** Preparedness planning, guidance on health impact assessment, treatment, etc
Healthy cities!
Early warning through webtool (EuroHEAT)
**Kompensations Code**: myclimate_6397245  
**Datum**: 30.01.2008

<table>
<thead>
<tr>
<th>Kompensation CO2-Emissionen</th>
<th>Menge CO2</th>
<th>Projekt Portfolio</th>
<th>Preis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flug von Roma (IT) FCO nach Belfast (GB) BFS via London (GB) LHR Retour, Economy Class, 3’897 km, 1 Reisender</td>
<td>0,847 t</td>
<td>myclimate CHF 40.32 / t</td>
<td>CHF 34.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0,047 t</td>
<td></td>
<td><strong>CHF 34.00</strong></td>
</tr>
</tbody>
</table>
"All scientific work is incomplete - whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. This does not confer upon us a freedom to ignore the knowledge that we already have, or to postpone the action that appears to demand at a given time"


“Having unintentionally initiated a global experiment, we cannot wait decades for sufficient empirical evidence to act. That would be too great a gamble with our children’s future”. Brundtland, G.H, Ex-Director General, World Health Organization. World Ecology Awards Ceremony, St Louis, Missouri, USA, 27 June 2001.
Health at the heart of prevention

• Health system stewardship: collaboration with climatologists and planners in land use and urban design
• Advocacy of "healthy" adaptation and mitigation measures
• Information and awareness rising (foodborne diseases, allergic disorders, and some vector and rodent-borne diseases)

• Systematic collection of information
• Sharing of lessons learnt
• Political will and support for public health approaches are a prerequisite for reducing any health risks and instability resulting from climate change!
Climate change as next great medical advance!? 

• It would not be the first time that environmental policy had substantial benefits for health.

• Could tackling climate be the next great medical advance?

Ian Roberts, BMJ 2008;336:165-166 (26 January)
Key messages

The climate is changing
• It has already affected health;
• All regions in the world are affected;
• Projected climate change-related exposures are likely to affect the health status of millions of people

Adaptive capacity needs to be improved everywhere;
• Critically important will be education, health system development, access, information etc
• Review, development or adjustments of public health activities are necessary
Thanks for your kind attention

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