Health Impacts of Extreme Weather Events
Total number of natural disasters reported. World: 1900-2004

Year
Number of disasters

OFDA created (1964)
CRED created & OFDA began compiling (1973)
EM-DAT created (1988)

Total number of natural disasters reported. World: 1900-2004

EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain, Brussels - Belgium

- Wave (5)
- Wildfire (7)
- Volcano (3)
- Earthquake (1)
- Windstorm (2)
- Extreme Temperature (8)
- Slide (9)
- Flood (6)
- Drought (4)
Natural disasters: 1974-2003
Victims of natural disaster per 100,000 inhabitants: '74-'03
Flooding affects health in Europe

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>total 2000-2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Events</td>
<td>31</td>
<td>25</td>
<td>42</td>
<td>24</td>
<td>23</td>
<td>145</td>
</tr>
<tr>
<td>Death</td>
<td>90</td>
<td>103</td>
<td>421</td>
<td>184</td>
<td>72</td>
<td>870</td>
</tr>
<tr>
<td>Affected</td>
<td>182,591</td>
<td>743,214</td>
<td>1,024,901</td>
<td>66,811</td>
<td>412,278</td>
<td>2,429,795</td>
</tr>
</tbody>
</table>

Source: EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium

The numbers represent the number of people affected.

Flood events 2000-2003
- 1 flood
- 2 - 4 floods
- 5 - 9 floods
- 10 - 16 floods
- No floods registered
Flooding affects health in Europe

1992: 1346 killed in Tajikistan
1993: 125 died in Yekaterinburg, Russia
1996: 86 died in the Biescas campsite, Spain
1998: 147 died in Sarno, Italy
2002: 120 died in Central Europe

Flooding affects health in Europe

**Immediate**: death, injuries, hypothermia

**Medium-term**: gastro-intestinal infections and respiratory diseases

**Long-term**: mental health consequences

**Direct effects**: Drowning, injuries, health implications due to contact with (cold, polluted) water, cardiovascular incidents.

**Indirect effects**:
- Waterborne infections;
- vector-borne diseases;
- food shortage;
- health effects of chemical pollution;
- decrease of health care and emergency service;
- psychosocial disturbances.

Menne 2000
Risk of floods will increase

- Magnitude and frequency of floods are likely to increase;
- Impact of floods increases because more people live in areas at risk of flooding;
- Human activities contribute significantly to increasing the risk of floods.

Christensen et al 2003
Flood events can be mapped:

Map 1  Recurrence of flood events in Europe 1998–2002

EEA 2005
Adapt to flooding by

Primary and secondary preventive measures:

- Building codes, legislation to relocate structures away from flood-prone areas
- Planning appropriate land use
- Floodplains and flood-control structures
- Early warning systems with advice

Locally: better information, better warnings, post-event care
Research gaps have been identified

- Retrospective analysis of flood morbidity and mortality using routine data sources or pre-existing cohorts;

- Impacts of floods on European health care systems;

- Flood early warning systems, current effectiveness;

- Cost benefits of preventing injuries, deaths and morbidity from floods;
Heat is an emerging issue

- The hottest summers since 1880 occurred within the past 15 years;
- Extreme weather events occur more frequently.

Schaer et al 2004
Hot weather causes excess deaths

INVS, 2003

<table>
<thead>
<tr>
<th>Country</th>
<th>Excess deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>England and Wales</td>
<td>2045</td>
</tr>
<tr>
<td>France</td>
<td>14802</td>
</tr>
<tr>
<td>Portugal</td>
<td>2229</td>
</tr>
<tr>
<td>Spain</td>
<td>3166</td>
</tr>
<tr>
<td>Germany</td>
<td>1415</td>
</tr>
<tr>
<td>Switzerland</td>
<td>975</td>
</tr>
</tbody>
</table>

Some risk factors are

Individual:
• being over 60 (Keatinge, WR et al., 2000; Basu, R. and Samet, 2002),
• suffering from pre-existing illness, especially heart and lung diseases;
• mental illness (Kaiser et al., 2001);

Social:
• working in jobs requiring heavy labour,
• living in inner cities and lower-income census tracts, (Basu, R. and Samet, 2002);
• being exposed to low economic status, (Basu, R. and Samet, 2002);
• people with impaired health but also those suffering from poor social conditions are most susceptible to impact of weather changes (Ballester et al., 2003; O'Neill et al., 2003);
• Additional behavioural risk factors (Semenza et al., 1996):
  living alone, being confined to bed, not being able to care for oneself, having no access to transportation, not leaving home daily, social isolation;
Relationship between temperature and emergency hospital admissions in London

- Cardiovascular
- Stroke
- Respiratory
- Renal
Why was France so badly affected?

- **Temperature extreme**
  - high minimum temperatures for a long time

- **Surveillance**
  - Delayed detection of the increase in mortality

- **Institutional failures**
  - Poor communication
  - Hospital/care home staff on holiday
  - Lack of cooling facilities

- **No experience/knowledge**
  - no public health measures in place
<table>
<thead>
<tr>
<th>Purpose of measures</th>
<th>Strategies</th>
<th>Sector involved</th>
<th>Level</th>
<th>How does it work?</th>
</tr>
</thead>
<tbody>
<tr>
<td>To reduce the urban heat island</td>
<td>Increasing green areas. Reducing building density. Maintain and improve ventilation paths through changing the layout and width of streets, orientation of streets in relation to prevailing winds.</td>
<td>Public urban planning</td>
<td>Municipal and Regional</td>
<td>Increases, reflection of short wave radiation; Reduces heating of urban structures by reducing heat release during night time and energy consumption; Provides shade and cooling; Allows cool air to enter the city and increase the wind speed.</td>
</tr>
<tr>
<td>To reduce indoor heating of the buildings</td>
<td>Use of building materials with a high albedo and low heat storage capacity. High thermal insulation. Shading of the windows. Building compact houses with small surface areas of the walls for a given floor area. Building orientation.</td>
<td>Public urban planning, architecture, Private construction firms</td>
<td>Municipal and Private</td>
<td>Reduces solar heating of the building (max. difference of surface temperature between white and black roof: 40 K. Natural ventilation during night.</td>
</tr>
<tr>
<td>To develop a heat health warning system</td>
<td>Meteo and public health offices development of a heat health warning system.</td>
<td>Meteorological and health services-....</td>
<td>Municipal and National</td>
<td>To warn the population and health care services some hours in advance.</td>
</tr>
<tr>
<td></td>
<td>Heat advice to the general public, medical staff and City managers on behavioural measures.</td>
<td>Media</td>
<td>National</td>
<td>Ensure preparedness and awareness of the problem to reduce exposure to heat.</td>
</tr>
<tr>
<td></td>
<td>Medical advice to patients.</td>
<td>Health care staff</td>
<td>Local</td>
<td>Prevent people from dehydration, control medical treatment, increase patient surveillance, etc.</td>
</tr>
<tr>
<td></td>
<td>Create a telephone hot line for advice.</td>
<td>Local</td>
<td></td>
<td>Provide access to information.</td>
</tr>
<tr>
<td>To protect the elderly</td>
<td>Systems to look after elderly.</td>
<td>Health care facilities, hospitals (national, municipal level)</td>
<td>National and Municipal</td>
<td>To ensure that this vulnerable group has access to a cool environment and will take enough liquids.</td>
</tr>
<tr>
<td></td>
<td>Information of hospitals, nurseries etc.</td>
<td>Health care facilities, hospitals (national, municipal level)</td>
<td>Municipal and Regional</td>
<td>To ensure that heat related morbidity is identified and treated in an appropriate way.</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>Schools, media, health care facilities, families. All levels</td>
<td>National– firms</td>
<td>Ensure appropriate behaviour in case of extreme heat events (liquid intake, reduction of exposure to heat etc.).</td>
</tr>
<tr>
<td></td>
<td>Adapt working hours to outdoor thermal environments (e.g. siesta)</td>
<td>National– firms</td>
<td>National– firms</td>
<td>Reduce exposure to heat.</td>
</tr>
</tbody>
</table>
Heat warning systems

Heat health warning systems before and after 2003
Heat is an emerging issue

- Climate change includes warming and increasing climate variability

- Extreme weather events occur more frequently

- The hottest summers since 1880 occurred within the past 15 years

Schaer et al. 2004
Prevention is possible with

**Actors**
City planners
Unions
Housing developers
National Weather Service

**Physical action**
Heat shelters
Changing roof Tops
Planting trees
Forecasting

**Media/ network**
Social services
Flyers
Neighbourhood meetings
Local TV and Radio
Internet

**Social action**
Risk communication
Community heat education
Community “buddy” system
Thanks for your attention!

Bettina Menne
bme@ecr.who.euro.int

http://www.euro.who.int/globalchange