Climate change and health

Dr Bettina Menne

WHO

Regional Office for Europe
Figure 3.1. Pathways by which climate change affects human health (modified from reference 2)

Source: WHO, WMO, UNEP: Climate Change and Human Health – Risks and Responses; Summary; 2003
Content

• What are the observed climatic changes?
• Has population health been affected?
• What are future potential changes, and How could health be affected?
• What actions are needed?
Temperature deviation, compared to 1961-1990 averages

Source: KNMI 2005
Rate of change since 1850

Rate of change (°C/10 year)

Source: KNMI 2005
What is the trend and rate of change in the European annual and seasonal temperature?

Source: KNMI 2005
Change in frequency of days with temperatures above 25°C in Europe, in the period 1976-1999

Source: KNMI 2005
Lengths and start of growing season

Length of growing season, Finland

Carter, 1998
Similar patterns in other biological systems

- Northward movement of range of plankton and fish in Northsea;
- Upward shift of the tree line in mountains;
- Invasion of laurophyllous evergreen species in forests and upward shift of pine mistletoe in Alps;
- Disappearance of palsa mires in Lapland;
- Increased species richness and frequency at altitudinal margin of plant life in Fennoscandia;
- Change in high mountain vegetation types and new occurrence of alpine vegetation on high summits in high mountain;
- Increased in growing season wine-grape and changes in wine quality in France;
- Advance in the beginning of growing season for fruit trees in Germany;
- Decrease in thickness and areal extent of permafrost in Northern Russia.

Sources: Brander and Blom, 2003; Kullman, 2002; Camarero and Gutiérrez, 2004; Shiyatov et al., 2005; Walther, 2004; Dobbertin et al., 2005; Luoto et al. 2004; Klanderud and Birks, 2003; Klanderud and Birks, 2003; Peñuelas and Boada 2003; Petriccione, 2003; San Elorza and Dana, 2003; Duchene and Schneider, 2005; Jones and Davis, 2000; Chmielewski, et al., 2004; Mazhitova et al., 2004; Frauenfeld et al., 2004
Evidence is growing that climate change is already affecting health.
Species in higher latitudes or altitudes

Spread of *Ixodes ricinus* was observed in higher
- latitudes (Sweden: milder winters, early arrival of springs) (Lindgren et al)
- altitudes (the Czech Republic: shift from 700 to 1,100 m) (Daniel et al, 2003)

Leishmania
- New endemic areas have been detected in northern Italy, North Croatia, Switzerland and Germany. (Lindgren and Naucke, 2005)

Source: adapted from Lindgren, 2001; Daniel, 2003 and 2004; Lindgren and Naucke, 2006)
In Europe the pollen season is expanding: on average it has increased by 10–11 days over the last 30 years (Menzel, 2001).

An earlier onset followed by a prolonged exposure implies a longer and possibly heavier period of symptom occurrence;

The introduction of new aeroallergens into an area, increases sensitization;

The introduction of **new invasive plant species** with high allergenic pollen, in particular ragweed (*Ambrosia artemisiifolia*), present important risks to human health.

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The risk of dying in heat is increasing

Perceived temperature on 8 August 2003 and August heat mortality
Mortality changed with degree increase of temperature

City-specific and pooled estimates of the effect of high apparent temperatures on mortality for all causes

The effect is expressed in terms of % variation in mortality associated to 1°C increase in exposure.

PHEWE, forthcoming
Excess heat attributable deaths by city, 75+ years

Deaths due to linear effect above the threshold of max apparent temperature
Deaths due to cumulative (up to lag 30 days) effect above the threshold of max apparent temperature
Confounding with air pollutants in summer

All air pollutants have statistically significant main effects on the daily total number of deaths. An increase of 10μg/m³ in these pollutants is associated with a 0.5-1.0% increase in the daily number of deaths.

Percent increase in the total daily number of deaths for an increase of 10μg/m³ in various pollutants in the warm season (March-October)

Phewe, forthcoming
Temperature influences the transmission in 35% cases in England, Poland, the Netherlands, Czech Republic, Switzerland and Spain (Kovats et al).

In some countries salmonella cases are decreasing, which shows that measures and policies can be effective. These diseases show seasonal variations.
Floods affect 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

Temperature (°C)

Year

IPCC estimates (2001): c. 1-5°C

Best estimate

High

Low

2050

1900

2000

2100

2.5°C

1.2°C
Increase in vulnerability?

9% of all European coastal zones are below 5 m elevation

2.5 million people at risk annually

EEA, 2005

Average sea levels are rising about 1.7mm/yr globally
Some projections are strong

Data source: Henrichs and Alcamo, 2001. Hadley Centre HadCM3 model, baseline scenario
Europe is aging

Figure 3. Proportion of population above age 80 in Western Europe (UN “low” scenario for 2100 = 0.17, UN “high” scenario = 0.07).

Lutz, 2002
Will inequalities further increase?

GDP and gini index

GDP per capita (US$) 2002

WHO Euro, 2005
Scenario studies on heat

• United Kingdom (Donaldson et al. 2001)
  – Medium-high climate change scenario results in an estimated annual 2800 heat deaths in the UK in the 2050s (250% increase). Greater reductions in cold-related mortality.

• Lisbon, Portugal (Dessai 2003)
  – Increases in heat related mortality by 2020s to range of 5.8-15.1 deaths per 100,000, from baseline of 5.4-6 deaths per 100,000
Contraction and expansion?
Predicted change by 2050

Change in population at risk = + 25 mill
What mix of mitigation/adaptation is possible?

(Holdridge diagram)
The costs of inaction are high

For the city of Rome the monetized mortality damages in the absence of adaptation programs are estimated to be €281 million for the year 2020 (2004 Euro)

Alberini and Chiabai, 2005
In summary

• Climate change affects health and will affect health
• Anticipatory thinking is needed to link the multiple global change exposures to anticipate risks to human health
• Adaptation strategies are needed to anticipate, detect and prevent the health effects
• Without the reduction of greenhouse gases in the long run adaptation will not be sufficient
The WHO EURO Global change and health programme

http://www.euro.who.int/globalchange
Climate change and adaptation strategies for human health

http://www.euro.who.int/globalchange
dgr@ecr.euro.who.int
bme@ecr.euro.who.int

WHO Regional Office for Europe
European Centre for Environment and Health