Climate Change
and Non-Communicable Diseases

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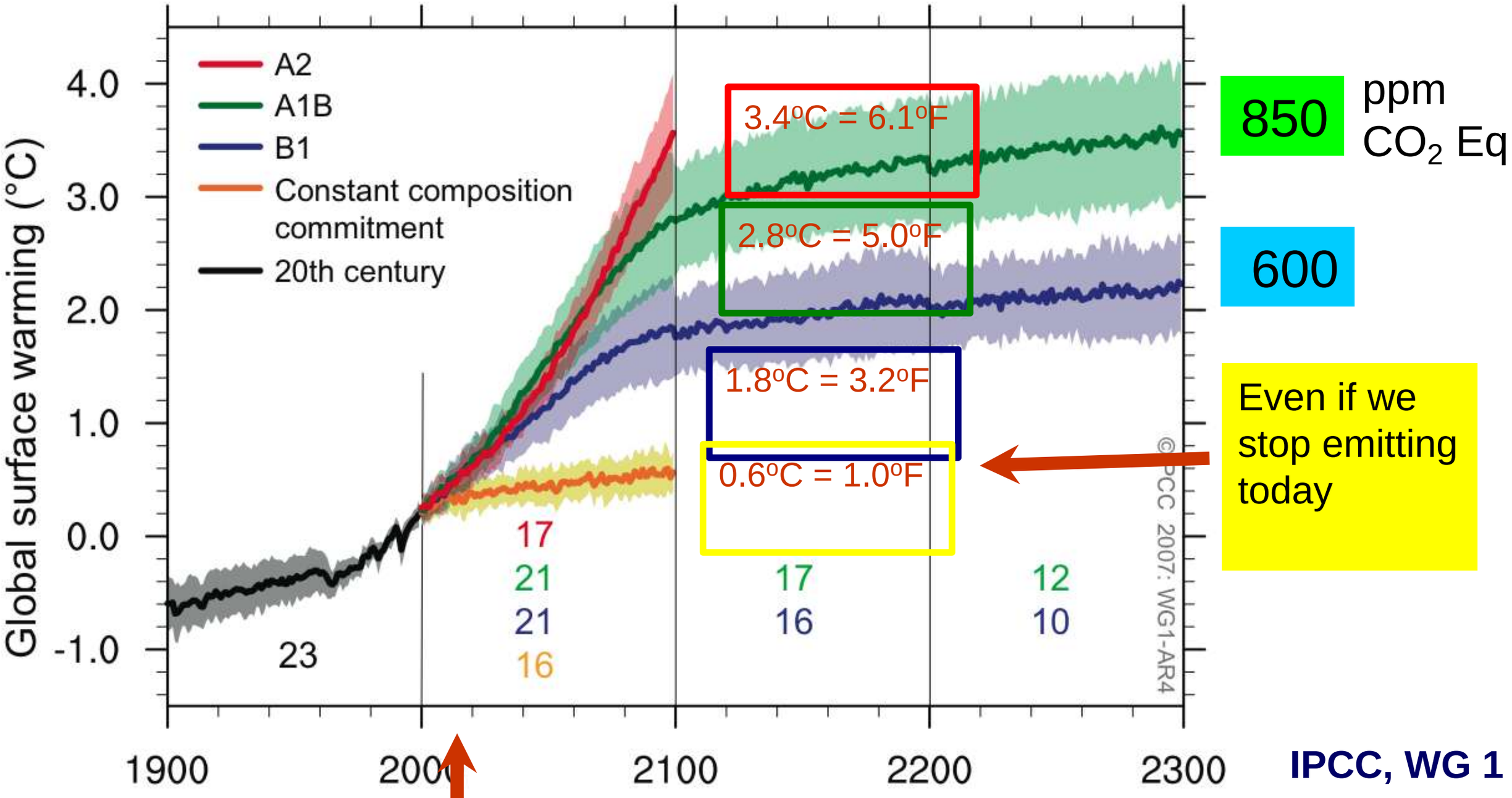
What will happen, and what could happen?



850 ppm CO_2 Eq

600

Even if we stop emitting today

IPCC, WG 1

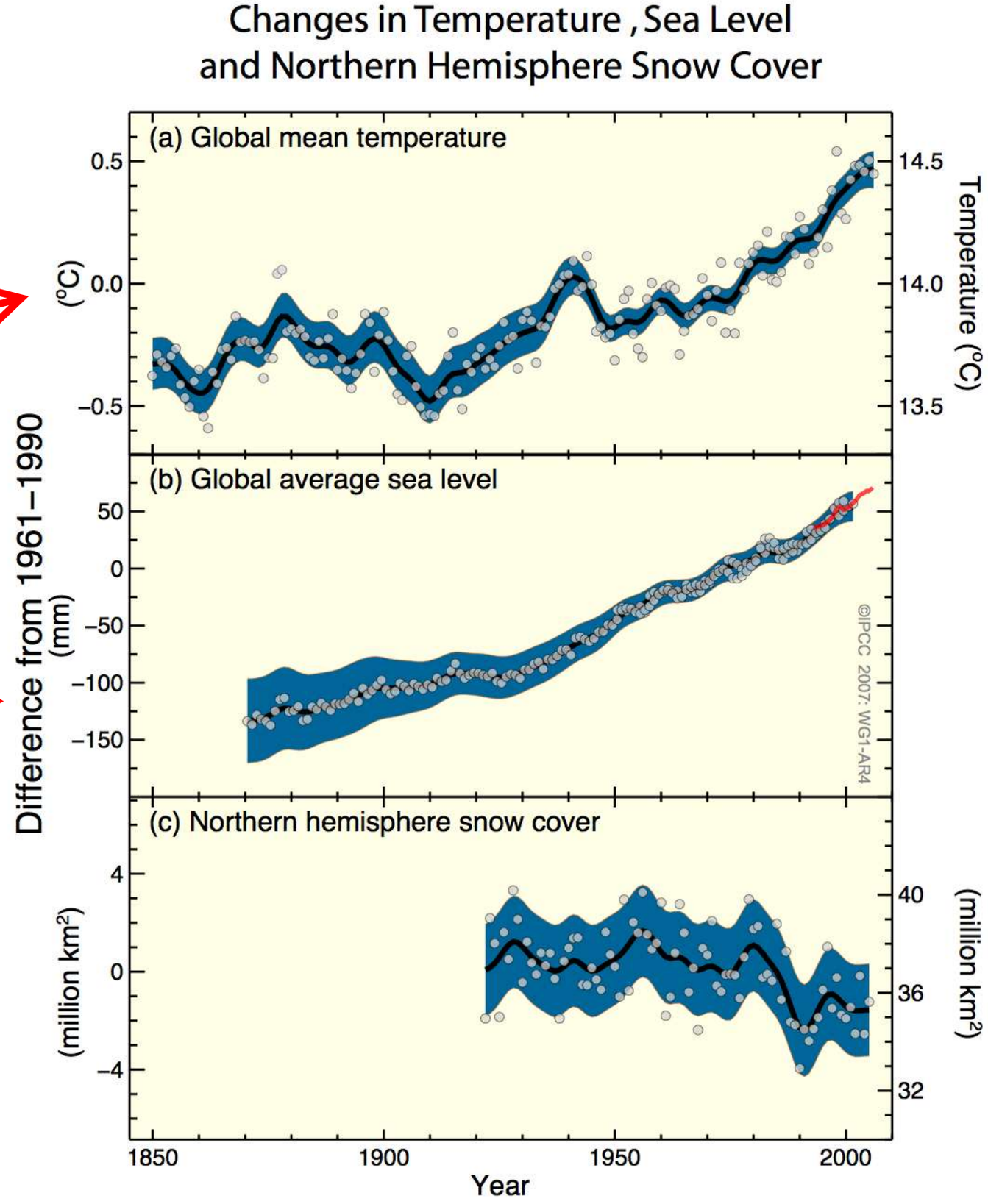
World Health Organization

Warming is Unequivocal

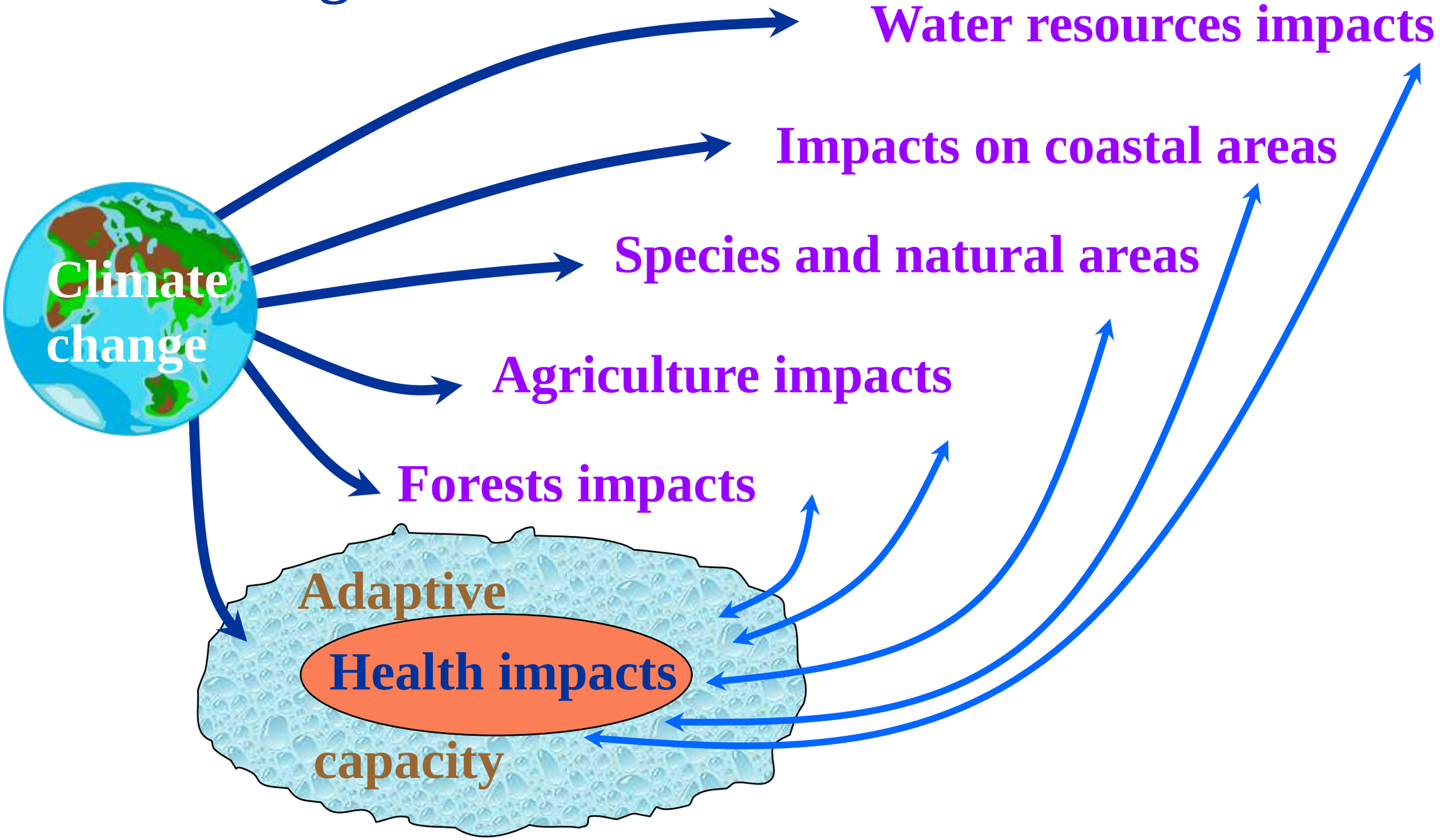
Rising atmospheric temperature

Rising sea level

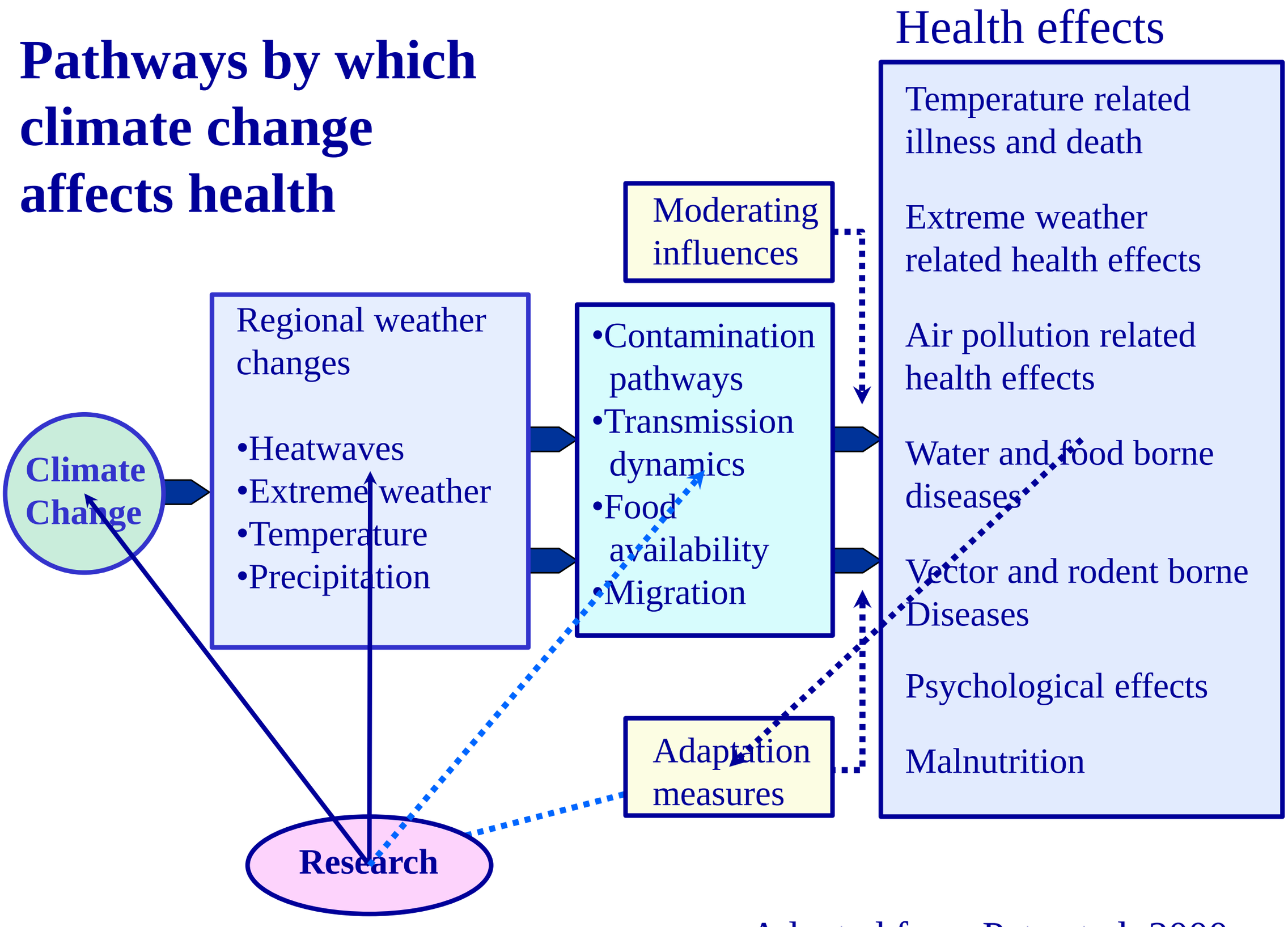
Reductions in North Hemisphere snow cover



Human health impacts and vulnerability to climate change

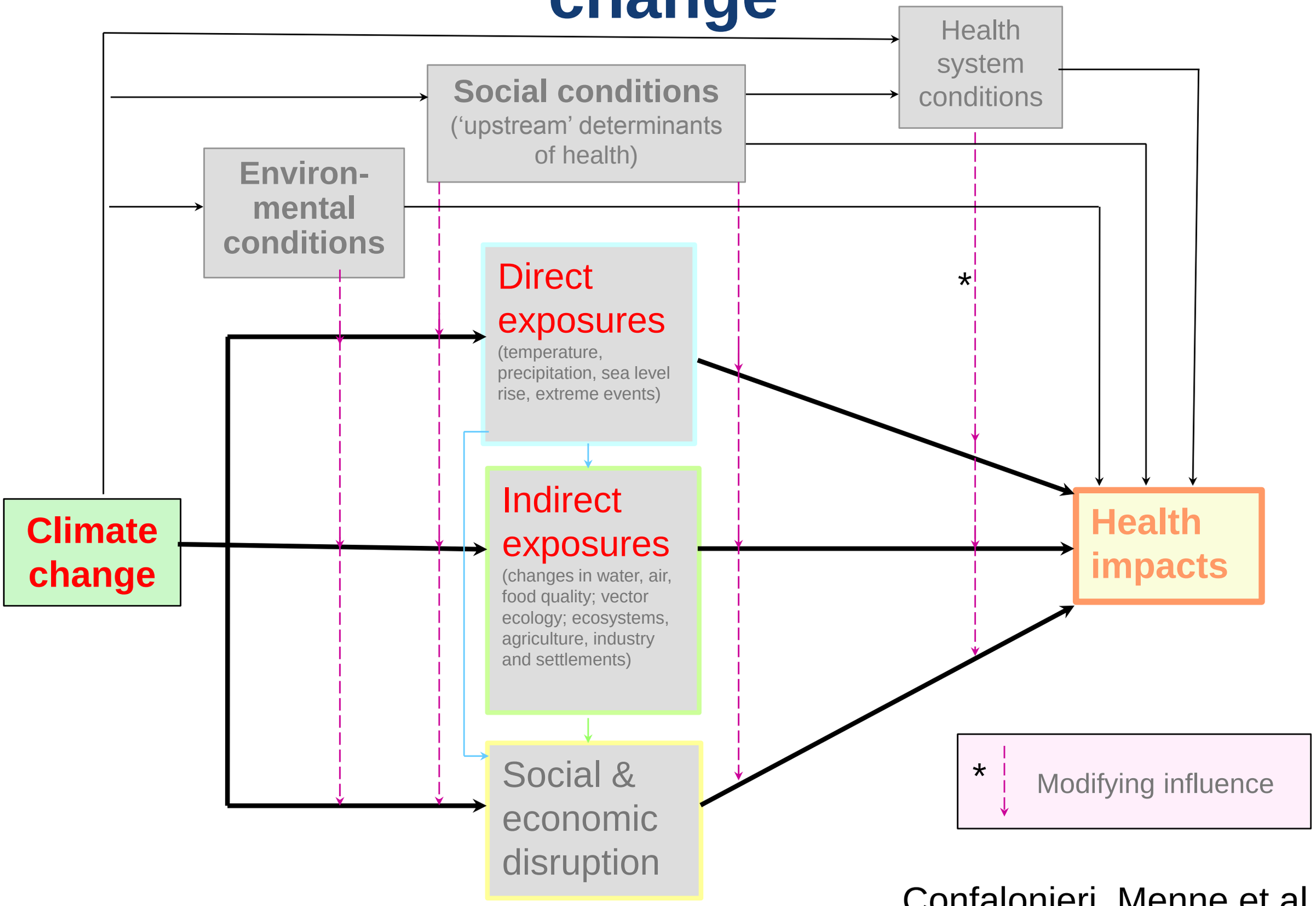


Pathways by which climate change affects health



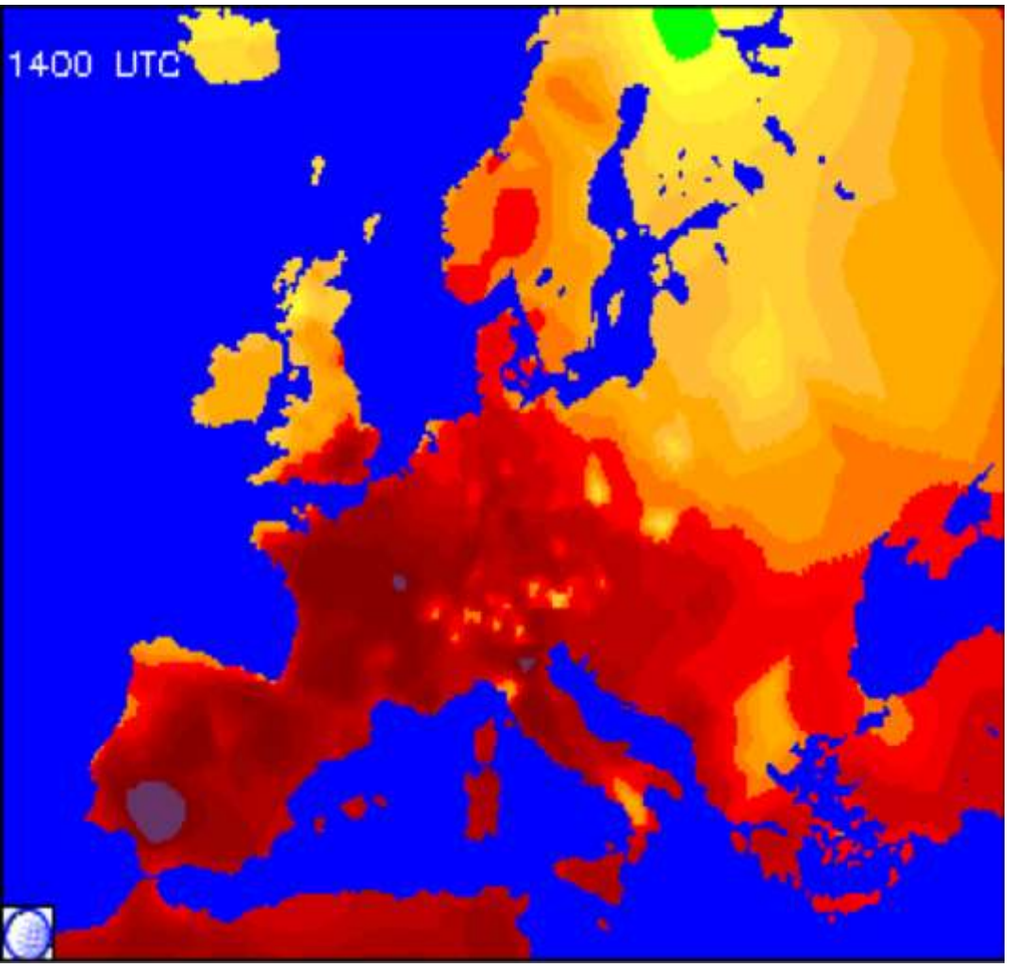
Adapted from Patz et al, 2000

The relationship between health and climate change



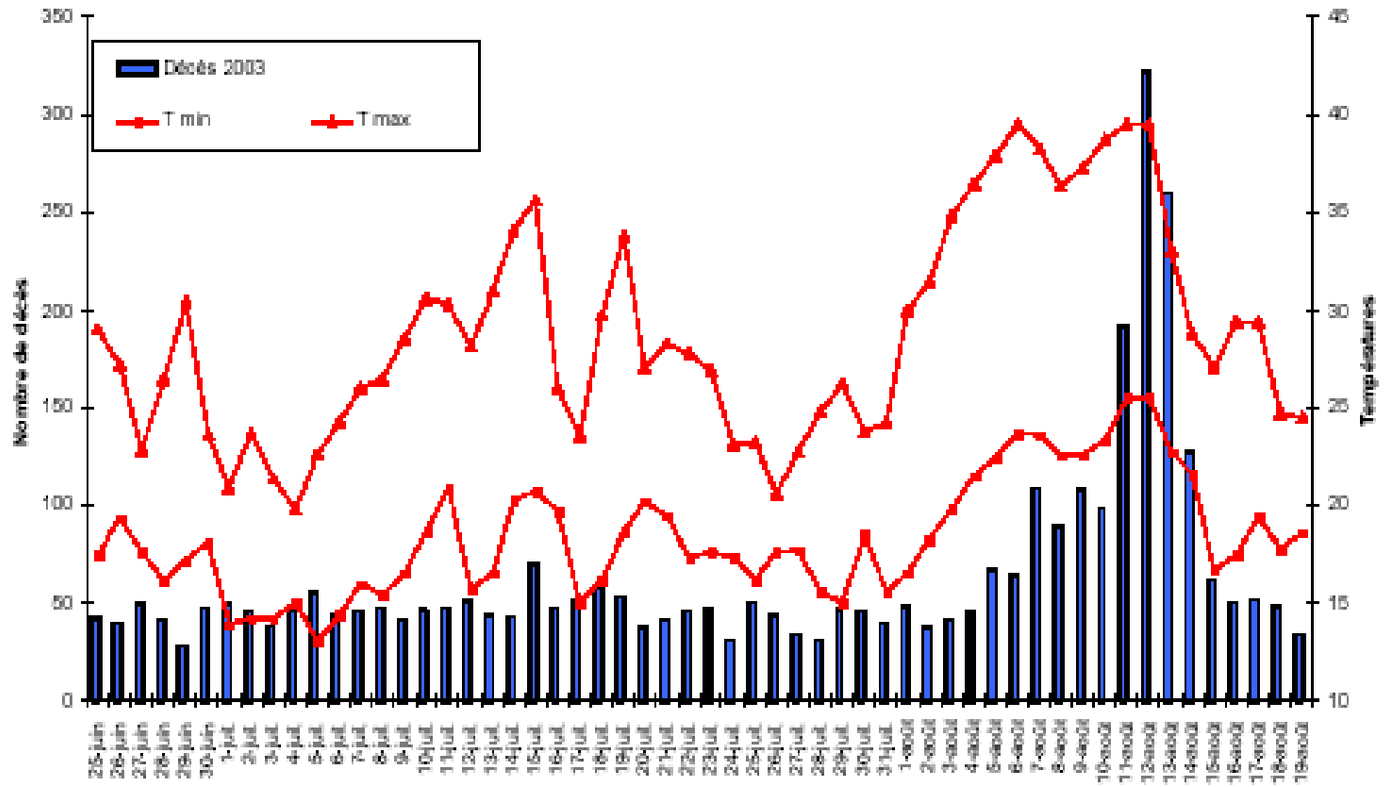
Confalonieri, Menne et al, 2007

Heat waves



European temperatures, Summer 2003

Graphique n°1 : Nombre de décès journaliers à Paris et températures minimales et maximales entre le 25 juin et le 19 août 2003



Deaths During Summer Heatwave. Paris Funeral Services (2003)

World Health Organization

Climate Change and Respiratory Health

Increased number of deaths and acute morbidity due to heat waves

Increased frequency of cardio-respiratory events due to higher concentrations of ground level of O_3

Change in frequency of respiratory diseases from transboundary long-range air pollution (e.g related to fires, aerosols)

Altered spatial and temporal distribution of allergens and some infectious disease vectors

Source: Environment and human Health Committee of the European Respiratory Society (ERS) Climate change and respiratory disease: a position statement

Risk of dying on days with temperature of 30°C (lag 0-1) vs of 20 °C in people age 65+

Acute conditions (ICD-9 code)	%	OR (95% CI)* (unadjusted)	OR (95% CI)* (age-adjusted)	REM index† (p value)
Cardiovascular diseases				
Acute myocardial infarction (ICD-9: 410)	3.9	1.16 (0.90 to 1.51)	1.19 (0.90 to 1.56)	0.88 (0.374)
Diseases of pulmonary circulation (ICD-9: 415–417)	0.9	1.82 (1.06 to 3.14)	2.07 (1.04 to 4.12)	1.55 (0.215)
Cardiac dysrhythmias (ICD-9: 427)	3.1	1.16 (0.86 to 1.57)	1.18 (0.86 to 1.61)	0.88 (0.415)
Heart failure (ICD-9: 428)	5.9	1.66 (1.33 to 2.07)	1.69 (1.34 to 2.14)	1.28 (0.047)
Cerebrovascular diseases (ICD-9: 430–438)	12.9	1.60 (1.39 to 1.85)	1.59 (1.37 to 1.84)	1.22 (0.019)
Respiratory diseases				
Pneumonia (ICD-9: 480–486)	4.2	1.43 (1.12 to 1.83)	1.48 (1.14 to 1.91)	1.10 (0.468)
Chronic pulmonary diseases (ICD-9: 490–505)	1.7	2.08 (1.33 to 3.26)	2.48 (1.50 to 4.09)	1.87 (0.015)
Other diseases				
Acute and chronic liver diseases (ICD-9: 570–572)	2.2	1.03 (0.67 to 1.58)	1.21 (0.61 to 2.43)	0.90 (0.776)
Renal failure (ICD-9: 584–588)	2.4	0.88 (0.62 to 1.24)	0.91 (0.64 to 1.31)	0.68 (0.035)

*Odds ratio (OR) and 95% confidence intervals (CI).
†REM, relative effect modification index is calculated as the ratio between the specific OR and the OR from the reference category (from the age-adjusted model).

4 italians cities 1997-2004

Stafoggia M, 2008

Climate and respiratory health in children

Previous studies

↓ temperature range

↓ relative humidity range

Asthma ↑ with:

↑ temperature in coldest month

↑ mean annual temperature

Droughts

- Droughts due to extreme weather
- Usually much larger than flood-related regions
- Another pollutant of concern is "particulate matter," also known as particle pollution or PM
- Increased concentration of PM pollution in the air by affecting natural or “biogenic” sources of PM such as wildfires and dust from dry soils

Short Term Flood Effects

- Injuries, exposure to toxic pollutants
- Excessive rainfall facilitates entry of human sewage and animal wastes into waterways and drinking water supplies, increasing the risk of water-borne diseases

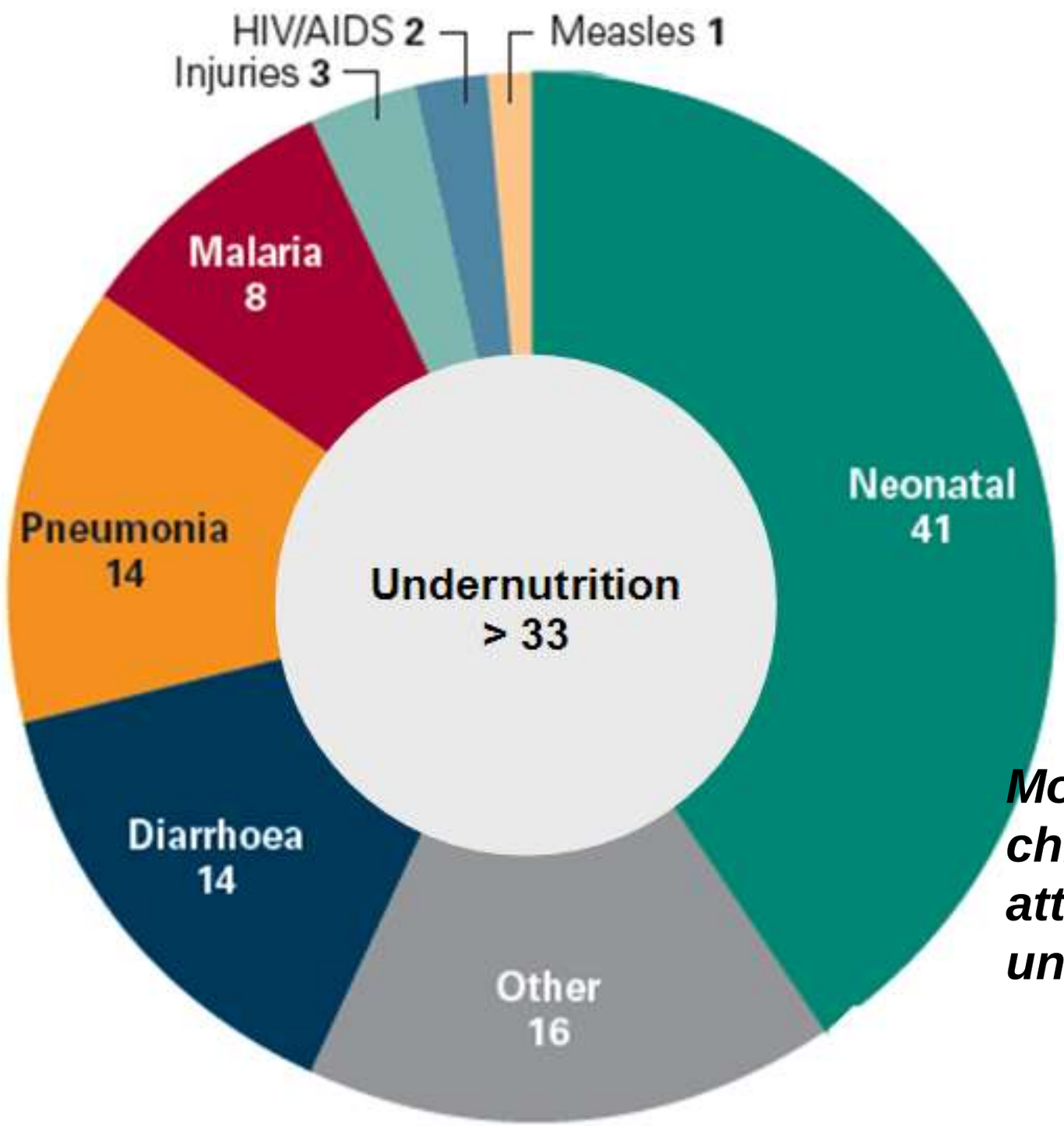
Longer Term Flood Effects

- Other effects of flooding may appear later
- These include malnutrition, caused by crop loss, and mental health disorders resulting from the stress of flood-related problems

Additional Problems

- McMichael *et al*. (2006) in The Lancet --) IPCC modelling indicates a future increase of 5-10% in the number of malnourished people
- Conflicts over food, together with migrant and refugee flows likely to result from these wider-ranging effects would create additional problems

Causes of deaths among children under age five, 2008



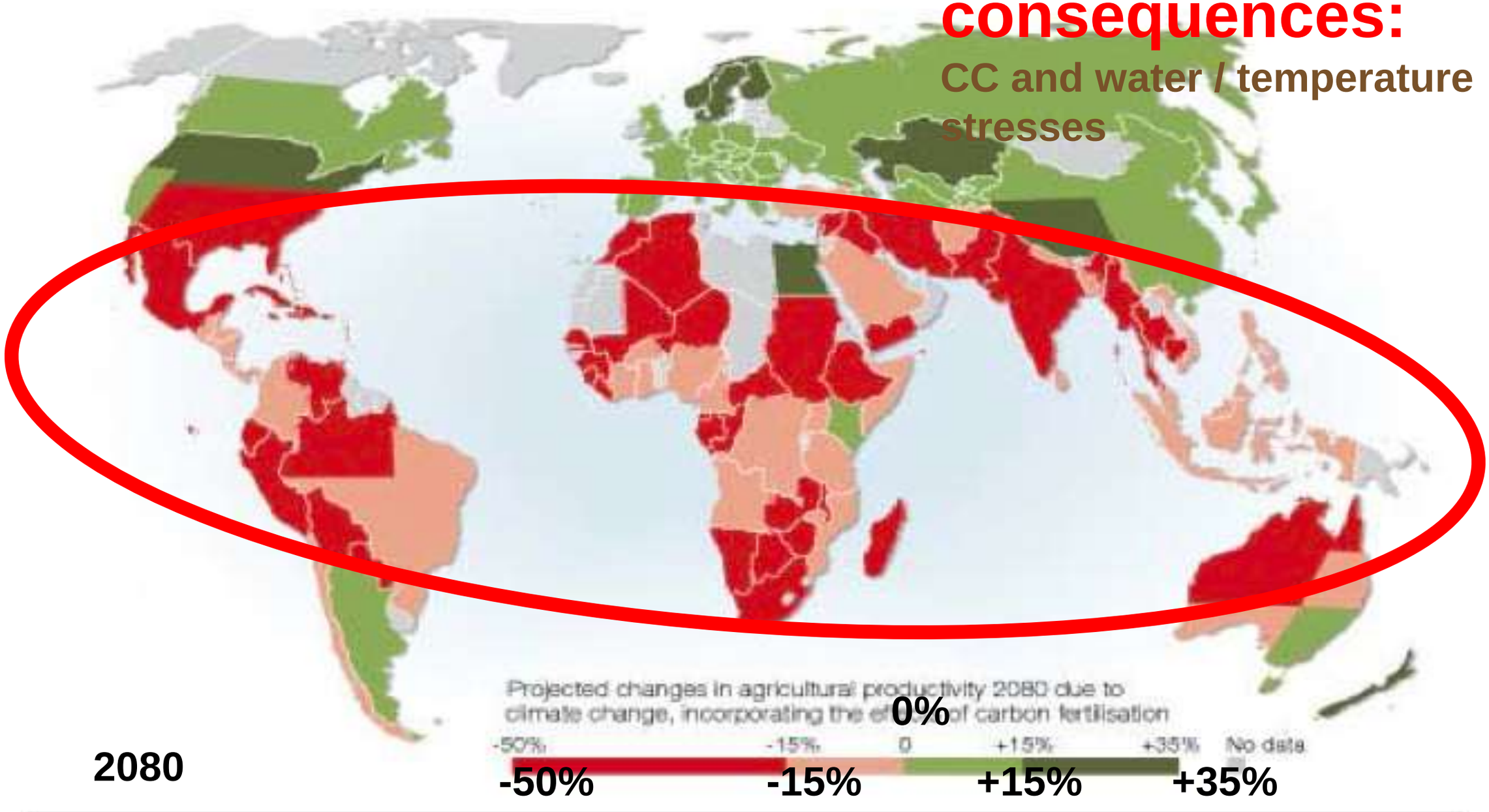
More than one-third of child deaths are attributable to undernutrition

***Source**:* Black et al. 2010, *Lancet*

Understanding the consequences:

CC and water / temperature stresses

Projected losses in food production due to climate change by 2080.



Source: The environmental food crisis - the environment's role in averting future food crises. A UNEP rapid response assessment. United Nations Environment Programme, February 2009, www.grida.no, page 46, quoting: Cline, W. R. (2007). Global warming and agriculture: Impact estimates by country.

The potential for immediate, local and large cobenefits

Policies that cut greenhouse gas emissions can also reduce:

The 800,000 annual deaths from urban air pollution, and the 1.5 million from indoor air pollution

The loss of 1.9 million lives, and 19 million years of healthy life, from physical inactivity

The 1.2 million deaths and over 50 million injuries from road traffic accidents

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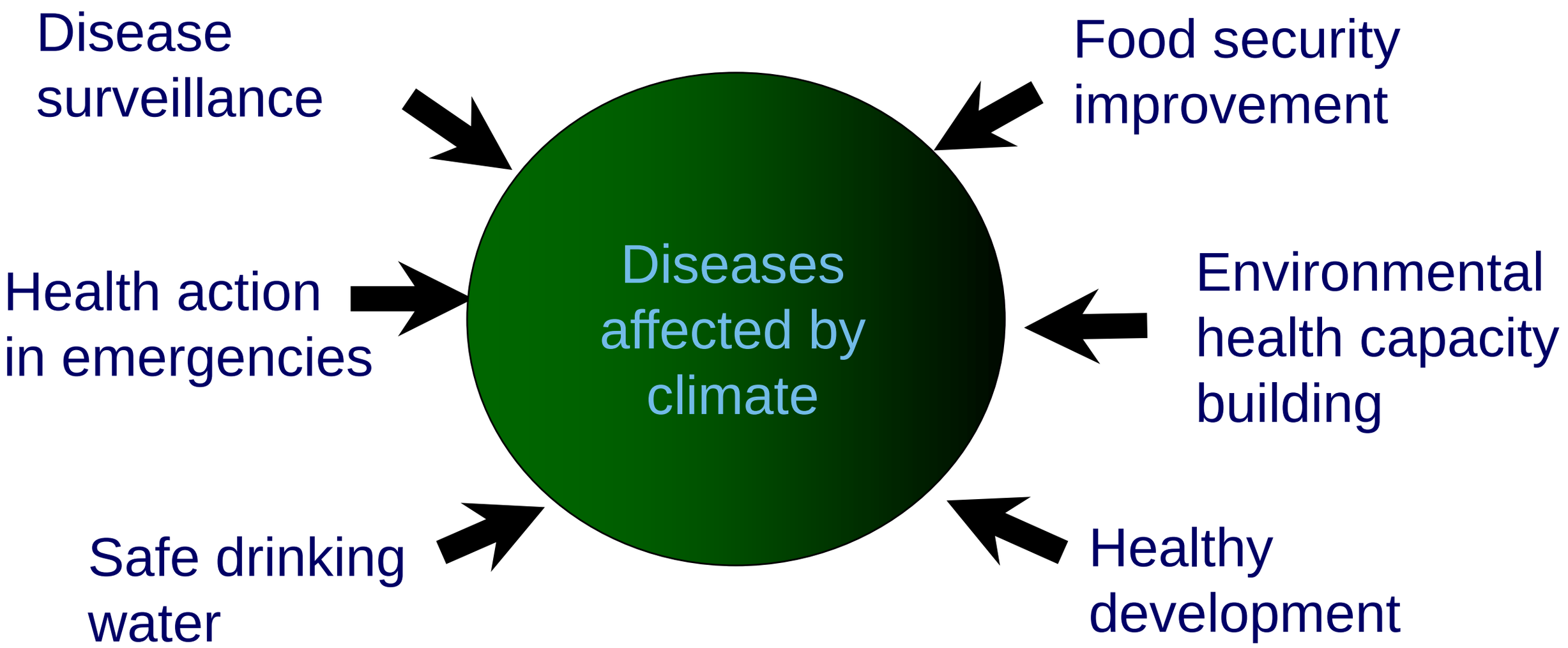
WHO, 2002, 2006

World Health Organization

Health sector actions as climate change adaptations

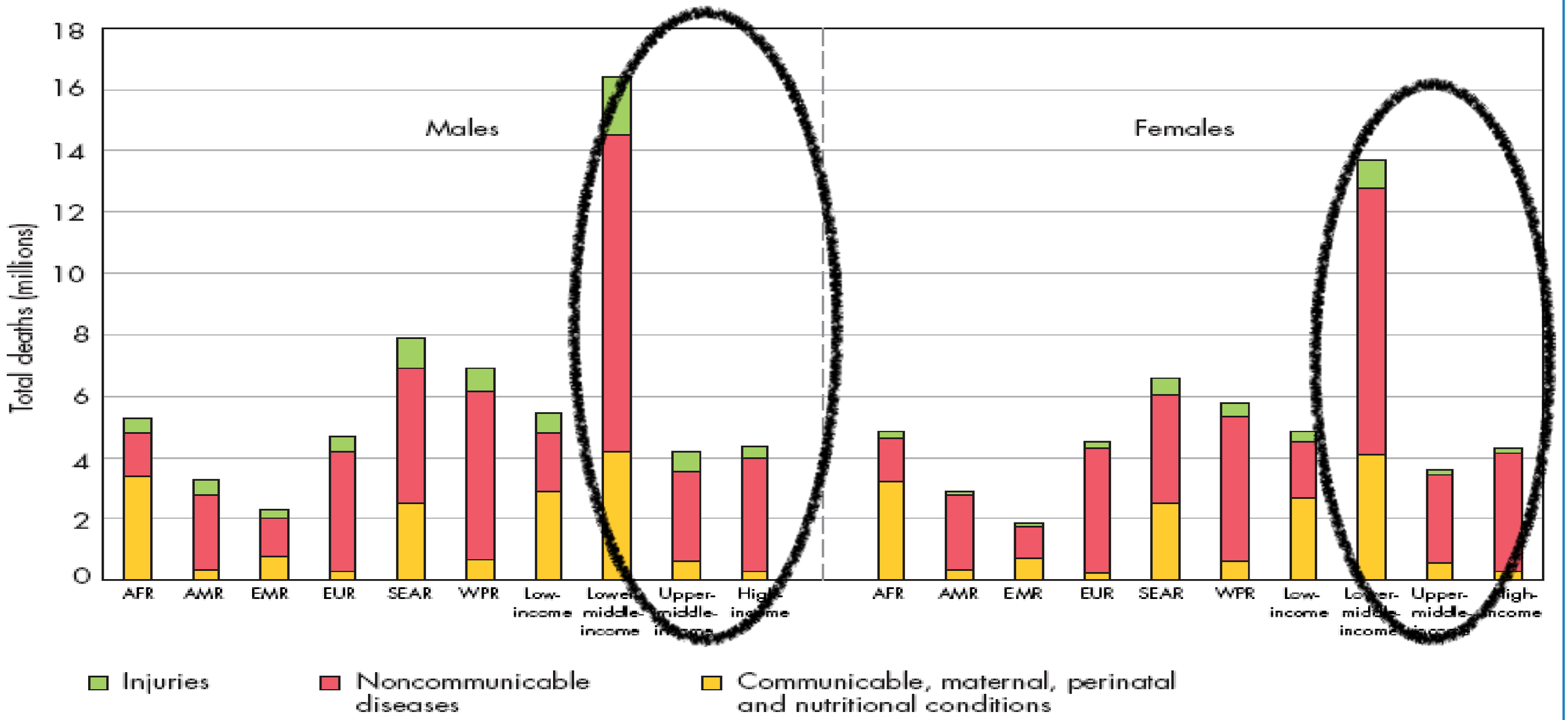


World Health Organization

United Nations System

Standing Committee on Nutrition

Total deaths by broad cause group Region and by sex



(Note: AFR=African Region, AMR=Region of the Americas, EMR= Eastern Mediterranean Region, EUR= European Region, SEAR=South-East Asia Region, WPR=Western Pacific Region).

Source: Global status report on non-communicable disease (WHO, April 2010)

Adaptive actions for the health sector:

primary adaptive measures: **actions taken to prevent the onset of disease arising from environmental disturbances**, in an otherwise unaffected population (e.g. early warning systems for disasters, integrated environmental management)

secondary adaptive measures: preventive **actions taken in response to early evidence of health impacts** (e.g. strengthening disease surveillance and responding adequately to clusters of diseases)

tertiary adaptive measures: health-care **actions taken to lessen the morbidity or mortality** caused by the disease (response and recovery from disaster)

“Adverse health impacts will be greatest in low-income countries. Those at greater risk include, in all countries, the urban poor, the elderly and children, traditional societies, subsistence farmers, and coastal populations (high confidence).” (IPCC AR4, 2007)