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Cambiamento climatico e salute

Worklimate

Roma Marzo 2023

MRC-HPA Centre for Environment & Health
Imperial College London
MRC Medical Research Council
Health Protection Agency
KING'S College LONDON

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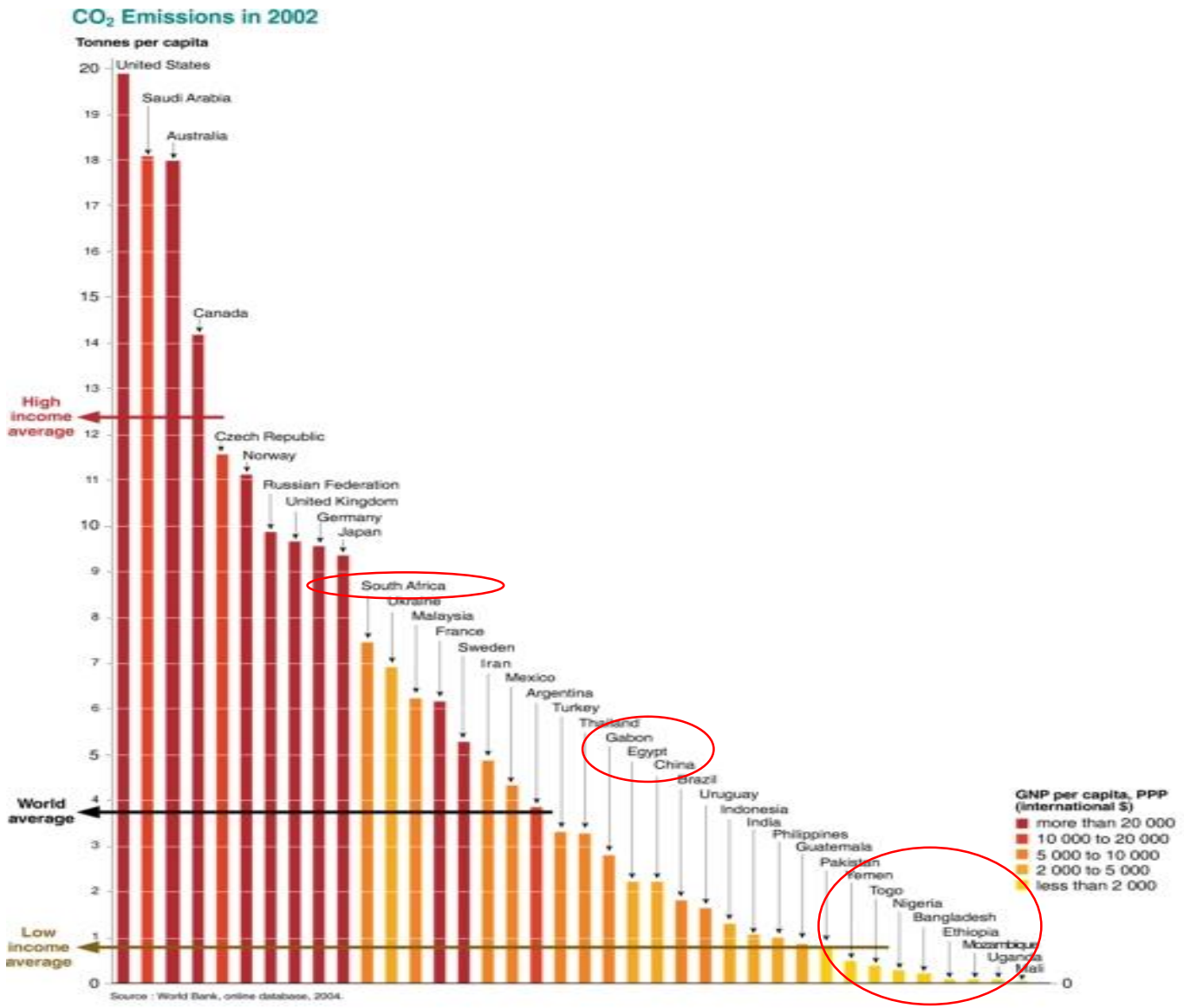
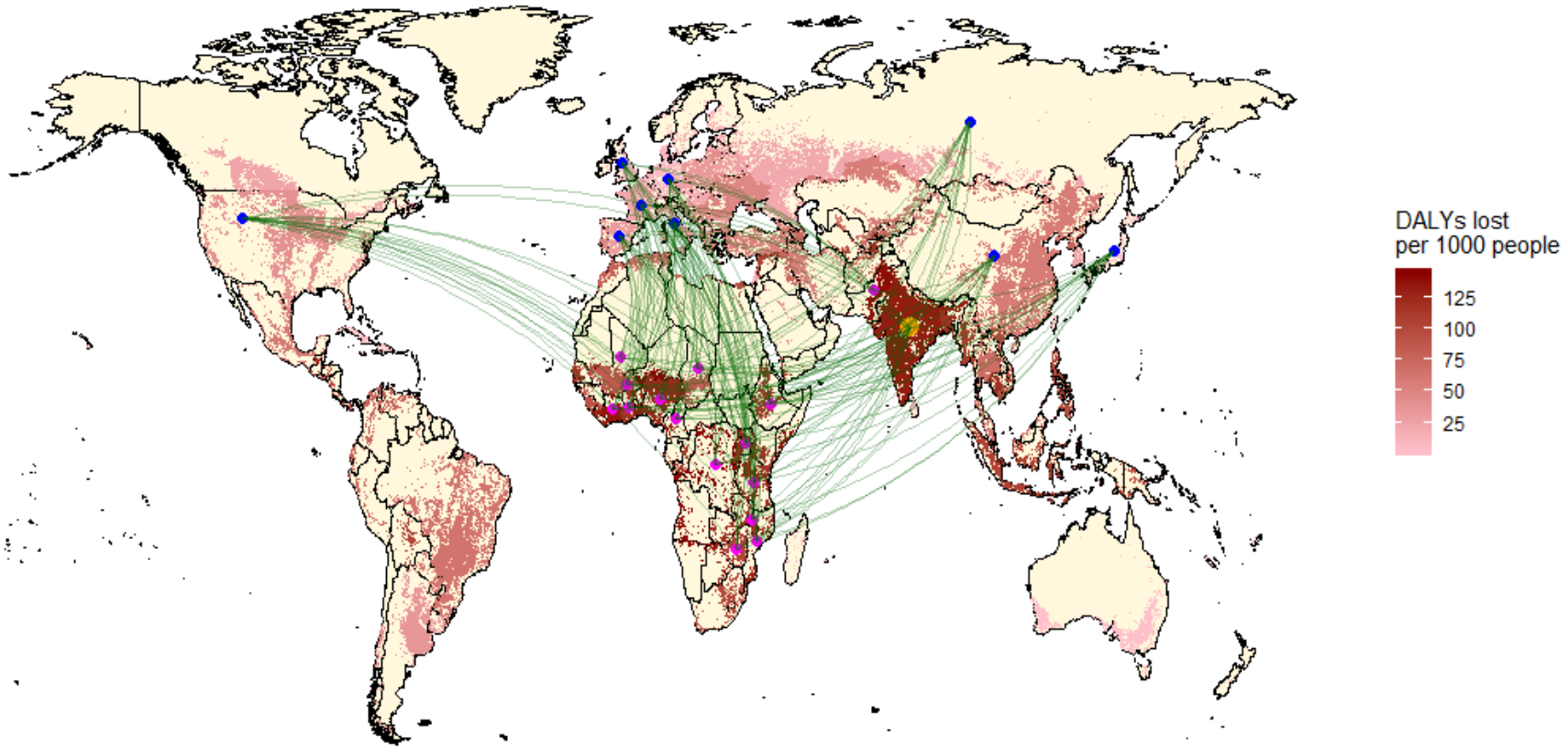
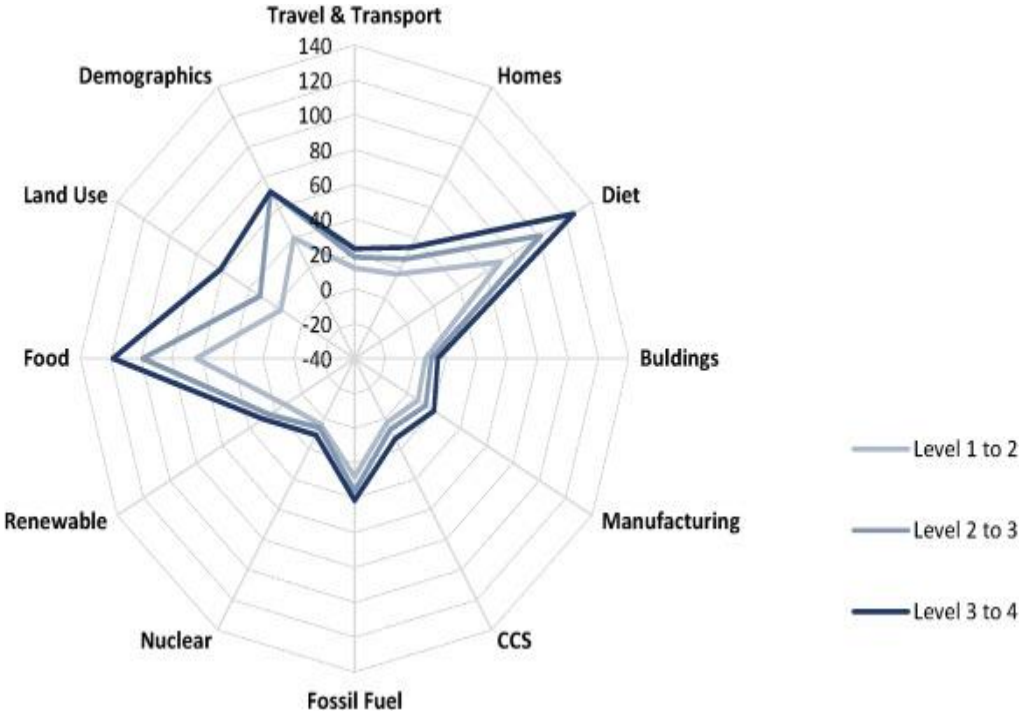
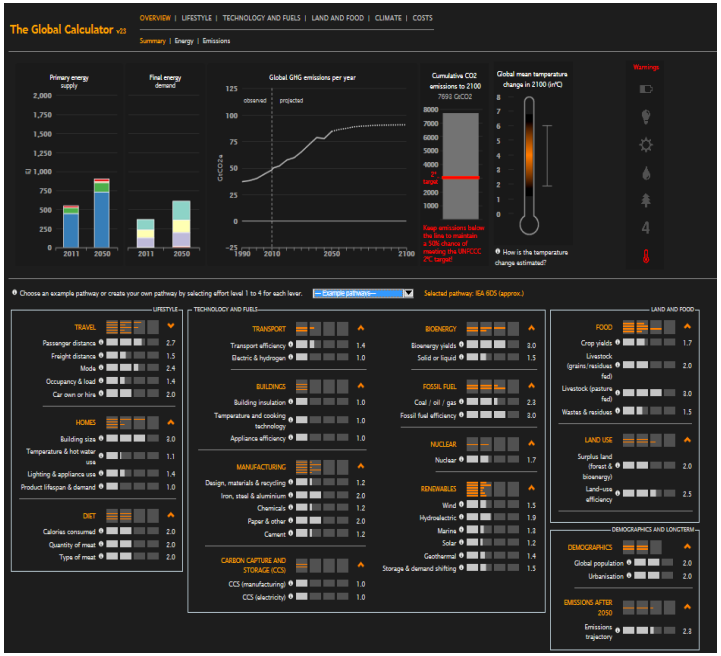
CO2 Emissions by country (2002)



Flow map of the top trade routes of disease implicated commodities: Note that the green lines directly link the agriculture producing countries, where disease burdens are incurred (magenta circles), and the top nine final consumer countries (blue circles). India is both an importer and sufferer. (courtesy H Shah, K Murray)

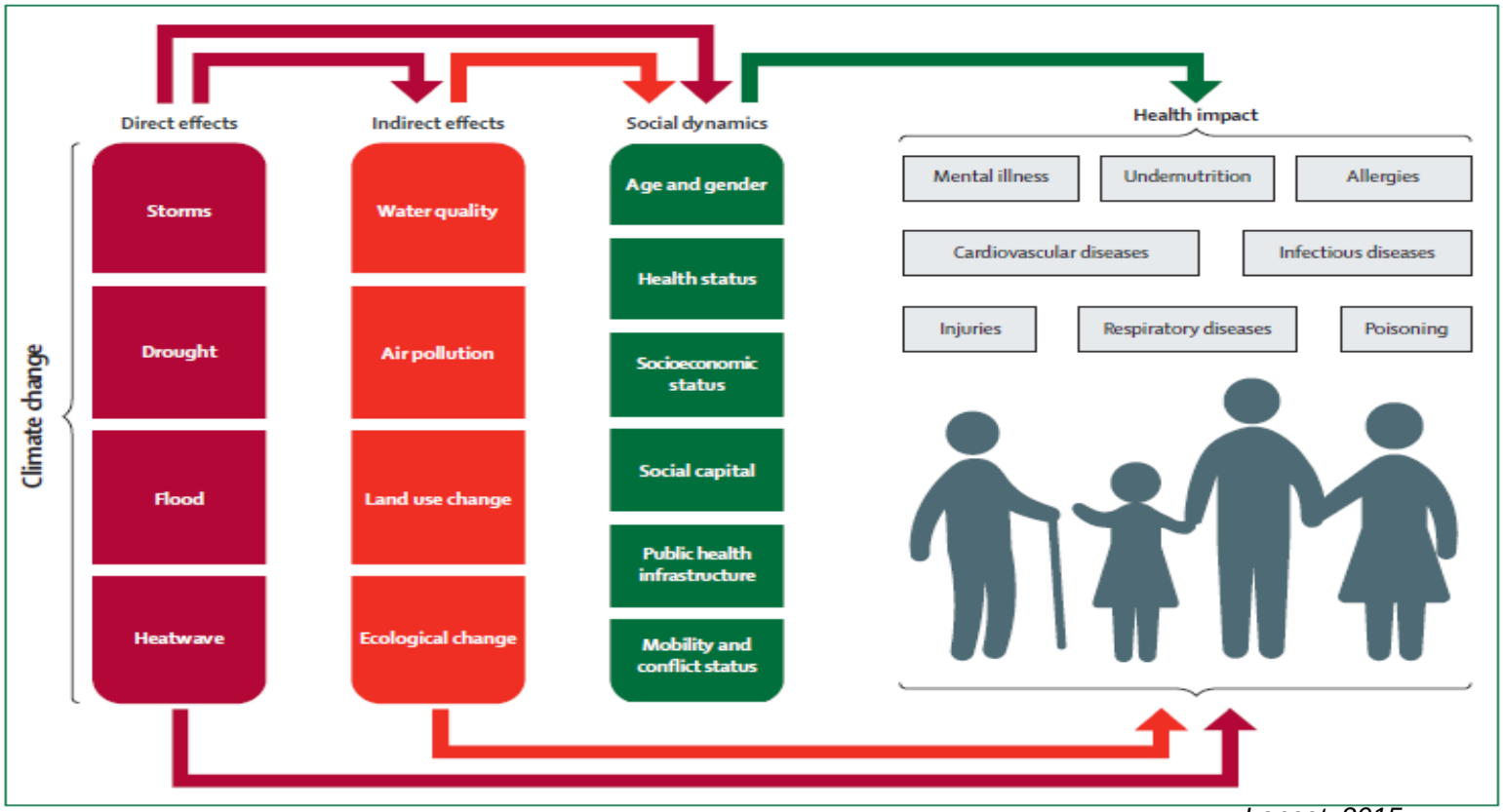






Global calculator: the impacts of diet, land use and food sectors combined are very high compared to more traditionally acclaimed areas for climate policy, such as, transport, building and renewables. Strapasson, 2020

Direct and indirect health effects of climate change on health and wellbeing



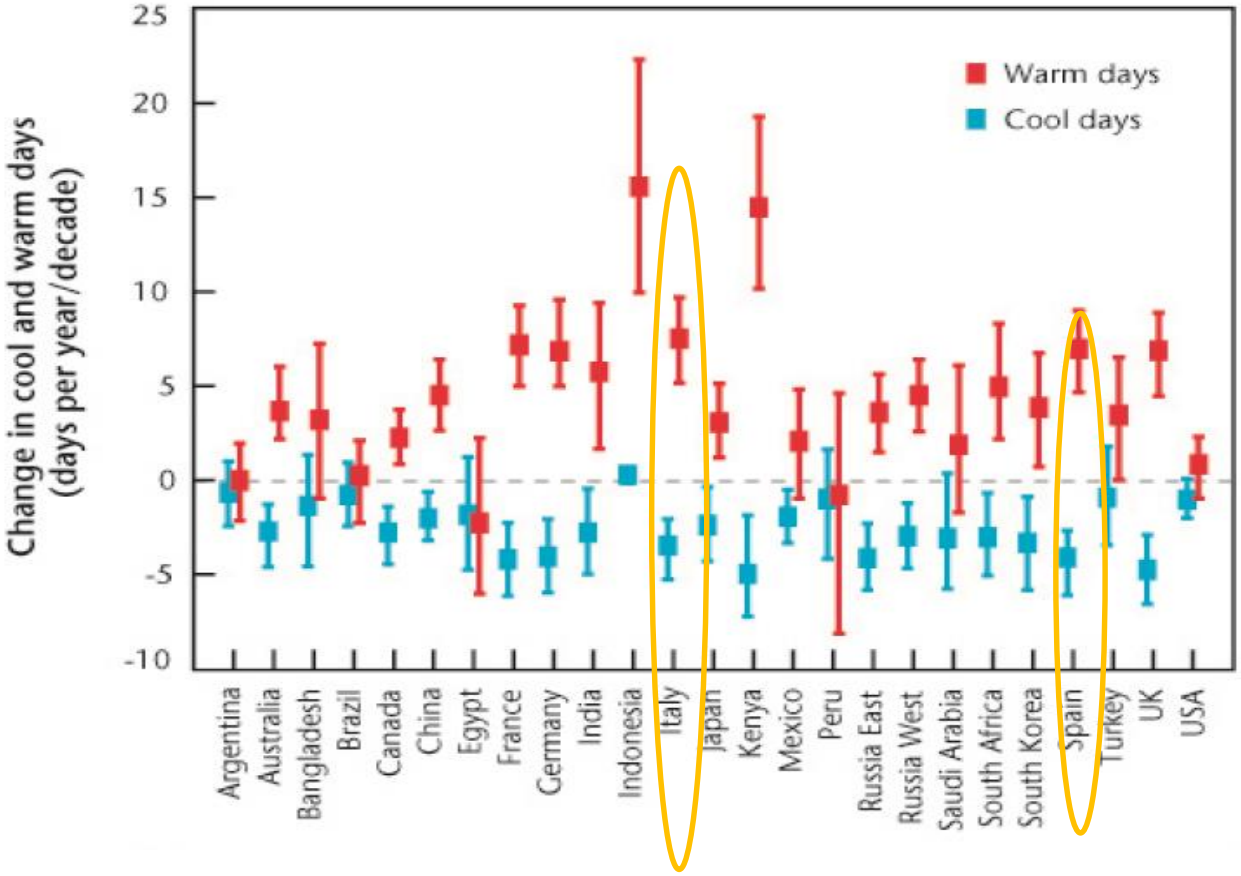
Lancet, 2015

The Lancet Commissions

THE LANCET

Climate change and heat waves: health effects of extreme temperatures

Increase in the number of warm days and a reduction in cold nights.



Met Office, 2013

SUMMER 2003 Heat wave in Europe

“More than 70,000 excess deaths occurred (16 EU countries) during the summer 2003”

It has been considered one of the worst natural disasters of the last 10 years.

Hottest summer on record since 1540

Paris. Daily mortality and mean temperature during summer 2003

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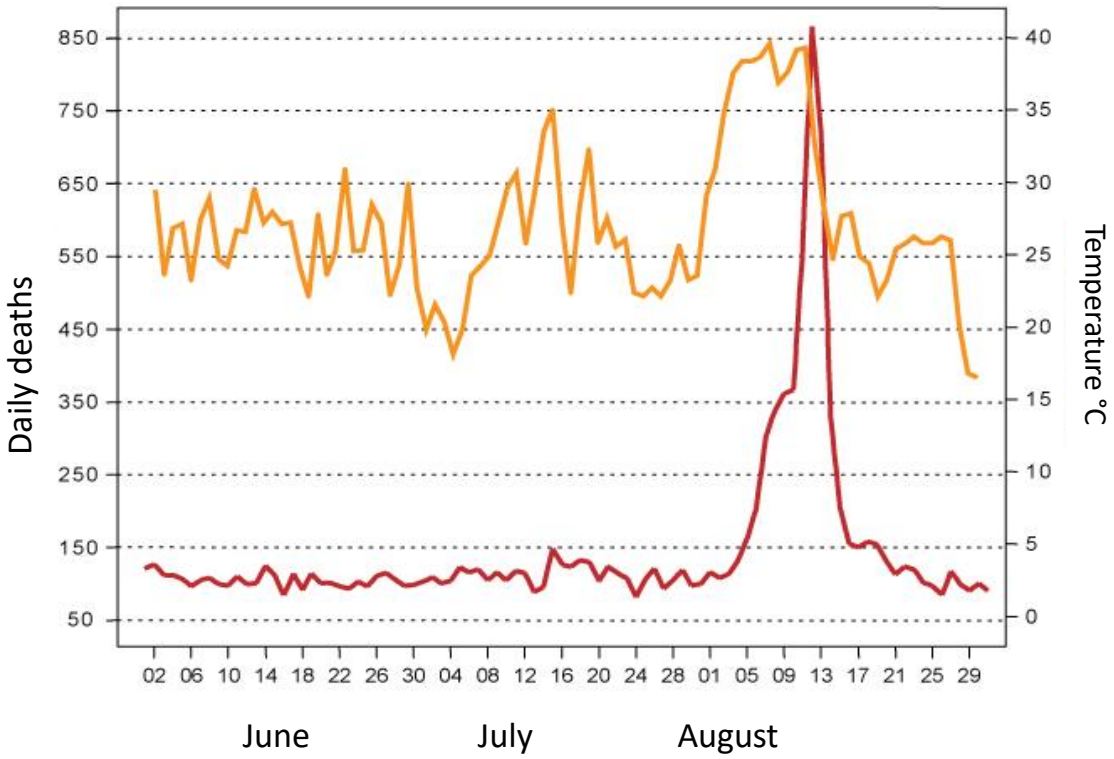


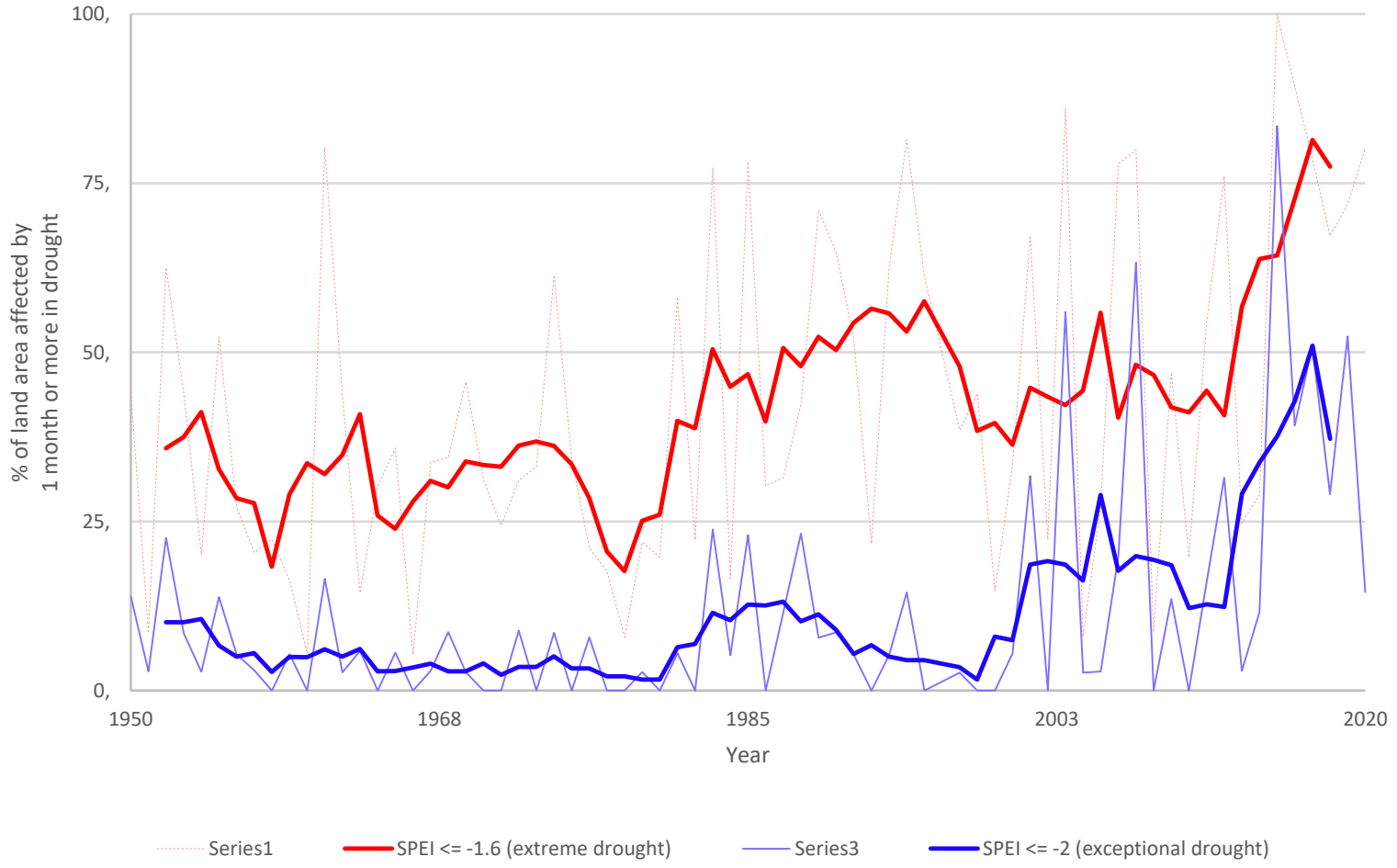
Harvesting effect

The number of deaths caused by extreme heat during heat waves is compensated by a fall in mortality in subsequent weeks suggesting a harvesting effect

(Kunst et al. 1993; Rooney et al. 1998, Braga, 2002)

Temporal advancement of death
among people at high risk of dying?

Drought in Italy. Percentage of land area affected by at least 1 month of severe (red) and extreme (blue) drought. Thin dashed and continuous lines represent the annual percentage of affected land area. Thick lines represent the centred 5-year moving averages (2 years forward and 2 years backward) (source Lancet Countdown)



A case study

A satellite image of Bangladesh. Much of the country is a vast river delta for the Ganges, Brahmaputra and Meghna Rivers. Directly in the middle of the image, just at the edge of the world's largest mangrove forests – the Sundarbans (dark green), shrimp farming has taken over from rice farming.

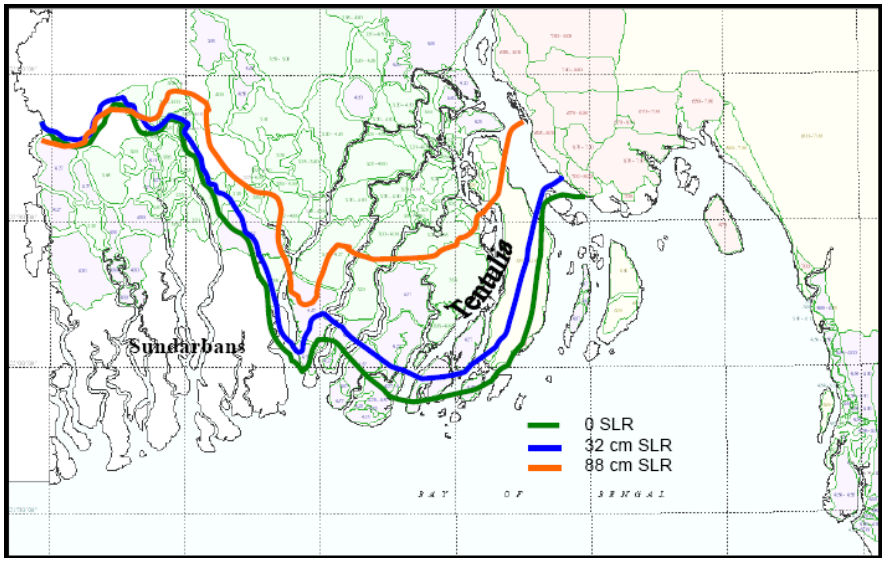
Photo from http://www.spiegel.de/fotostrecke/fotostrecke-21321-2.html

Cyclones

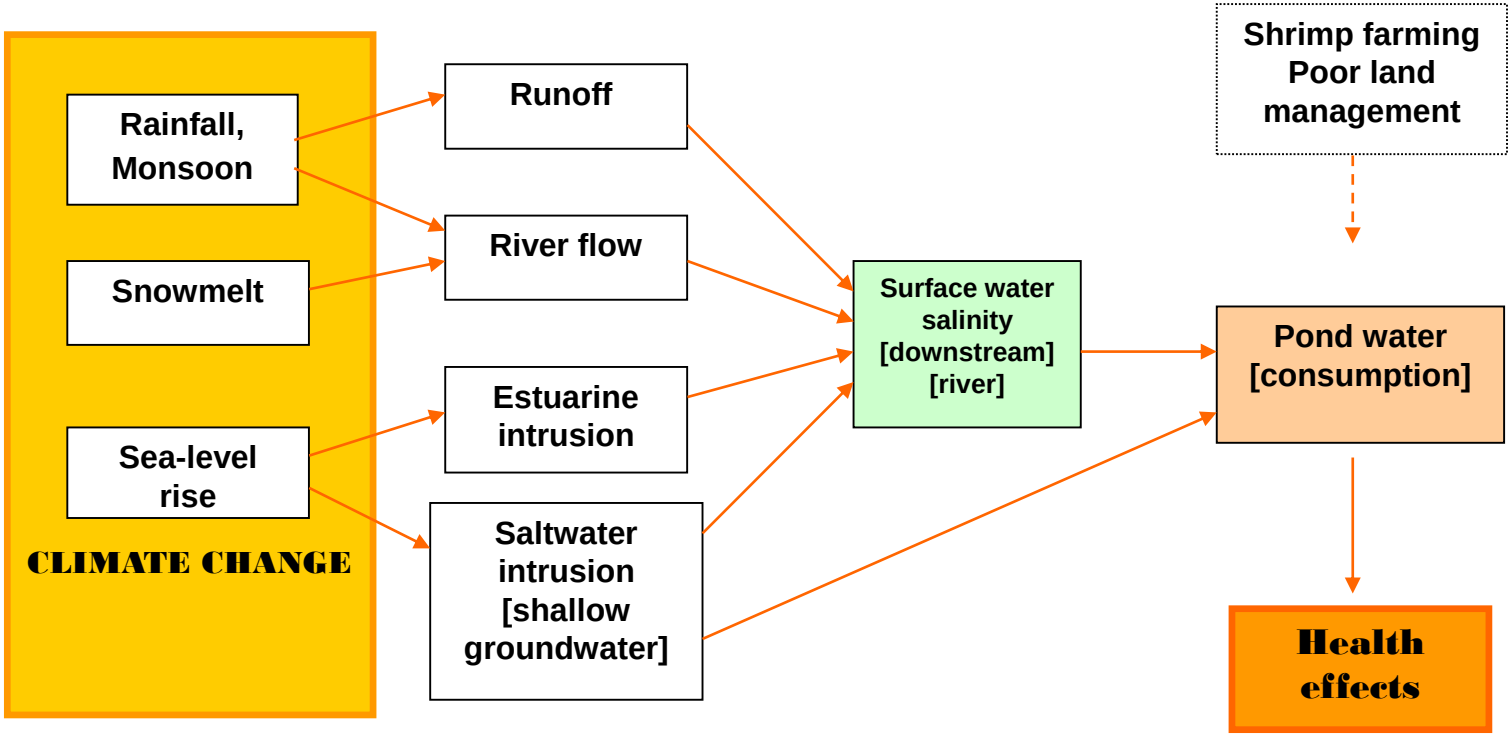
- **Cyclones in 1970 and 1991 killed 300,000 and 138,000 people, respectively**
- **Storm surges in Bangladesh have been recorded to range between 1.5 and 9 meters in height**
- **Coastal flooding, damaged infrastructure, saltwater intrusion, damage to the ecosystem, coral reefs, fisheries, population displacement, changes in the range & prevalence of climate-sensitive health outcomes.**

Map showing different SLR scenarios to estimate how much salt water will intrude inland

- **Rising sea levels in the Bay of Bengal** - resulting in salinization
- Currently saline 2.8 million ha
- **20 million people** currently affected by varying degrees
- In 2005, about 6 million people were exposed to very high degrees of salinity (>5 ppt), which is likely to increase to 13.6 and 14.8 millions in the years 2050 and 2080, respectively.
- In the last 50 years, salinity has risen by 45%



Simplified causal diagram of salinity & health

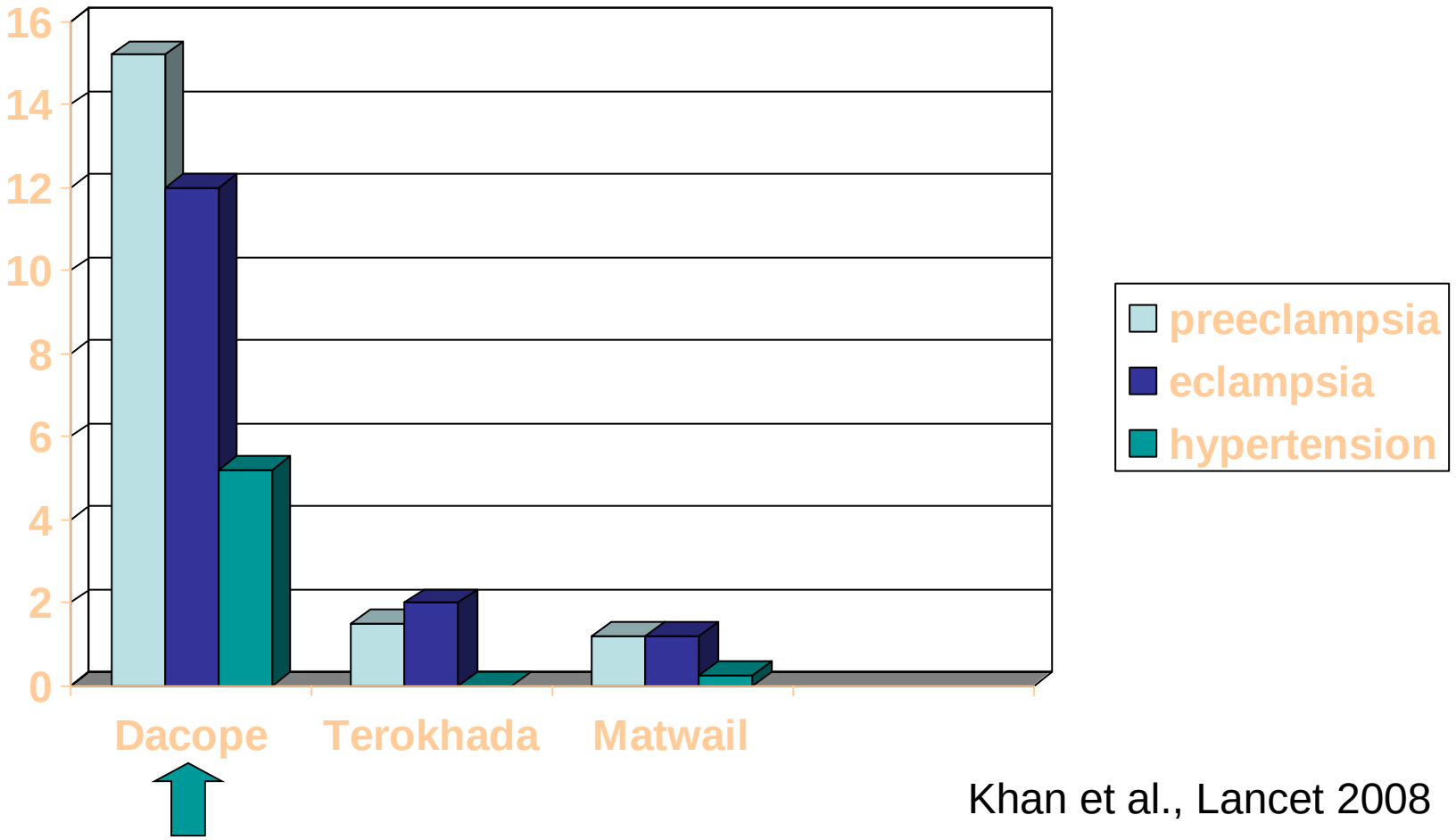


Hypothesis generation: descriptive data

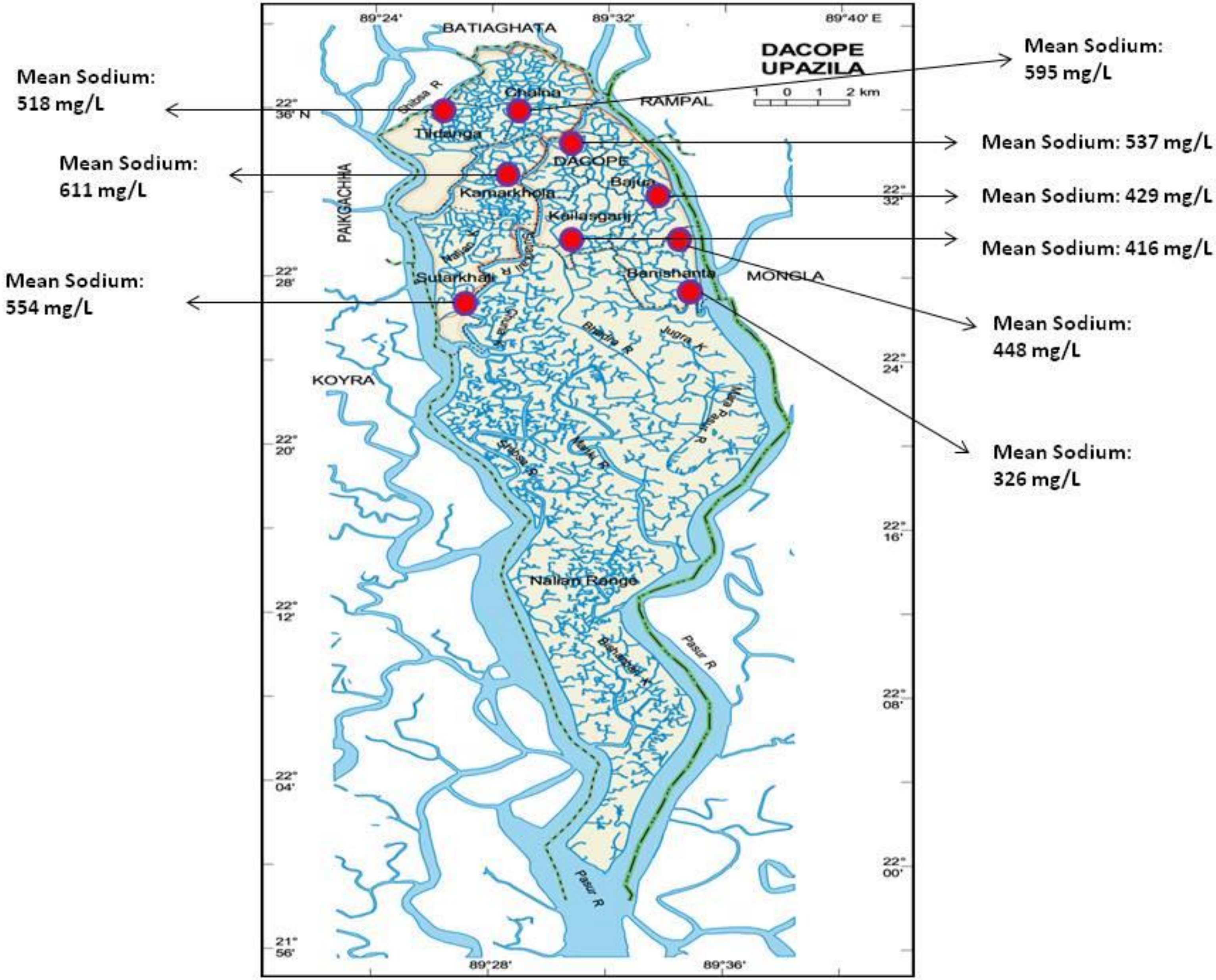
Women and children from Sultansadi village are bringing safe water from far places. Photo - Salahuddin Azizee

Rising salinity – cause of pregnancy-related hypertension in coastal bangladesh?

% prevalence of hypertensive disorders in women attending antenatal check-ups [May – July 2007]

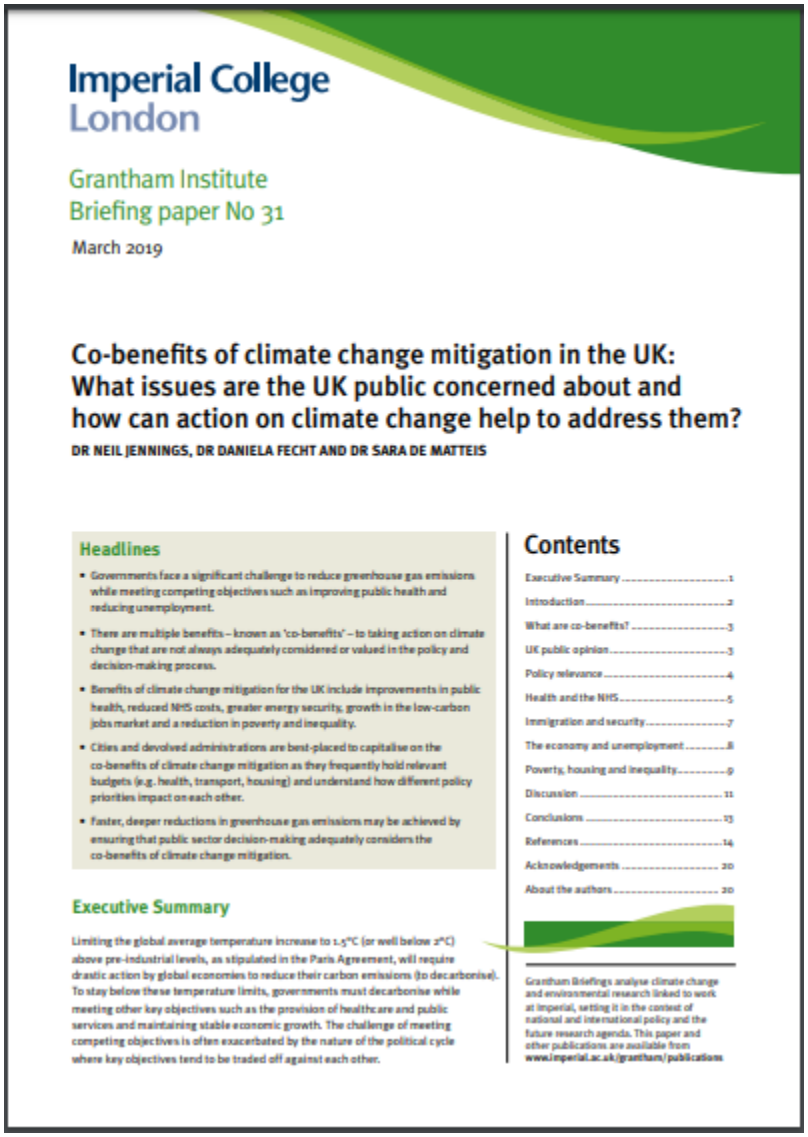


Khan et al., Lancet 2008


Mean Sodium: 518 mg/L
Mean Sodium: 595 mg/L
Mean Sodium: 537 mg/L
Mean Sodium: 611 mg/L
Mean Sodium: 429 mg/L
Mean Sodium: 416 mg/L
Mean Sodium: 554 mg/L
Mean Sodium: 448 mg/L
Mean Sodium: 326 mg/L
DACOPE UPAZILA
BATIAGHATA
RAMPAL
PAIKGACHHA
MONGLA
KOYRA
Chalna
Tildanga
DACOPE
Kamarkhola
Bajua
Kailasganj
Sutarkhali
Banishanta
Nalian Range
Pasur R
1 0 1 2 km
89°24'
89°32'
89°40' E
89°28'
89°36'
22° 36' N
22° 32'
22° 28'
22° 24'
22° 20'
22° 16'
22° 12'
22° 08'
22° 04'
22° 00'
21° 56'

Mean Systolic and Diastolic BP in cases and controls by all categories of water source

Water source	n=1,208	Mean SBP	SD	Median
Rain	5	101.3	7.67	100.0
Filter	142	112.7	22.7	106.7
Pond	298	112.6	21.8	108.3
Tubewell	418	**119.4**	26.7	110.0
River	14	104.7	8.99	103.8
Multiple	331	104.3	18.2	100.0
p-value: 0.000				
Water source	**n=1,208**	**Mean DBP**	**SD**	**Median**
Rain	5	61.3	5.06	60.0
Filter	142	73.2	14.8	70.0
Pond	298	72.6	13.9	70.0
Tubewell	418	**76.1**	17.3	70.0
River	14	63.8	7.02	62.5
Multiple	331	67.7	12.7	66.7
p-value: 0.000				



Imperial College London

Grantham Institute
Briefing paper No 31

March 2019

Co-benefits of climate change mitigation in the UK: What issues are the UK public concerned about and how can action on climate change help to address them?

DR NEIL JENNINGS, DR DANIELA FECHT AND DR SARA DE MATTEIS

Headlines

- Governments face a significant challenge to reduce greenhouse gas emissions while meeting competing objectives such as improving public health and reducing unemployment.
- There are multiple benefits – known as 'co-benefits' – to taking action on climate change that are not always adequately considered or valued in the policy and decision-making process.
- Benefits of climate change mitigation for the UK include improvements in public health, reduced NHS costs, greater energy security, growth in the low-carbon jobs market and a reduction in poverty and inequality.
- Cities and devolved administrations are best-placed to capitalise on the co-benefits of climate change mitigation as they frequently hold relevant budgets (e.g. health, transport, housing) and understand how different policy priorities impact on each other.
- Faster, deeper reductions in greenhouse gas emissions may be achieved by ensuring that public sector decision-making adequately considers the co-benefits of climate change mitigation.

Executive Summary

Limiting the global average temperature increase to 1.5°C (or well below 2°C) above pre-industrial levels, as stipulated in the Paris Agreement, will require drastic action by global economies to reduce their carbon emissions (to decarbonise). To stay below these temperature limits, governments must decarbonise while meeting other key objectives such as the provision of healthcare and public services and maintaining stable economic growth. The challenge of meeting competing objectives is often exacerbated by the nature of the political cycle where key objectives tend to be traded off against each other.

Contents

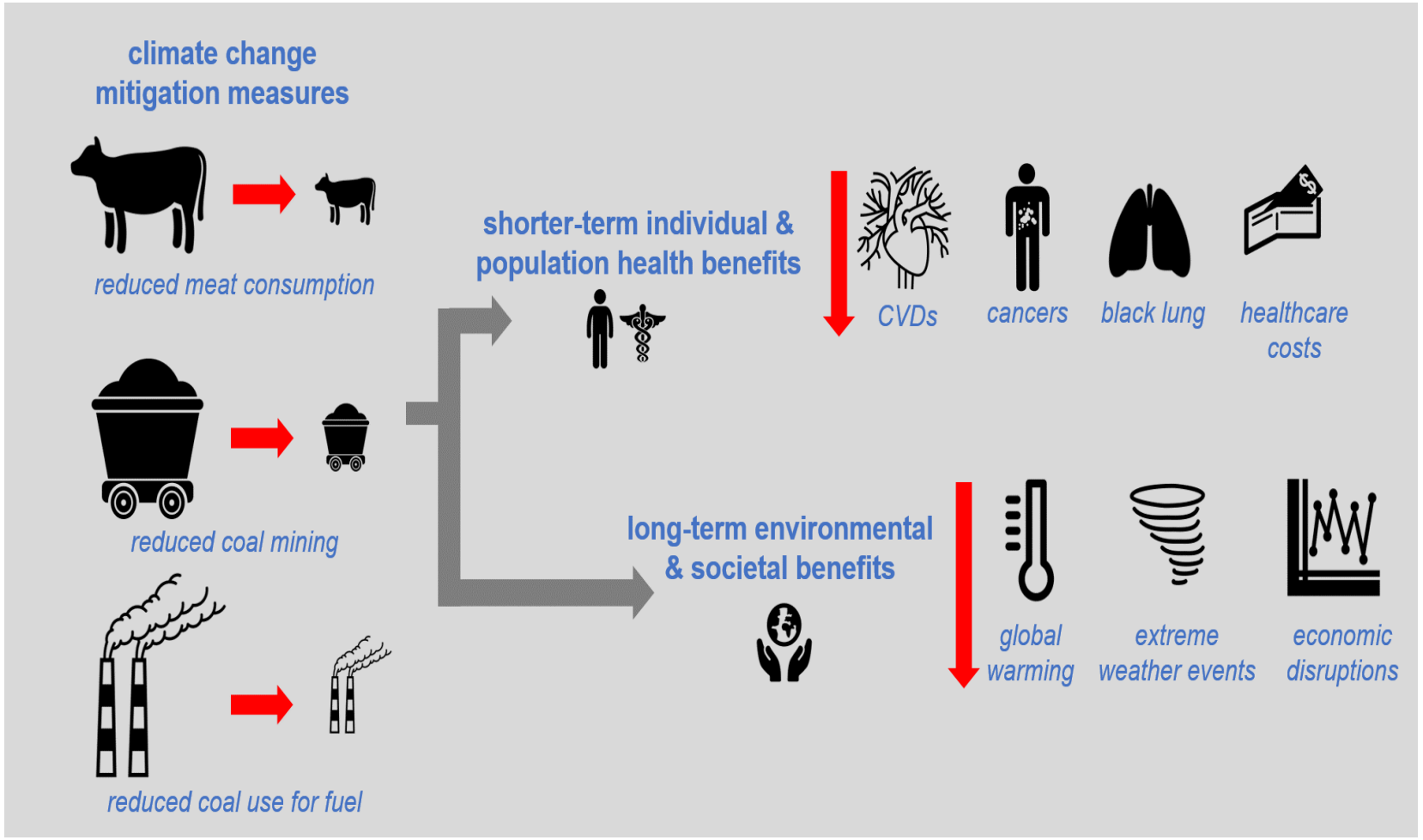
Grantham Briefings analyse climate change and environmental research linked to work at Imperial, setting it in the context of national and international policy and the future research agenda. This paper and other publications are available from www.imperial.ac.uk/grantham/publications

CO-BENEFITS

"*the positive* [or negative] *effects that a policy or measure aimed at one objective might have on other objectives*"

"often referred to and argued with, they are rarely measured, quantified, or monetized, and even less frequently do they enter the quantitative decision-making frameworks applied to climate change"

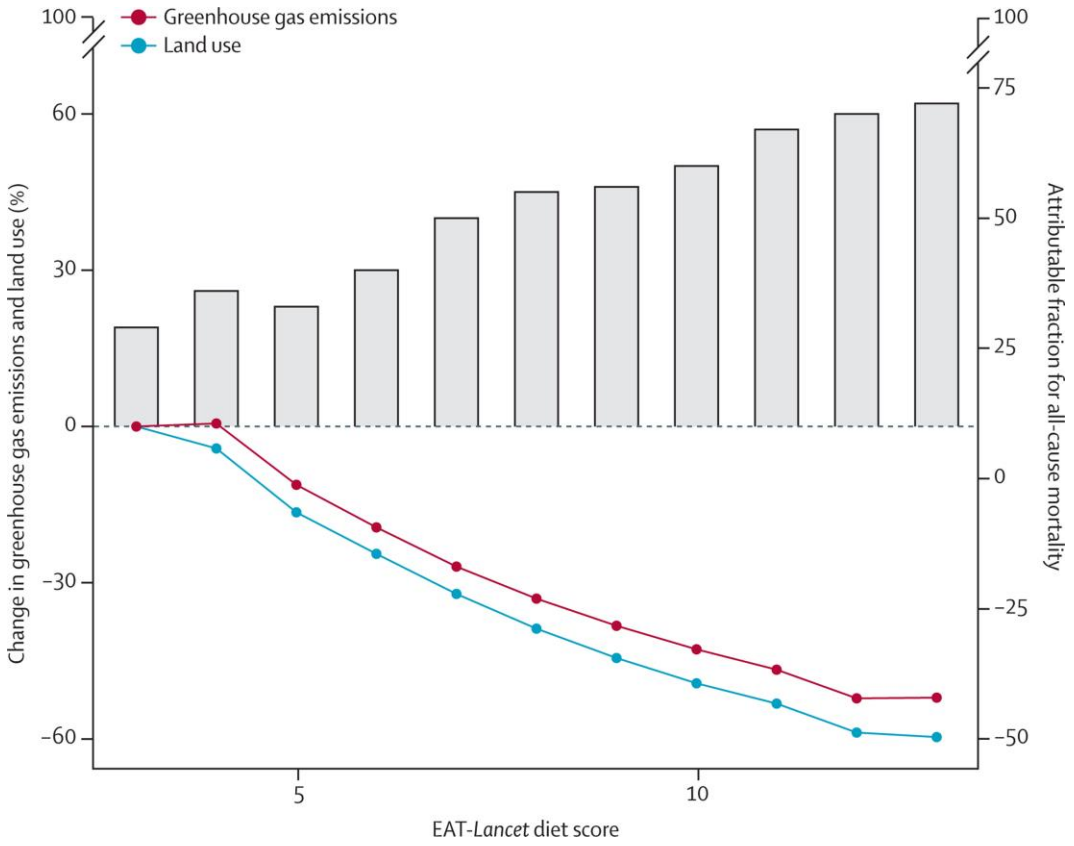
IPCC Fifth Assessment Report (2014)


climate change mitigation measures
reduced meat consumption
reduced coal mining
reduced coal use for fuel
shorter-term individual & population health benefits
CVDs
cancers
black lung
healthcare costs
long-term environmental & societal benefits
global warming
extreme weather events
economic disruptions

MRC
Centre for Environment & Health

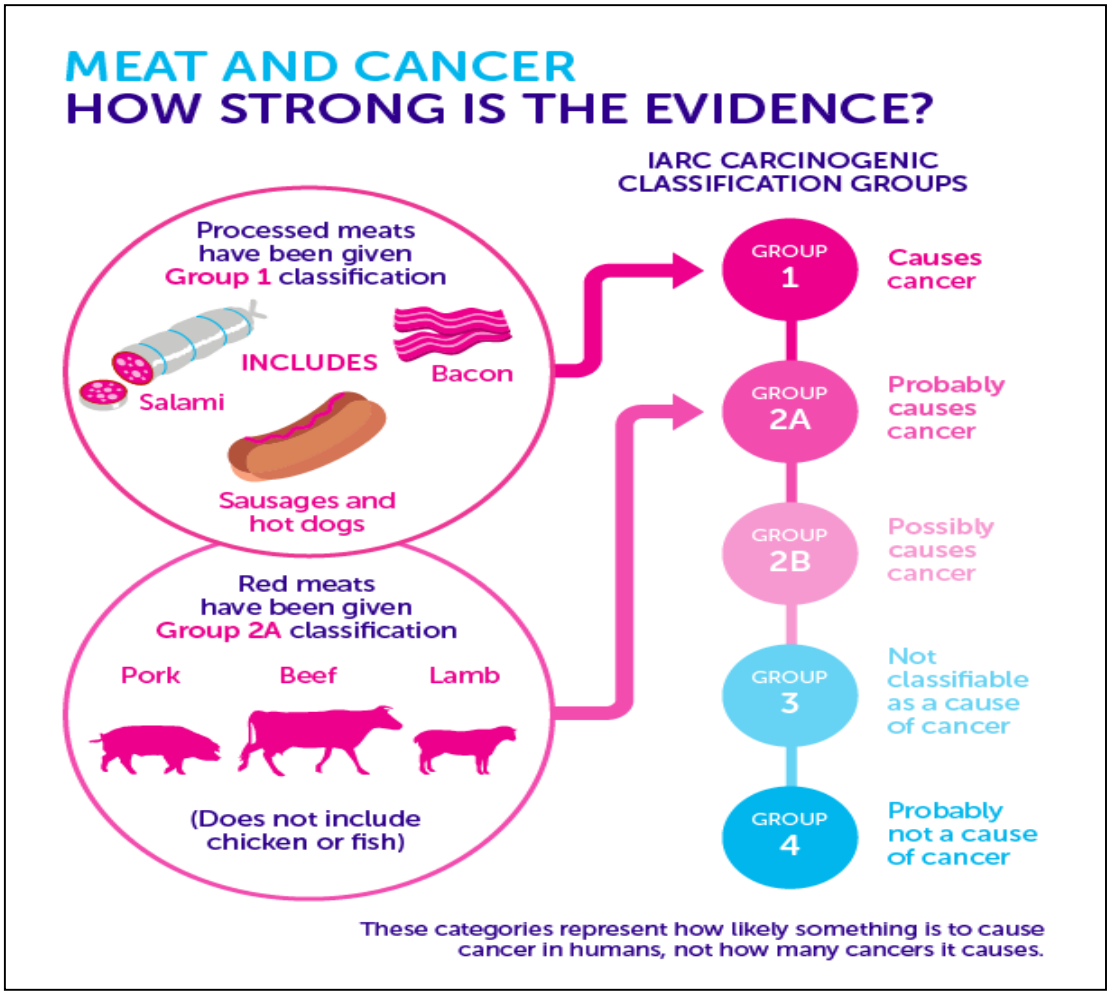
Medical Research Council

Imperial College London



Co-benefits of dietary changes for climate change mitigation and mortality reduction - Laine, Vineis et al The Lancet Planetary Health DOI: (10.1016/S2542-5196(21)00250-3)

Red (processed) meat & colorectal cancer



Expansion of agricultural practices, deforestation, trades – risks of zoonoses

- Malaria
- Yellow fever
- Hendra virus
- Monkeypox virus
- Lassa virus
- Junin virus
- Laguna negra virus
- Machupo virus …

Shah et al performed a meta-analysis and showed that people who live or work in agricultural land in Southeast Asia are on average 1.74 times as likely to be infected with a pathogen than those unexposed. Effect sizes were greatest for exposure to oil palm, rubber, and non-poultry based livestock farming.

Shah et al, Nature Communications 2019

An example of concrete guidelines (from Lancet EAT Commission, 2019): a diet for the Anthropocene

Red meat is not essential and reduction has co-benefits: limit intake to <28 g/day.
Poultry has less impact than red meat and its recommended intake is <58 g/day
For dairy products the proposed upper limit is 500 g/day (average 250)

Fish is positive for health and the recommended intake is up to 100 g/day

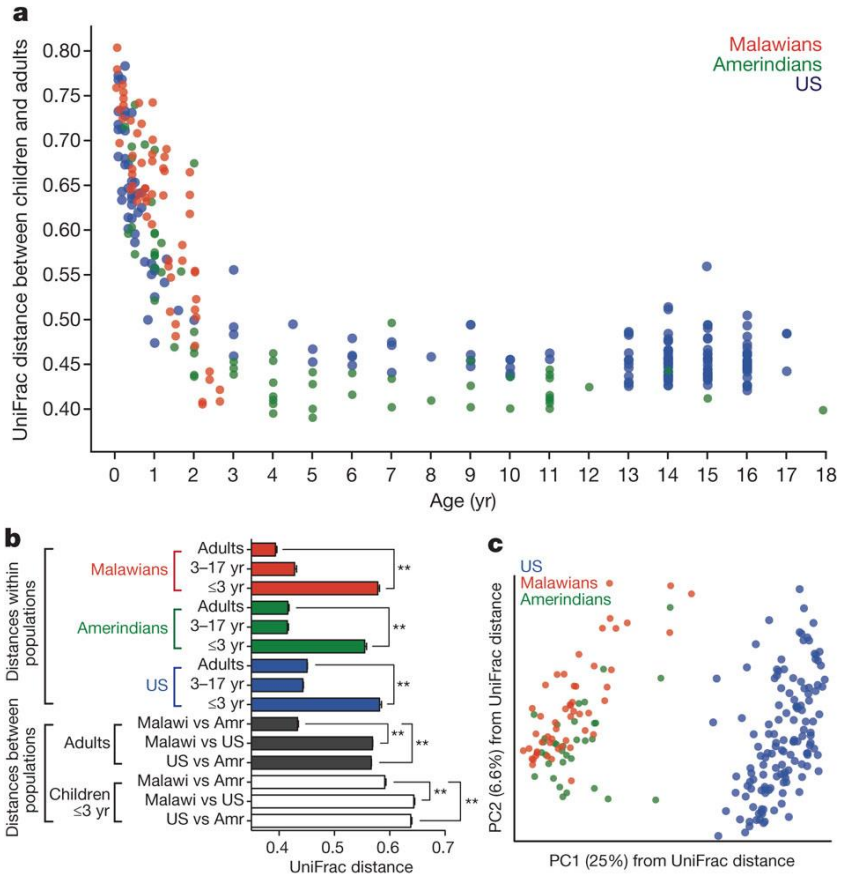
A parsimonious intake of eggs is recommended (1.5 per week).
50 g/day of nuts and 50 g/day of peas, lentils or beans are recommended

Carbohydrates should be less than <60% of calories

Vegetables: 300 g/day

Fruits: 200 g/day

Differences in the fecal bacterial communities of Malawians, Amerindians and US children and adults.



Yatsunenko, T *et al. Nature* 2012; 486:222-27. doi:10.1038/nature11053

Distances travelled by one family

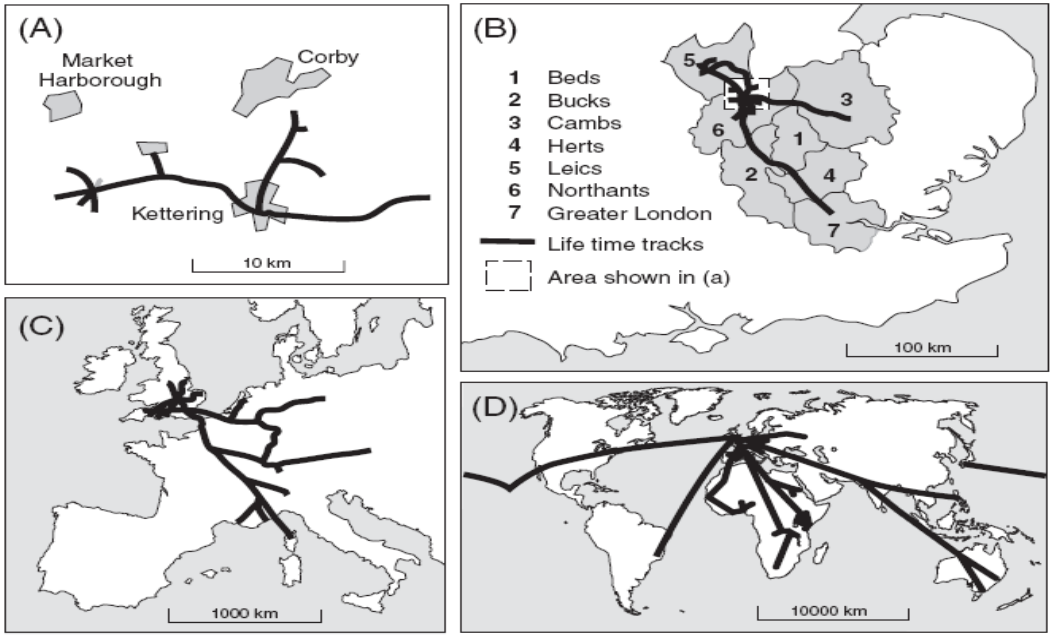


Fig. 2 Bradley's record of increasing travel over four male generations of the same family[6]. (A) Great-grandfather. (B) Grandfather. (C) Father. (D) Son. Each map shows in a simplified manner the individual's 'life-time tracks' in a widening spatial context, with the linear scale increasing by a factor of 10 between each generation.

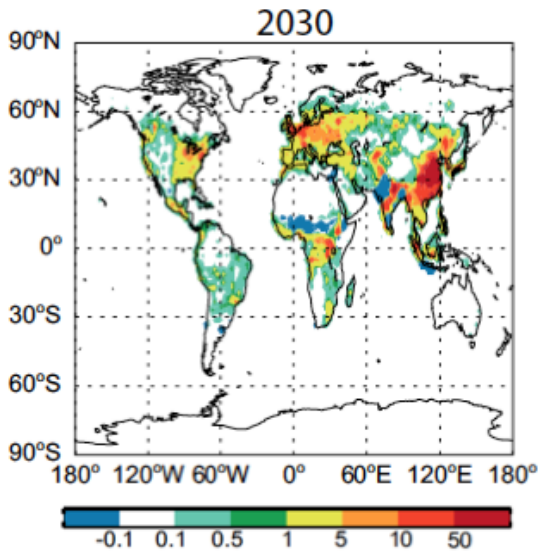
A) Great Grandfather
B) Grandfather
C) Father
D) Son

"distance travelled increased by factor of 10 with each generation"

Cliff and Haggett, *British Med Bull* (2004)

PM Cleanup Co-Benefits of Climate Mitigation Can Be Large if Fossil Fuel Combustion Reduced

a.) Health Benefits



b.) Economic Benefits

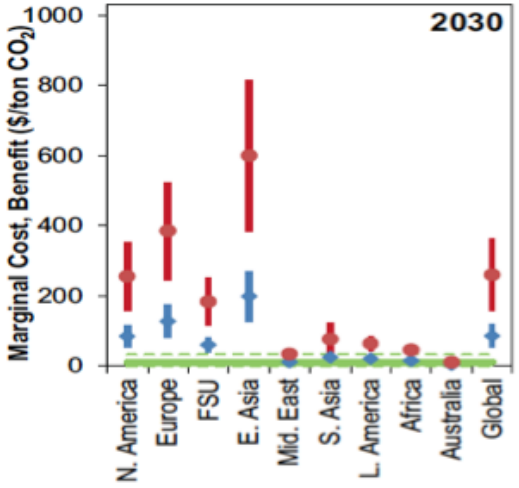


Figure 1. The Health and Associated Economic Benefits of Climate Change Mitigation[4] a.) the premature mortality (due to Cardio-Pulmonary Disease, CPD, plus lung cancer) from $PM_{2.5}$ in 2030 (deaths per year per 1000 km^2) avoided by climate change mitigation measures; b.) the range of associated marginal benefits ($/ton CO_2) by region (Red: High Estimate, Blue: Low Estimate), relative to the range of expected mitigation cost (Green lines) achieved by climate change mitigation. Reproduced from West et al.

Thank you