

Pathways and key facts on the health impacts of climate change & carbon

A summary of a document compiled by Hannah Barton, Barts' Medical School

It has been widely recognised among the health community that the impacts of climate change on health are 'direct and indirect, many and varied' – and that they are likely to be severe. Carbon also has high costs to health through air pollution and through the health cost of reduced activity due to motorisation.

- Therefore, on both counts, there is a major health gain to be made by decarbonising our societies rapidly, which can also save us large amounts of money and improve quality of life.
- Health will be affected everywhere, as our systems are interconnected - but change will vary between different parts of the world and will affect groups of people differently.
- The effects of climate change on peoples' health are dependent on exposure, sensitivity and adaptive capacity; globally there are major differences in vulnerability.

Major impacts of climate change on health

Heat, non-communicable disease and health impacts

- Heat-related: 2003 European heatwave accounted for an additional 44,000 deaths (70000 over the whole summer), mainly due to respiratory and cardiac causes (elderly particularly at risk). Also a link to kidney stones and renal failure (Kjellstrom et al. 2010)
- People in cities are at high risk; due to "heat-island" effects, the temperature may be 10°C above that of the surrounding countryside (Munslow and O'Dempsey, 2010) A 2°C rise will cause a 30% drop in productivity in Delhi in the hottest months. Oxfam, 2009.

Air pollution:

- Over 1 billion people in Asia live in places where air pollution is above guideline amounts (Munslow and O'Dempsey, 2010).
- Ozone has an impact on cardiovascular mortality and its formation is promoted by high temperatures and vehicle emissions.

- Indoor air pollution from cooking is the fourth leading cause of morbidity in developing countries, as well as producing emissions – role for cleaner stoves for both mitigation and health improvement (Ayres et al. 2009)

Natural disasters

- Climate change will “increase the number of people suffering from disease, injury and death as a result of heatwaves, floods, fires and droughts (high confidence) - IPCC, 2007
- Disasters have direct effects but also increase susceptibility to all other health risks below due to their psychological effects, damage to infrastructure, food supplies and improving conditions for infectious disease.
- The International Committee of the Red Cross estimates that the number of people affected by disasters has risen from 740 million in the 1970s to 2 billion in the past decade (inc. some double counting) (Simms et al. 2004)
- Oxfam estimates that the number of people affected by climate-related disasters will go up by over 50% by 2015 to 375 million people (Oxfam, 2009)

Food security

- Agricultural productivity will be decreased yields in many parts of Africa, 40-90% decline in productivity of grasslands, and increased desertification in Sub-Saharan Africa, Asia and Latin America (FAO, 2009). Sub-Saharan Africa is very vulnerable as up to 90% of its agriculture is rain-fed. (Simms et al. 2004)
- Changes in suitability/yields of crops– rice production in the Philippines may drop by 50-70% by 2020, by 2030 wheat production is predicted to decrease by over 50% in the Indo-Gangetic plain (where 15% of the world’s wheat is currently grown, supporting up to 200 million people) (Oxfam, 2009)
- Impacts of ocean acidification and warming on aquatic ecosystems may also impact severely on protein availability and intake.

Water security

- Currently 1.2 billion lack access to safe water and 2.4 billion to basic sanitation: climate change is predicted to exacerbate issues around water security – the Stockholm environmental institute estimates that the global population under significant water stress will increase from 34% to 63% by 2025 (Simms et al. 2004)
- It may also compromise water quality through sea level rise and flooding.

Migration

- Estimated that there will be 200 million people displaced by climate change in 2050 (Oxfam, 2009)
- Many people, especially from small-island states, will be displaced and will have uncertain legal status (as they will be “stateless”) and will have to be re-settled (Simms et al. 2004) which will have major health impacts. 10 times more people (100 million) may be affected by coastal flooding by 2080 than currently (WHO, 2009)
- Difficulties will arise over defining people fleeing a climate-affected and hostile environment as “climate change refugees” vs economic migrants.

Infectious diseases

- Diseases can increase their range, decrease their range, or change their range: each pathogen will behave differently under climate change and interact with many other factors. These include population growth, biodiversity loss, urbanisation, international trade, poor socioeconomic conditions, changes in land use, famine and war (Zell et al. 2008).
- IPCC forecast: high confidence of changing the range of some infectious disease vectors, very high confidence of a mixed effect on malaria (it will expand in some areas, contract in others and the season may change), medium confidence that diarrhoeal disease will increase (IPCC, 2007)
- Good evidence for link between ocean-atmospheric currents, particularly the El-Niño Southern Oscillation (ENSO) and infectious disease: ENSO data used in surveillance of West Nile Virus in California and to predict a Rift Valley Fever outbreak in the Horn of Africa (Tabachnick, 2010)

Mental health

- Mental health problems are higher after disasters e.g. a study in Sumatra after the 2004 tsunami found significant levels of Post Traumatic Stress Reactivity, proportionate to the trauma suffered (Frankenberg et al. 2008)
- Other reactions include somatoform disorders and major depression and in general these are under-recognised, even in developed countries e.g. post-Hurricane Katrina (Page and Howard, 2010)
- Other, less direct causes: migration, outbreaks of infectious diseases (associated with anxiety disorders), urbanisation (associated with a higher risk of schizophrenia).

- Those with existing mental health problems will experience greater difficulties, for instance psychotropic medications make people more susceptible to heat stress (Page and Howard, 2010)

Health of vulnerable groups Gender, children vs adults vs elderly

- Women: as a result of employment or tasks e.g. women are caregivers and look after the home – harder for them to migrate, fetch water – as this becomes more scarce they must travel farther and more dangerous routes. Due to cultural norms etc, many women in Asia and Latin America are not taught to swim for reasons of modesty so are more vulnerable during floods.
- Gender inequalities are also very important e.g. lack of access to healthcare, more likely to be economically dependent, at risk of sexual violence post-disaster or in conflict (WHO, 2009, CARE, 2010)
- Children: more susceptible to many of the increased risks of climate change (American Academy of Pediatrics, 2007). Direct effects – diarrhoeal disease, malaria, hunger and malnutrition, disasters (risk of injury and separation, also decreased breastfeeding of babies/infants due to separation or maternal stress). Indirect effects – weak health systems, migration, impact on women (Baker, 2009)
- Those living in marginal environments i.e. nomads, pastoralists: e.g. frequent droughts in the 20th century have overwhelmed traditional coping strategies and made life for pastoralists in East Africa almost unsustainable. As well as drought, there are problems of environmental degradation (overgrazing when people temporarily become sedentary) and conflict over limited resources. (Blackwell, 2010)

Interactions, vulnerability and indirect effects

- The effects of infectious diseases are strongly influenced by many factors, and the same is true for how food and water security may contribute to increased migration and conflict over scarce resources and land.
- Vulnerability is a key factor: the poorest populations will suffer the worst health impacts, and the poorest people within any given population will suffer disproportionately. WHO report on health and climate change: “poverty alleviation is critical to reducing vulnerability but public health measures are also required” (WHO, 2009)

- The true extent of indirect impacts - for example through major disease epidemics, famine, war - will depend upon mitigation and adaptation policies, population growth, changes in land use and biodiversity loss, urbanisation, international trade and socioeconomic conditions - making prediction and determining causation almost impossible.

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