

HEALTH IMPACTS OF CLIMATE CHANGE

Changes in the climate have impacted on the health of populations throughout human history¹, at times catastrophically. We are now experiencing climate change at a rate that is completely unprecedented, and is likely to accelerate further. This is already impacting on human health, and will certainly have greater impact in the near future.

How does climate change impact on human health?

There are three pathways by which climate change affects human health:

1. **through the direct effects of weather, in particular extreme weather events;**
2. **effects mediated by natural systems such as changing distribution of disease vectors;**
3. **effects mediated by social systems such as malnutrition, violence or mass refugee flows.**

These pathways are influenced by local geographical and environmental conditions, and their overall impact on population health mediated by public health and other responses, and adaptation measures. Different groups within populations differ in their vulnerability. The effectiveness of public health and adaptive measures may be limited as climate changes.

Direct effects of weather

The impact of heat (and cold) on health have long been observed, of both background and extreme temperatures. The 2003 European heatwave is likely to have caused an excess of 15,000 deaths in France alone². More heat related deaths may be offset by a reduction in deaths due to cold weather, though the link between cold and human health on a population level is less well documented. Concern is also increasing about the impact of humid heat on human populations, because it makes normal physiological cooling mechanisms ineffective, with death occurring quickly even in fit young adults.

Floods are the most frequently occurring type of natural disaster, and will increase in all projected climate change scenarios³. Flooding causes tens of thousands of deaths annually, and many millions of people are affected in other ways⁴. Most reports only include immediate traumatic (including drowning) deaths, so underestimates are likely. As well as drowning, floods and storms affect health through injury, hypothermia and infectious disease, and also cause longer term psychological impacts and ill health through adverse economic impacts⁵. The IPCC predicts that it is very likely that health losses caused by storms and floods will increase, though the amount directly attributable to climate change cannot be predicted.

Effects mediated by natural systems

Climate change changes the distribution of vector borne diseases. Increased rainfall and humidity, as well as increased temperatures, can increase breeding of mosquito vectors, but the incidence of disease will also depend on the effectiveness of control programmes. Modelling predicts that climate change will increase the number of people at risk of malaria by 200 million (from 1.74Bn to 1.95Bn) in 2050⁶, and the area climatically suitable for dengue fever will also increase⁷.

Tick-borne diseases such as encephalitis and Lyme disease, Haemorrhagic fever with renal syndrome (HFRS), plague, Chikungunya fever, Japanese encephalitis and Rift Valley fever have all been shown to be linked to climate change.

Food and water borne infections, including cholera, increase with increasing temperature and rainfall. In addition, there are likely to be discontinuous increases in exposure due to, for example, flash flooding causing sewage overflow, or drought restricting drinking water supplies. Overall impacts are difficult to predict, though one study has projected an increase of 8 – 11% in the risk of diarrhoea in the tropics and subtropics by 2039⁸. Diarrhoea currently kills half a million children per year. Northward progression of the midwinter freezing line will also significantly increase the area in which schistosomiasis transmission can occur⁹.

Climate change is also likely to increase disease attributable to poor air quality, independent of the impact of GHG emissions on the climate itself, through increased levels of ozone, particulate air pollution following forest fires, or increased production and release of aeroallergens.

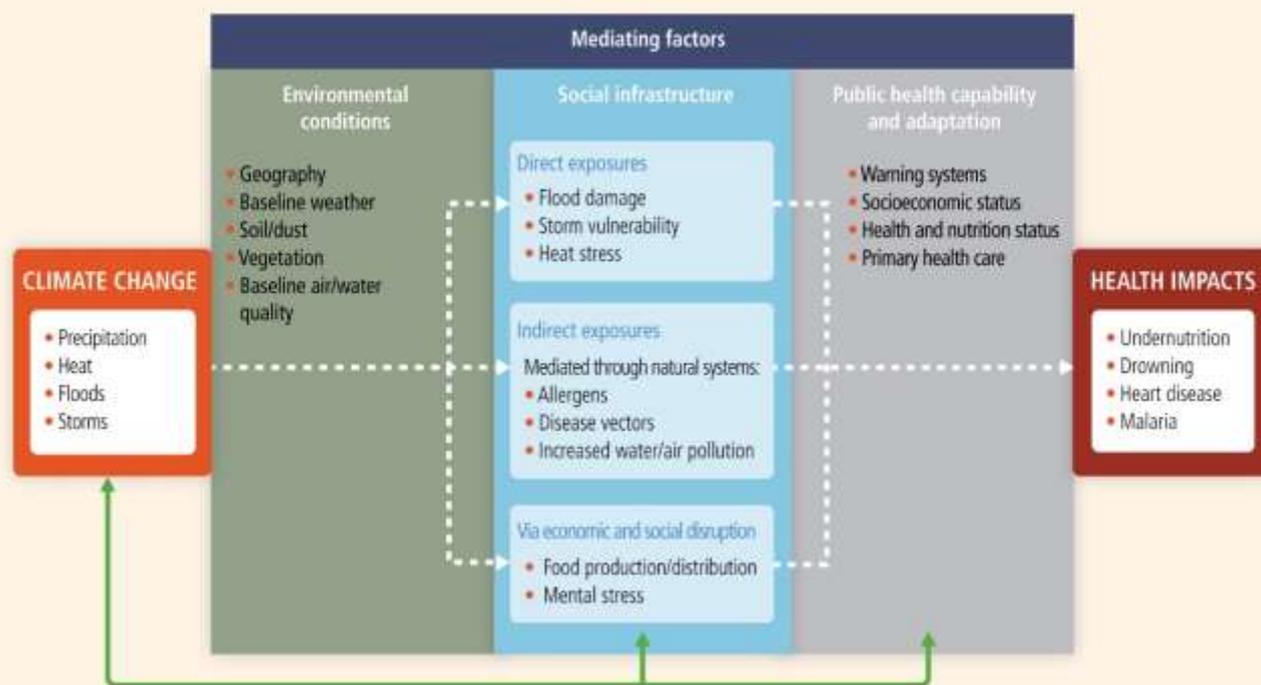


Figure 11-1 [Reproduced with permission from the IPCC AR 5] Conceptual diagram showing three primary exposure pathways by which climate change affects health: directly through weather variables such as heat and storms; indirectly through natural systems such as disease vectors; and pathways heavily mediated through human systems such as undernutrition. The green box indicates the moderating influences of local environmental conditions on how climate change exposure pathways are manifest in a particular population. The gray box indicates that the extent to which the three categories of exposure translate to actual health burden is moderated by such factors as background public health and socioeconomic conditions, and adaptation measures. The green arrows at the bottom indicate that there may be feedback mechanisms, positive or negative, between societal infrastructure, public health, and adaptation measures and climate change itself.

Tracking the impacts

The *Lancet* Countdown tracks 41 indicators of the health impacts and responses to climate change. Its latest report¹³ demonstrates that present day changes provide early warning of overwhelming impacts if temperatures continue to rise, and that lack of progress with reducing emissions means that public health and health services may be overwhelmed. Despite this, there is evidence of the beginning of a low carbon transition in some sectors. **Ensuring a widespread understanding of climate change as a central public health issue will be crucial in delivering an accelerated response.**

Effects mediated by social systems

Food and water security are greatly threatened by climate change. Droughts will likely be a significant driver for population migration and conflict, particularly in rural areas. All aspects of food security - production, quality, access, and price - will likely be adversely impacted. The IPCC concludes that climate change will have a substantial negative impact on per capita calorie availability, childhood undernutrition, and consequent deaths and disability adjusted life years lost¹⁰. The impact is likely to be greatest in the developing countries of the global south.

Increasing temperatures also adversely affect occupational health and economic productivity. Outdoor workers (and some indoor workers) in hot conditions are at increasing risk of heat exhaustion and heat stroke. Productivity falls with increasing temperature adversely impacting on economic development, in turn militating against improvement in population health.

Population movement, violence and conflict, are all influenced by factors which are sensitive to climate. Human security will be progressively threatened as the climate changes¹¹. Migration driven by resource availability and damage to ecosystems will increase. This, together with low income, economic contraction and weak state institutions, is associated with increased incidence of violence and conflict. People living in places affected by violent conflict are particularly vulnerable to climate change. Traditional values and forms of knowledge, which may protect against some impacts of climate change, are themselves threatened.

'Runaway' climate change, with rises in average temperatures of 4 or more degrees above pre-industrial levels, and the development of positive feedback loops, has been predicted to be associated with a *'discontinuity in the long term progression of humanity'*.¹²

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Professional Development Questions

1. Which of the following two statements are true?
 - a) The distribution of infectious diseases in future will be determined by temperature changes alone.
 - b) The incidence of infectious diseases in future will depend in part on the effectiveness of control measures.
 - c) Tick-borne disease, but not viral diseases, will increase in incidence.
 - d) The worldwide distribution of schistosomiasis may well expand.
 - e) Non-infectious diseases are unlikely to increase in prevalence as a result of climate change.
2. Which of the following statements best summarises the likely effect of climate change on disease mediated by social systems?
 - a) The overall impact of climate change on our social systems is very difficult to predict, but likely not to impact on disease prevalence.
 - b) The reduced per-capita calorie availability predicted will help control the current obesity epidemic.
 - c) Disease due to food and water insecurity, reduced economic productivity and population movement, violence and conflict are all likely to increase in future.
 - d) The impact of food and water insecurity, reduced economic productivity and population movement, violence and conflict are likely to be equally distributed globally.
 - e) It is not possible to make any predictions with any degree of confidence, so it would be better not to try.

FPH General CPD Questions

1. What did I learn from this activity or event?
2. How am I going to apply this learning in my work?
3. What am I going to do in future to further develop this learning and/or meet any gaps in my knowledge, skills or understanding?