

What are the health impacts of climate change?

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‘You cannot have well humans on a sick planet’.

Thomas Berry

Climate change is a major threat to public health globally and in the UK.

Direct health impacts include increased deaths, disease and injury associated with environmental changes. Indirectly climate change will also lead to widening of health and social inequalities.

While there are some positive health impacts of climate change (eg fewer cold-related deaths) it is widely acknowledged that the overall health impact will be overwhelmingly negative.

Global burden of disease

Climate change currently contributes to the global burden of disease and premature deaths. [1] It has been estimated that the modest climate change that occurred between the mid-1970s and 2000 caused the loss of over 150,000 lives and 5.5 million disability adjusted life years (DALYs) per year. [2] With the estimated current and projected future impacts of climate change on human health, this global burden of death and DALY is predicted to increase in the future, most noticeably in developing countries. [2]

How does climate change affect health?

Changes in temperature, precipitation, humidity and wind patterns can have a range of environmental impacts including:

- extreme weather events
- disturbance of ecosystems
- sea-level rise
- environmental degradation.

This in turn leads to a number of adverse health effects including:

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- death and illness associated with thermal stress
- injury and death from floods, storms, cyclones, bushfires
- microbial proliferation (food poisoning and unsafe drinking water)
- changes in vector-pathogen-host relationships and infectious disease patterns
- reduced crop, livestock and fisheries yields leading to impaired nutrition, health and survival
- loss of livelihoods and displacement leading to poverty and adverse health. [3]

Health impacts of climate change in the UK

There are a range of direct and indirect health consequences for the UK as a result of climate change.

1. Increased temperatures and heatwaves

- Increased temperatures and heatwaves can have acute consequences for health, resulting in dehydration, heat exhaustion or heat stroke. This in turn can lead to irreversible damage to various organs and even death.
- The greatest impact is witnessed among the elderly, babies and children, and people with ill-health including those with mental health problems.
- The increased frequency and severity of heatwaves that is predicted in the future for the UK, could result in a rise in heat-related deaths. [4]
- While it is predicted that the population of the UK will become more tolerant to hotter temperatures, the increased frequency and severity of heatwaves will be of major concern, as the effect of several hot days in a row is much greater than the effect of the same number of separate hot days. [4]

Climate fact

In 2003, a heatwave that affected much of Western Europe was estimated to have caused around 2,000 extra deaths in England and Wales. The impact was greatest in the southern half of England and among the elderly. [5]

2. Flooding and storms

- The health impacts of flooding and storms are complex and far-reaching. Potential health outcomes include: direct mortality and morbidity due to drowning, chemical hazards and contamination, and a lack of sanitation and safe drinking water.
- Traumatic weather events, such as flooding, can have serious implications for mental health, including increased anxiety and depression, especially in the elderly.
- Flooding can disrupt essentials including communications and power supplies, potentially leading to impacts on healthcare service delivery. A particular concern is the fact that many hospitals in the UK have their generators situated in the basement. [1, 4, 6, 7, 8, 9 and 10]

Climate fact

The English summer of 2007 was the wettest since records began. As a result 55,000 properties were flooded, 7,000 people were rescued and 13 people died. [11] In July, rising floodwaters from the river Severn severely threatened power supplies in southern England as flood waters enclosed Gloucestershire's main electricity sub-station, at Walham near Gloucester.

3. Infectious diseases

- Higher temperatures, flooding, and changes in climate variability may increase the spread of infections in the UK.
- At present, vector-borne diseases, with the exception of Lyme disease, are of minimal concern to health in the UK. [12] Malaria was previously endemic [13] and it is possible that there may be future small-scale malaria outbreaks. [4]
- It is unlikely that climate change will have a significant effect on the risk of water-borne infections as the UK's water treatment and distribution is of a very high standard. There could potentially be an impact on private water supplies (which are often poorly treated), surface water supplies without filtration and groundwater supplies. [4 and 12]
- Indirectly, with increased cross boarder networks, there may be increased risks from a number of infectious diseases from other parts of the world with major shifts predicted in the global distribution of tick-borne encephalitis, lyme disease, malaria, dengue, leptospirosis and West Nile Virus [HPGTCC].

4. Food safety

- Instances of food-borne infection have been shown to rise with warmer temperatures [14] and the occurrence of salmonellosis is affected by temperature. [15 and 16]
- Additional food poisoning notifications of 4,000, 9,000 and 14,000 are predicted for +1oC, +2oC and +3oC respectively [4]
- Higher temperatures will also lead to an increased risk of shellfish poisoning resulting from algal blooms. [Ref: Hallegraeff G (2009) Impacts of climate change on harmful algal blooms. *SciTopics*.]

5. Ultraviolet radiation

- Climate change can increase human exposure to ultraviolet radiation (UVR) by altering cloud distribution (ie increasing UVR surface levels), and as a result of changes in human behaviour resulting from increased temperatures such as time spent in the sun and clothing choices. [1]
- Adverse effects of exposure to UVR include an increased risk of skin cancers, sunburn and sunstroke, cataracts, and a weakened immune system in response to immunisations. [1, 4 and 17]

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6. Air quality and aeroallergens

- Concentrations of air pollutants and fine particulate matter may change as a result of climate change, as their formation partly relies on temperature and humidity. [1] Ground level ozone for example, although naturally occurring, is a principal element of urban smog and the chemical reactions that produce ground level ozone are temperature dependent. [1]
- Exposure to elevated levels of ground level ozone could lead to an increase cardio-respiratory morbidity and mortality. [1] The impact of ground level ozone increases could also result in a 15-53 per cent increase in deaths and hospital admissions in the UK from respiratory infections related to air pollution each year. [4]
- Climate change has resulted in the pollen season starting earlier and lasting longer in the northern hemisphere, increasing pollen concentrations and the prevalence of allergenic diseases such as asthma and rhinitis [1]

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What are the public health co-benefits of action on climate change?

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Taking action on climate change to create a sustainable future will have substantial public health co-benefits across society.

Health inter-linkages

There are a number of inter-linkages between climate change and other health problems. Climate change policies that target the reduction of greenhouse gas (GHG) emissions will contribute to reducing the risks of cancer, heart disease, obesity, diabetes, air pollution, road traffic injuries and osteoporosis. [1 and 2]

Action in the following sectors will lead to reductions in GHG emissions and improvements in public health in the UK:

1. **Household energy use** – residential buildings account for just over a quarter of the total UK emissions of CO₂. Research suggests that the introduction of more house insulation, better ventilation and heat recovery, a switch to electric heating, and a reduction in household temperature by 1°C would lead to a 36 per cent reduction in CO₂ emissions compared with 1990 (base-line) [3]. This would in turn lead to net benefits for health through improvements in indoor air quality from reductions in exposure to fine particles, radon, and carbon monoxide.
2. **Urban land transport** – the introduction of policies combining reduced motor vehicle use, more walking and cycling, and low-carbon-emission motor vehicles will lower GHG emissions as well as reduce obesity levels, lower the rate of chronic diseases caused by physical inactivity, lessen the health-damaging effects of air pollution, and make the roads safer for pedestrians and cyclists. In London, for example, it has been estimated that more active travel has been estimated to reduce heart disease and stroke by 10–20 per cent breast cancer by 12–13 per cent, dementia by 8 per cent, and depression by 5 per cent. [4] Further information on the interconnecteness between climate change and sustainable transport polices can be found in the 2009 BMA Board of Science briefing paper [Transport and health](#).
3. **Electricity generation** – altering the way electricity is produced will reduce GHG emissions and the emission of airborne particles that cause damage to the respiratory and cardiovascular systems. It has been estimated, for example, that a 50 per cent reduction in global GHG emissions by 2050 would save 100 life-years per million of the European Union (EU) population in 1 year. [5]

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4. **Food and agriculture** – the agriculture and food sector contributes 10–12 per cent of total global GHG emissions, of which livestock farming is responsible for four-fifths as a result of the methane emitted by ruminant animals. Reducing the production of food from livestock will reduce GHG emissions and the amount of saturated fat and meat in the diet, thereby providing substantial benefits to cardiovascular health. In the UK, for example, it has been estimated that a 30 per cent fall in the adult consumption of saturated fat from animal sources would reduce heart disease by around 15 per cent. [6]

Action to combat climate change will also provide public health co-benefits in low-income countries (see Box 4).

Box 4 – low-emission stove technology

In many low-income countries, especially in sub-Saharan Africa and low-income Asia, many people rely on solid-fuel household stoves for energy for cooking and heating. These simple stoves operate at low combustion efficiency and produce airborne particles, including black carbon, various GHGs and other health-damaging pollutants. This indoor air pollution increases the risk of acute respiratory tract infections in children younger than 5 years and chronic respiratory and heart disease in adults older than 30 years. Globally, almost 1 million children are currently dying every year of respiratory infections induced or exacerbated by the inefficient burning of solid fuels. National programmes offering low-emission stove technology for burning local biomass fuels in poor countries could, over time, avert millions of premature deaths. In India for example, it is estimated that the cumulative effect of a 10-year programme to introduce 150 million low-emission cookstoves would be to lower the national burden of these three diseases by approximately one sixth.

Source: Wilkinson P, Smith KR, Davies M et al (2009) Public health benefits of strategies to reduce greenhouse-gas emissions: household energy. *Lancet* **374**: 1917-29.

Health equity

Existing health inequalities are likely to be exacerbated as a result of health impacts related to climate change. In general, health and life expectancy are strongly linked to social circumstances and childhood poverty. [7] Those at the lower end of the economic or social scale tend to be less healthy and to have poorer access to healthcare.

As highlighted in [Sir Michael Marmot's 2010 strategic review of health inequalities in England](#), creating a sustainable future is entirely compatible with action to reduce health inequalities: sustainable local communities, active transport, sustainable food production, and zero-carbon houses will have health benefits across society. [7]

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