

CLIMATE CHANGE & HEALTH FOR SECONDARY STUDENTS VOL. 6





CLIMATE CHANGE AND HEALTH FOR SECONDARY STUDENTS



NOTE:

The purpose of this booklet is to enhance knowledge on Climate for students from Grades 9-11. The material relies heavily on content from WHO.org.

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Climate Change

Over the last 50 years, human activities – particularly the burning of fossil fuels – have released sufficient quantities of carbon dioxide and other greenhouse gases to trap additional heat in the lower atmosphere and affect the global climate.

In the last 130 years, the world has warmed by approximately 0.85°C. Each of the last 3 decades has been successively warmer than any preceding decade since 1850. Sea levels are rising, glaciers are melting, and precipitation patterns are changing. Extreme weather events are becoming more intense and frequent.

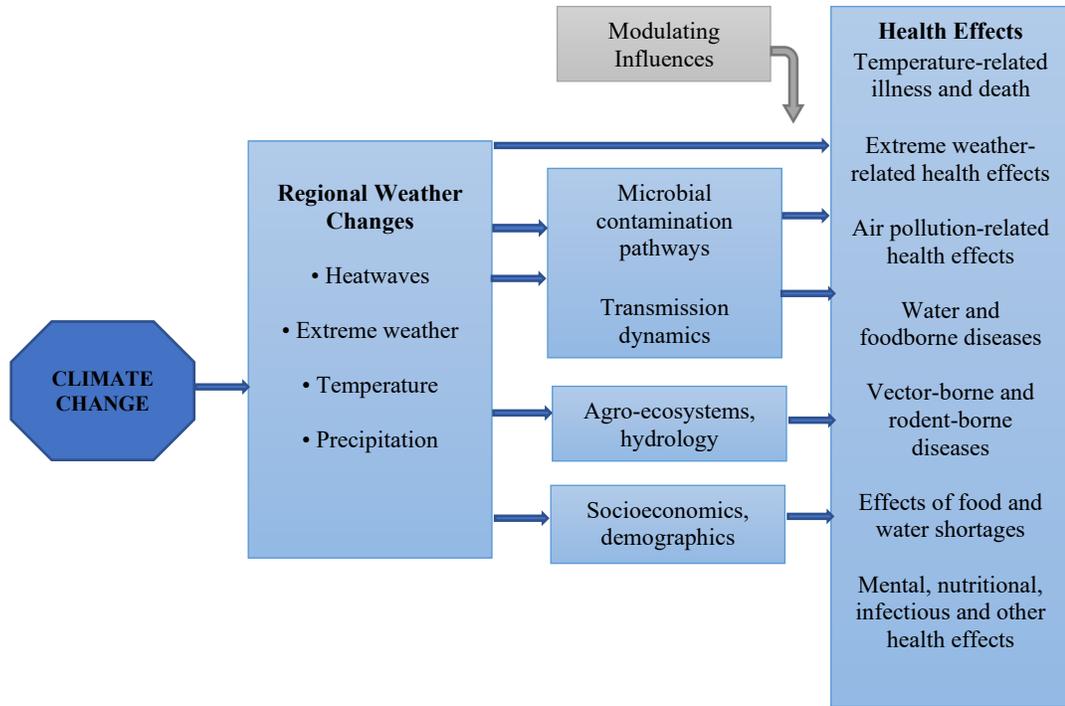
Potential Health Impacts of Climate Change

Although global warming may bring some localized benefits, such as fewer winter deaths in temperate climates and increased food production in certain areas, the overall health effects of a changing climate are overwhelmingly negative. Climate change affects many of the social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter. It is already causing rising sea levels, more frequent and extreme weather events, heatwaves and droughts, forest fires and increased spread of mosquito-borne diseases like malaria.

Global climate change would affect human health via pathways of varying complexity, scale, and directness and with different timing. Similarly, impacts would vary geographically as a function both of environment and topography and of the vulnerability of the local population. Impacts would be both positive and negative (although expert scientific reviews anticipate predominantly negative). This is no surprise since climatic change would disrupt or otherwise alter a large range of natural ecological and physical systems that are an integral part of Earth's life support system. Via climate change humans are contributing to a change in the conditions of life on Earth.



Pathways by which climate change affects human health, including local modulating influences and the feedback influence of adaptation measures.



Extreme heat

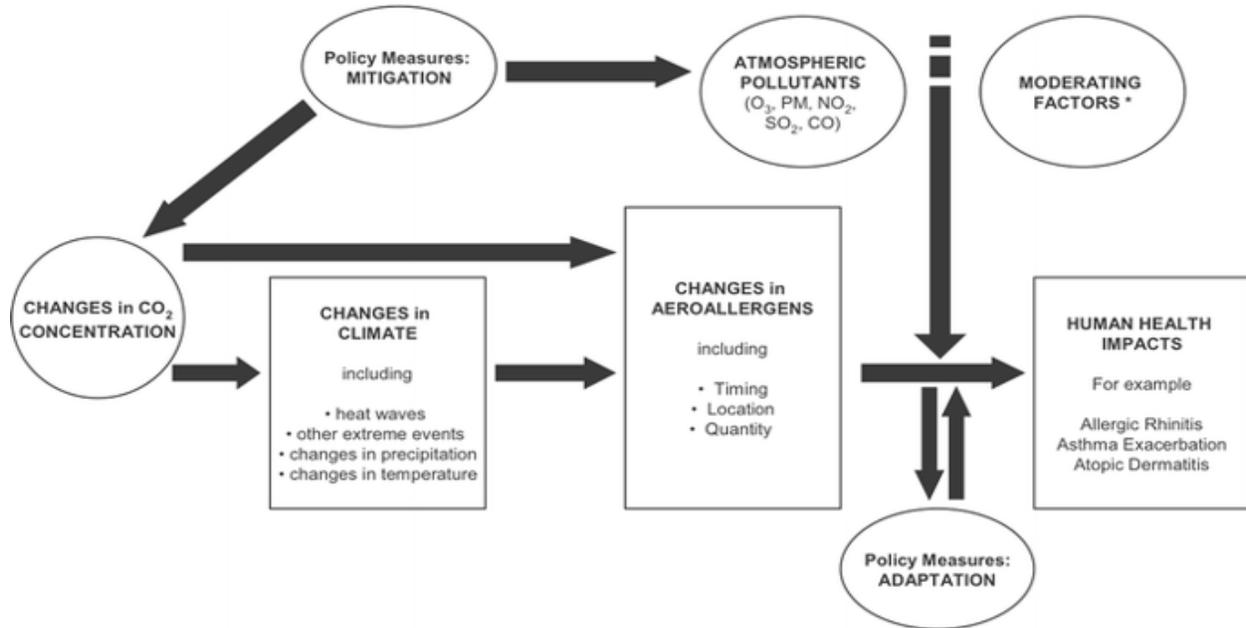
Extreme high air temperatures contribute directly to deaths from cardiovascular and respiratory disease, particularly among elderly people. In the heat wave of summer 2003 in Europe for example, more than 70 000 excess deaths were recorded.



High temperatures also raise the levels of ozone and other pollutants in the air that exacerbate cardiovascular and respiratory disease.

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Pollen and other aeroallergen levels are also higher in extreme heat. These can trigger asthma, which affects around 300 million people. Ongoing temperature increases are expected to aggravate this burden.



Modified from Bernard et al. 2001

* Moderating Factors are non-climate factors that may affect health outcomes, such as standards of living, health care access, and public health infrastructure

Natural disasters and variable rainfall patterns

Globally, the number of reported weather-related natural disasters has more than tripled since the 1960s. Every year, these disasters result in over 60 000 deaths, mainly in developing countries.

Rising sea levels and increasingly extreme weather events will destroy homes, medical facilities, and other essential services. More than half of the world's population lives within 60 km of the sea. People may be forced to move, which in turn heightens the risk of a range of health effects, from mental disorders to communicable diseases.



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Increasingly variable rainfall patterns are likely to affect the supply of fresh water. A lack of safe water can compromise hygiene and increase the risk of diarrhoeal disease, which kills over 500 000 children aged under 5 years, every year. In extreme cases, water scarcity leads to drought and famine. By the late 21st century, climate change is likely to increase the frequency and intensity of drought at regional and global scale.

Floods and extreme precipitation are also increasing in frequency and intensity. Floods contaminate freshwater supplies, heighten the risk of water-borne diseases, and create breeding grounds for disease-carrying insects such as mosquitoes. They also cause drownings and physical injuries, damage homes and disrupt the supply of medical and health services.

Rising temperatures and variable precipitation are likely to decrease the production of staple foods in many of the poorest regions. This will increase the prevalence of malnutrition and undernutrition, which currently cause 3.1 million deaths every year.

Patterns of infection

Climatic conditions strongly affect water-borne diseases and diseases transmitted through insects, snails or other cold-blooded animals.



Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases and to alter their geographic range. For example, climate change is projected to widen significantly the area of China where the snail-borne disease schistosomiasis occurs.

Malaria is strongly influenced by climate. Transmitted by Anopheles mosquitoes, malaria kills over 400 000 people every year – mainly children under 5 years old in certain African countries.

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The Aedes mosquito vector of dengue is also extremely sensitive to climate conditions, and studies suggest that climate change is likely to continue to increase exposure to dengue.

The vector-Aedes aegypti

- Transmitted by the infected female *Aedes aegypti*
- Can be identified by the white bands or scale patterns on its legs and thorax
- Primarily a daytime feeder
- Found in tropical & subtropical region
- Lives around human habitation
- Lays egg & produces larvae preferentially in artificial containers



Measuring the health effects

Measuring the health effects from climate change can only be very approximate. Nevertheless, an assessment by the World Health Organisation (WHO), taking into account only a subset of the possible health impacts, and assuming continued economic growth and health progress, concluded that climate change is expected to cause approximately 250 000 additional deaths per year between 2030 and 2050; 38 000 due to heat exposure in elderly people, 48 000 due to diarrhoea, 60 000 due to malaria, and 95 000 due to childhood undernutrition.



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Who is at risk?

All populations will be affected by climate change, but some are more vulnerable than others. People living in small island developing states and other coastal regions, megacities, and mountainous and polar regions are particularly vulnerable.

Children – in particular, children living in poor countries – are among the most vulnerable to the resulting health risks and will be exposed longer to the health consequences. The health effects are also expected to be more severe for elderly people and people with infirmities or pre-existing medical conditions.

Areas with weak health infrastructure – mostly in developing countries – will be the least able to cope without assistance to prepare and respond.

The Human Cost

From the tropics to the arctic, climate and weather have powerful direct and indirect impacts on human life. The most disadvantaged, vulnerable and poor populations are expected to be disproportionately affected by climate change, with rising food and water insecurity, higher food prices, loss of income and livelihood opportunities, negative health effects, and population displacement (including forced migration).



Effects on Nutrition

Climate variability and extremes are among the leading causes of severe food crises, and affect the nutrient quality of crops, dietary diversity of food produced and consumed, water and sanitation, patterns of health risks and disease, as well as changes in maternal care, childcare and breastfeeding.



Rising Sea Levels

Rising sea levels are already causing population displacement, particularly in island states. More than half of the world's population now lives within 60 km (37.3 Miles) of coastlines. Floods can directly cause injury and death and increase risks of diseases. Population displacement can increase tensions and potentially the risks of conflict. While Small Island Developing States contribute very little to causes of climate change, they are among the most vulnerable to climate change impacts.



Water

More variable rainfall patterns are likely to compromise the supply of safe drinking water. Globally, water scarcity already affects 4 out of 10 people. A lack of safe drinking water increases the risk of diarrhea (which kills approximately 2.2 million people every year), trachoma (an eye infection that can lead to blindness) and other illnesses. Water scarcity also means people are forced to transport water long distances and store supplies in their homes. This can increase the risk of household water contamination.



Air Pollution

The most direct link between the drivers of climate change, and of poor health, is air pollution. Burning fossil fuels – for power, transportation, and industry – is the main source of the carbon emissions driving climate change, and also a major contributor to air pollution, that kills 7 million people every year. Black carbon (the sooty **black** material emitted from gas and diesel engines, coal-fired power plants, and other sources that burn fossil fuel), produced by inefficient combustion in sources such as stoves and diesel engines, is the second greatest contributor to global warming. Over 90% of the urban population of the world breathes air that exceeds the World Health Organization’s guideline levels for outdoor air pollution.



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Extreme Heat

Heat stress can lead to increased death rates from heart and respiratory diseases, particularly in elderly or vulnerable populations. With 1.5°C warming, 350 million more people could be exposed to deadly heat stress by 2050. Pollen and other aeroallergen levels are also higher in extreme heat. These can trigger asthma, which affects around 300 million people. Warmer climatic conditions also increase the risk of deadly water-borne and mosquito-borne diseases.



Cities Can Make a Difference

Many of the necessary actions to reduce carbon emissions, improve health and increase resilience occur at the subnational level, particularly in cities. Local authorities are often wholly or partly responsible for services including energy provision, transport, and water and sanitation and health. Cities in particular are important drivers for climate and health action.



Positive Co-benefits

Steps to reduce greenhouse gas emissions can have more immediate positive health effects. For example, promoting the safe use of public transportation and active movement - such as cycling or walking as alternatives to using private vehicles - reduces carbon dioxide emissions and air pollution. It can also reduce traffic injuries and increase levels of physical activity which helps prevent diseases like diabetes, heart disease and cancer.



ACTIONS WE CAN TAKE TO PREPARE FOR CLIMATE CHANGE

We can responsibly manage the problems facing our environment by taking sensible steps toward protecting human health and safety. Whether measures are meant to reduce future climate change impacts or address the health impacts of climate change that are happening already, early action provides the greatest health benefits. It makes sense to invest in creating the strongest climate-health adaptation and preparedness programs we can.

Reducing the release of heat-trapping gases like CO₂ can help protect our health and wellbeing by decreasing impacts on our climate system. Activities that reduce the amount of heat-trapping CO₂ in the atmosphere are many of the same things we already know prevent health problems. Active modes of transport like biking or walking can help reduce traffic-related air pollution and encourage physical activity, which has public health benefits including reduced rates of obesity, heart disease, and diabetes.



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Key facts

- Climate change affects the social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter.
- Between 2030 and 2050, climate change is expected to cause approximately 250 000 additional deaths per year, from malnutrition, malaria, diarrhoea and heat stress.
- The direct damage costs to health (i.e. excluding costs in health-determining sectors such as agriculture and water and sanitation), is estimated to be between USD 2-4 billion/year by 2030.
- Areas with weak health infrastructure – mostly in developing countries – will be the least able to cope without assistance to prepare and respond.
- Reducing emissions of greenhouse gases through better transport, food and energy-use choices can result in improved health, particularly through reduced air pollution.



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