



Climate Change and its impacts on Human Health: Kerala Perspective

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Abstract

The climate change is connected with change in worldwide weather and an increase in average temperature. Climate change is not only includes the increase in global average temperature, but also the effects of this on climate. Not only the humans that are affected by the climate change. Increasing ocean temperature leads to increase the coral bleaching those results from the loss of a coral's symbiotic algae. The global warming which causes forest fires and it destroys the wildlife habitats around the world. Climate change having socio-economic and politics impacts too. Food security is one of the major impacts of climate change. 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 250000 additional deaths per year from malnutrition, malaria, diarrhoea and heat stress. Reduced emissions of greenhouse gases through better transport, food and energy-use choices can result in improved health, particularly through reduced air pollution.

Key words: Climate change, health and diseases

Introduction

Climate change will have large scale implications for human health, especially because of vector borne and waterborne infectious diseases. Climate change is happens because of an imbalance between incoming and outgoing radiations in the atmosphere. As sun's radiant's enters in to the atmosphere, some of it is absorbed by the greenhouse gases mainly carbon dioxide, methane and nitrous oxide- which are present in the atmosphere because of the combustion of fossil fuels and which are not effectively removed from the environment because of deforestation. This process increases heat. Because of the concentration of green house gases in the atmosphere-global temperature have rises at a faster rate. Some areas will have more rainfall or drought or severe weather like storms are become more common.

Climate change results in the introduction of some infectious diseases into previously unaffected geographic areas. This spread is due to the setting of weather that was much hotter and wetter than usual. It results in high rates of illness and death. According to WHO, developing nations of the world have been more affected by climate change than developed nations. But there is a contrast in



the case of imbalance in green house gas emission, which is mainly attributable to developed nations like US and nations with highly developing economies like China and India. The impacts of climate change include increasing temperature, changes in precipitations, and increase in the frequency or intensity of extreme weather and rising sea levels. These changes threaten our health by affecting food, water, air and weather. Impacts of the climate change will be based on the living location, sensitivity towards health threats and the ability of the community to adapt the change. Climate change can affect human health directly and indirectly through changes in the ranges of disease vectors, waterborne pathogens, water quality, air quality and food availability and quality. The actual health impacts will be strongly influenced by local environmental conditions and socio-economic circumstances.

Extreme Heat

The weather has direct impact on human health. The extreme rise in temperature will affect the people in urban areas than in rural areas. Indirectly, changes in weather lead to ecological disturbances, changes in food productivity and increase in the distribution of diseases. Global warming will cause the sea level to rise that could lead to erosion and damage to ecosystems such as wetlands and coral reefs. Climate change could raise air pollution levels by increasing atmospheric chemical reactions. Certain types of population are highly affected by extreme heat; Outdoor workers, homeless people, low income households, children, pregnant women, older adults etc

Waterborne Diseases

Climate impacts leads to waterborne pathogens like bacteria and viruses. Increase in water temperature means the waterborne bacteria and harmful algae toxins are present in the water.

Climate change strongly affects waterborne diseases and diseases through insects. Malaria is strongly influenced by climate. In every year, over 400000 people are killed by Malaria (WHO). Dengue is also highly sensitive to climatic conditions. During Drought, water scarcity results poor sanitation and majority of population can be exposed to potentially contaminated water. Like drought, excess rainfall and flooding are also leads to waterborne infectious diseases, this is because of poor sanitation results from runoff from sewage lines or the contamination of water by livestock.

Air pollution

Climate change causes air pollution. Raising temperature and changing weather patterns can worsen air quality, which leads to asthma and other respiratory and cardiovascular diseases. Increasing temperature causes wildfires which again increase the severity of climate change, create smoke and other unhealthy air pollutants, raising the level of carbon dioxide and also affect airborne allergens. Climate change increases the level of ground level ozone, which is a harmful air pollutant. High levels of ground levels of ozone create the risk of dying prematurely or which causes respiratory problems. Ground level ozone damages lung tissue and reduces lung



function. This creates asthma or other lung diseases. The highly vulnerable groups are children, older adults, outdoor workers etc.

Extreme weather events

There is increase in the frequency or severity of extreme weather events like extreme precipitation, flooding, droughts, storm etc. the high risk groups are young children, older adults, disabled persons and the poor. Extreme events can affect human health by-reducing the availability of food and drinking water, damaging infrastructure and prevent the access to hospitals and pharmacies, increase amount of carbon monoxide in the atmosphere, creating mental health problems such as depression.

Change in particulate matter

Because of climate change, there is change in particulate matter. Particulate matter means small particles and liquid droplets suspended in the atmosphere. Some particulate matter occurs naturally, while some is created by human activities such as burning of fossil fuels. These particles may be emitted to atmosphere directly or formed from chemical reaction of gases. These particles lead to adverse health effects like lung cancer, chronic obstructive pulmonary diseases and cardiovascular diseases. The highly vulnerable groups are older adults, outdoor workers etc.

Vector borne diseases

Vector borne diseases are illness transmitted by disease vectors like mosquitoes and fleas. These vectors can carry infectious pathogens from animals to

humans. Climate change increases the geographic range of diseases spread by vectors. The risks of climate sensitive diseases are much higher in poorer country that has less capacity to prevent and treat illness.

Food security

Climate change and the increase in atmospheric temperature affect food safety and nutrition. Extreme weather events disrupt the distribution of food. Increasing atmospheric temperature causes bacteria related food poisoning because bacteria grow more rapidly in warm environment. Higher sea surface temperature will lead to higher mercury concentrations in seafood. High levels of carbon dioxide in the air lower the levels of proteins and essential minerals in crops and making these foods less nutritious.

Mental health

The surrounding environment has serious impacts on the mental health of the people. Extreme weather can cause stress and other mental health issues. Some groups are at higher risk for mental health impacts like children, older adults, pregnant women, low income people and people with pre-existing mental illness. Some groups of people are more vulnerable to health risks from climate change. Vulnerability is mainly because of three factors

- Sensitivity - It means the degree to which people are affected by the stressor
- Exposure – It means physical contact between people and stressor



- Adaptive capacity – Means ability to adjust or avoid the hazard because of climate change.

Climate change and human health are highly correlated. Changes in temperature, extreme

Climate change and Health issues in India

India is the second largest country in the case of population, the lack of adaptive capacity and the limited resources make challenges for the country and lead to spread of illness and disease. The problem of climate change makes the situation far worse. Extreme temperature across India is make some areas inhabitable and large number of people suffers with respiratory diseases resulting from air pollution. Malaria and cholera epidemics are increase in the country with easy access to dirty water and increase in temperature which leads to increase the volume of disease carrying vectors.

High Temperature

The average temperature in India is now 1.2⁰C higher than the baseline year 2001. Recent developments and infrastructure building have altered the Indian climate. Large changes in climate negatively impacting human health, with increase in mortality and morbidity during the periods of extreme heat and cold.

Malaria

In India, there are over 2 million annual cases of malaria are reporting. Malaria is a major problem in all parts of India except the areas such as Himalayas and some Coastal

weather, drought and floods will affect agricultural productivity. It may compromise food security and affect human health through malnutrition, spread of diseases and food poisoning. The problem is very severe in developing countries.

regions. The risk of malarial infection in developing countries will increase between 5 and 15%. According to IPCC, the areas that are currently malaria free will become malaria prone in the future. There is a significant correlation between high temperature and the incidence of malaria.

Dengue

Dengue is a viral infection caused by four types of viruses (DENV-1, DENV-2, DENV-3, DENV-4). The viruses are transmitted through the bite of infected *Aedes aegypti* and *Aedes albopictus* female mosquitoes. According to figures of the National [HYPERLINK "https://www.business-standard.com/category/current-affairs-news-national/1150106.htm"](https://www.business-standard.com/category/current-affairs-news-national/1150106.htm) Vector Borne Disease Control Programme (NVBDCP) under the Health Ministry, the disease claimed the lives of 83 people till September 30, while 40,868 persons were affected by it. Last year, the mosquito-borne tropical disease had killed 325 people and affected 1,88,401 people. Till September, 2018, dengue claimed the lives of 35 people in Kerala and 3,660 were affected in Kerala. In Maharashtra, 18 people lost their lives and 4,667 people were affected by the disease.



Waterborne diseases

The problem of waterborne disease in India is very high. The spread of disease causing pathogens and chemical hazards are very high because of temperature fluctuations, increasing frequency of floods and rising sea levels. The spread of diarrhoea is mainly because of lack of sanitation and reduction in the availability of fresh water. In India, the spread of cholera has also increased. There are nearly five million cases of cholera are reporting annually in India. There is a positive correlation between climate change and precipitation on the spread of cholera. The poorest people are the most vulnerable group in the case of water borne diseases, because their only source of water is the stagnant and contaminated one.

Mental health

The climate change can also affect the mental health of the people. There is a correlation between mental health and climate vulnerability. The climate change leads to depression, psychological distress and increased suicide rates. The suicide rates are very high in the agricultural area, poor harvest because of climate vulnerability creating cycle of borrowing will leads to increasing suicide rates.

Food Security

Climate change also affects food security. According to World Food Summit, 'Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food

preferences for an active and healthy life. Climate change negatively affects the crops, livestock, forestry, fisheries and can also cause social and economic consequences including health impacts. Indian agriculture faces the problem of low productivity. India's cereal yields are lower than the developed nations.

Kerala Economy

Kerala is lying at the south-west corner of India. It lies to the north of the equator between 8°

18' and 12° 48' north latitude and 74° 52' and 77° 24' east longitude. Kerala extends an area of 38,863 sq.km which is only 1.03 percent of the total area of India. There was an increase in maximum temperature over Kerala by 0.64° C during the period of 50 years; Increase in minimum temperature was 0.23° C. Overall increase in annual average temperature was 0.44° C. It indicated that there was a clear upward trend in surface air temperature of Kerala Projections for the 2030s indicates an all-round warming in India associated with increasing GHG concentrations. The annual mean surface air temperature is projected to rise by 1.7°C and 2.0°C in 2030s. To tackle these, concerted and committed efforts with proper inter sectoral coordination is essential.

Major Health Problems in Kerala

Communicable Diseases

Kerala has witnessing an increasing burden of communicable and non-communicable diseases. Although the State has been successful in controlling a number



of communicable diseases. The emergence of dengue, chikungunya, leptospirosis, malaria, hepatitis, H1N1, in recent years has led to considerable increase in morbidity and mortality. Instances of vector borne diseases like dengue, malaria, Japanese encephalitis, scrub typhus etc. have seen a marked increase in many areas. Water borne infections like diarrhoeal diseases, typhoid and hepatitis are showing persistence in different Districts. Cholera has surfaced in many Districts. The diseases like diphtheria and whooping cough are yet to be eliminated despite years of effort.

Dengue

Dengue fever, which present in Kerala as early as 1998, has now become the single largest vector borne disease. Till 2015, dengue was more prevalent in Districts like Thiruvananthapuram, Kollam, Kottayam, Pathanamthitta, Kozhikode and Malappuram. But in 2017, all Districts reported Dengue in large numbers. The main reason for the wide spread distribution is due to the changes in the environmental factors causing proliferation of the dengue vector-Aedes mosquitoes. These mosquitoes, which are in earlier days seen more in rural areas have now, spread to urban areas also.

Leptospirosis

Leptospirosis is another public health challenge faced by the State. It is a rare disease in the early 1980's, now it spread to all Districts. The disease is initially a rodent borne infection, spread through urine of the infected rodents, and the consequent contamination of the environment is the

factor responsible for the spread of the disease. The disease has been reported in many domestic animals like cows, dogs, pigs etc. and thus has become an occupational risk for those engaged in agriculture works

Chikungunya

Chikungunya is a new type of disease among the vector borne infections. This disease have originated in the remote islands in Arabian Sea in 2005-06 spread rapidly over whole Kerala within the next two years, affecting more than 80 per cent of the population. It has resulted in lifelong immunity for the affected population. In 2015, out of 104 cases, 99 were from Thiruvananthapuram District alone, while it was 90 and 67 respectively in 2016-17 and it was 54 and 41 respectively in 2017-18. In 2018-19, 37 cases reported in which 33 from Thrissur District.

Malaria

Malaria is another vector borne disease which is transmitted by Anopheles mosquitoes has been a major public health challenge for our country. Though Kerala had eliminated the disease in 1970s, Malaria has now reemerged as a public health challenge. Thiruvananthapuram, Kollam, Kozhikode, Malappuram, and Kannur Districts have pockets of indigenous malaria over years. Kasaragod District having high number of malaria, over many years, because of its proximity to the highly endemic Districts of Karnataka. Movement of fishermen along the western coast of our State is a major threat for spread of malaria along the coastal Districts. The cases of malaria in 2017 are 1,192 and



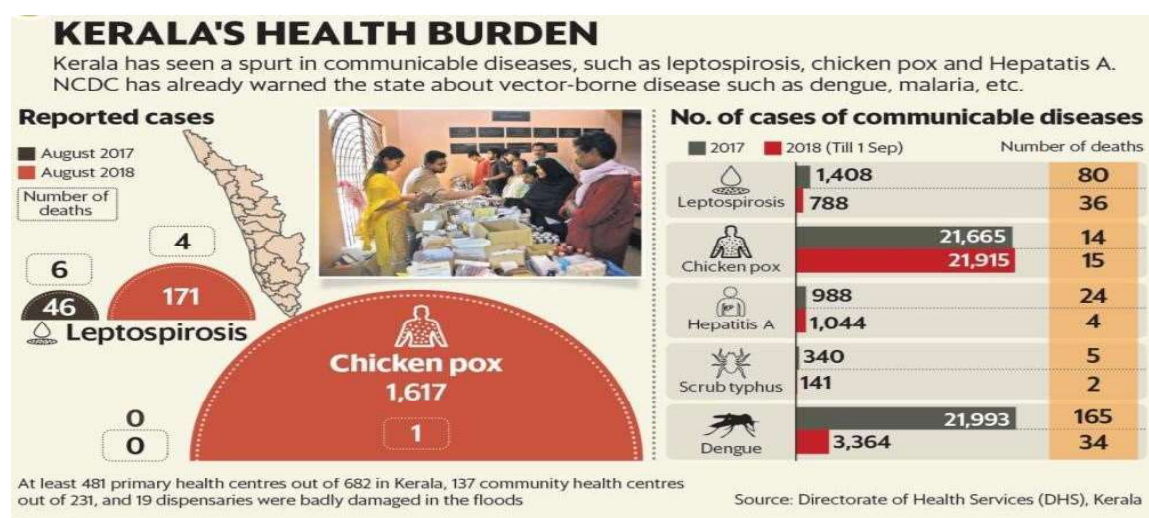
two deaths were reported. In 2018 number of cases is 551 and no death was reported.

Cancer

Cancer is the major non communicable disease in Kerala. Every year, 35,000 new cases of cancer are detected in Kerala. Nearly there are 1 lakh people are under treatment for cancer disease annually. In 2016, cancer

incidence rate in India was 106.6 per 1 lakh people, while in Kerala it is 135.3 per 1 lakh people. Even mortality and disability rates due to cancer are high in the southern states. The death rates due to cancer were highest in Mizoram, followed by Kerala and Haryana

Effects of Communicable diseases



Source: Directorate of Health Services (DHS), Kerala

Mental Health

As per Census of India 2011, 0.20 per cent of the population of Kerala suffers from mental illness and 0.20 per cent suffers from mental retardation compared to a national average of 0.06 per cent and 0.12 per cent respectively. Kerala reports higher levels of mental illness compared to all India, but there is less importance is given to the field of Mental Health in Kerala.

Conclusion

Climate change will have large scale implications for human health, especially because of vector borne and waterborne infectious diseases. Climate change is happens because of an imbalance between incoming and outgoing radiations in the atmosphere. Due to rising temperature and changing rainfall patterns, climate change is expected to have an effect on the burden of infectious diseases through insect vectors and through contaminated water. Overall, climate change is projected to increase threats to



human health, particularly in lower income populations, predominantly within tropical/subtropical countries. Climate change can affect human health directly and indirectly through changes in the ranges of disease vectors, waterborne pathogens, water quality, air quality and food availability and quality. The actual health impacts will be strongly influenced by local environmental conditions and socio-economic circumstances. Kerala has started witnessing the climate change and its impacts on various geographic areas and economic sectors. In order to face these challenges, suitable mitigation and adaptation measures are necessary.

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