

Impact of Climate Change on Human Health and Role of Mathematics

Dr. Kavita Jain

Associate Professor, Mathematics, B.B.D. Govt. College, Chimanpura, Shahpura, Jaipur (Rajasthan)

ABSTRACT:

In recent times the 'Climate Change' has emerged as the single biggest threat being faced by humanity. The vigorously changing climate has harmful impacts on the physical and mental health of different sectors of the society. Although these impacts are felt around the globe disproportionately yet it is a major cause of concern for the entire humanity. The frequent variations in the climatic conditions of a place have direct impact on the flora and fauna of the place and thus needs to be taken care of. Mathematics can be of great use in resolving the changing climate issues to a certain extent. It can be helpful in analyzing, modelling and communicating environmental data such as carbon emission, biodiversity or resource consumption. Mathematics can also help us to evaluate and compare the various environmental solutions, such as renewable energy, recycling and conservation.

Keywords: Climate, health, diseases, Mathematics

CLIMATE CHANGE AND HUMAN HEALTH:

Climate change impacts human health in numerous ways. Extreme heat waves, rising sea level, changes in precipitation resulting in flooding and droughts, and intense hurricanes can directly cause illness and other problems in human beings. The effects of climate change can also indirectly affect health through alterations to the environment. For example, worsening air pollution levels can have negative impacts on respiratory and cardiovascular conditions. Frequent changes in temperature and uneven rainfall can alter the survival, distribution, and behaviour of insects and other species that can lead to changes in allergic and infectious diseases. The rise in precipitation, storm surge, and sea temperature can lead to more water-related diseases. Climate change can also affect food safety, exposing people to contaminated foods that can result in foodborne diseases. Additionally, climate change can affect mental health and physical well-being of people. The major negative effects of climate change that are observed around the globe are as under:

(i) **DROUGHT:** Every year nearly 50-60 million people in the world are affected by droughts. Drought is an elongated dry period characterized by water shortage, rising temperature and threat to human health. The rising temperature due to climate changes result in making the dry regions drier which in turn increases the risk of prolonged period of drought. This results in visible dry vegetation and lower water levels in lakes and reservoirs which in turn affects the production of food which leads to increased hunger and malnutrition in places where people cannot grow or find sufficient food. It is estimated that nearly 40% of the global population face the problem of water scarcity and are forced to

be displaced from their homes as life is not possible without water. Droughts have long term impact on human health as shortage and contaminated water result in poor sanitization and hygiene.

(ii) **FLOODS:** The massive overflow of water that submerges the land which is usually dry is termed as flood. A study on natural disasters has revealed that unexpected floods are the second largest natural disaster occurring on this earth after wildfires. The melting of polar ice shields results in rising sea level which has resulted in extreme and unpredicted rainfall leading to more floods. The health is also acutely impacted by floods as this situation leads to spreading of waterborne diseases in the flood affected areas. When the water gets contaminated due to floods people are at the risk of being infected by diseases like cholera, malaria, typhoid, yellow fever, skin allergies, gastrointestinal illness etc. The unexpected floods also damage the ecosystem and causes harm to infrastructure.

(iii) **EXTREME WEATHER CONDITIONS:** Health is also acutely impacted by extreme weather events through injuries, diseases and air pollution in the case of wildfires. The other health impacts of this condition include forced migration or displacement due to rising sea levels, food insecurity, undernutrition, reduced availability of drinking water, increased harmful algal blooms in oceans and lakes and increased ozone levels as an additional air pollutant during heatwaves. The extreme weather conditions also affect the quality and quantity of the food production which has adverse effect on human health. Extreme heat can cause skin allergies, headache, nausea, dizziness and other heat-related illness like, rashes, heat exhaustion or heat stroke. On the other hand extreme cold can cause Hypothermia (a condition in which the rate of heat loss is greater than the rate of production), Trench foot or immersion foot which causes redness and swelling in the foot caused due to prolonged exposure to cold waves. Other common infections caused by extreme cold weather are sore throat, cough, pneumonia, running nose, nasal congestion etc.

(iv) **INCREASE IN PROPORTION OF VIOLENT TROPICAL CYCLONES:** Cyclones are gigantic storms that occur generally in low-pressure areas and warm intertropical waters which can create havoc and severe damages to humanity. Tropical cyclones use warm, moist air as their source of energy or “fuel”. As climate change is warming ocean temperatures, there is potentially more of this fuel available thereby leading to increase in the proportion of tropical cyclones. These cyclones lead to unprecedented floods which may lead to many health issues for people residing in the vicinity. The soil becomes infertile due to cyclonic storms as the strong wind drains the top soil. This results in poor vegetation which raises the price index of food stuff which in turn results in malnutrition because the economically weak people cannot afford to purchase enough nutritive food stock for themselves. Analysis of the impact of cyclones suggest the demand of the more efficient weather forecasting techniques to enable early warning and disaster management system. Public education on safety measures and precautions and post-impact hazards can only reduce cyclone -related mortality and morbidity rates in the affected regions.

(v) **THREAT TO BIODIVERSITY:** Biodiversity or biological diversity is the variety and variability of life on Earth. Prof. David Macdonald of Oxford university has rightly remarked that, ‘Without biodiversity there is no future for humanity. The increased rate of changing climate has led the plants and animal kingdom to struggle for their existence. The frequent change of climate has caused an

unprecedented rise in the rate of species extinction. The direct impacts include changes in phenology, species abundance and distribution, community composition, habitat structure and ecosystem processes. This can cause serious disturbance in the balance of nature. It is essential that serious efforts are to be taken to preserve biodiversity in order to save the endangered species and their habitat.

(vi) POLLUTION: The wavering changes in the climate creates hot and stagnant air, which increases the risk of unhealthy levels of ozone levels. The extreme weather conditions leads to depletion of the ozone layer which increases our exposure to UV radiations. Radiations are very harmful for human health. These radiations increase the risk of certain types of skin cancers, eye cataracts and some immune deficiency disorders.

(vii) HUMAN HEALTH ISSUES:

Climate change can affect human health by changing the severity, duration, or frequency of health problems and by creating unprecedented or unanticipated health threats in places or populations where they have not previously occurred. Individuals may experience greater risk from climate-related health effects because they have greater exposure to climate-related hazards; they are more sensitive to the effects of climate stressors; their own present state of health and wellbeing; or they do not have sufficient capacity or resources to cope or remove themselves from harm. It has been estimated that climate change might cause approximately 250000 additional deaths per year between 2030 and 2050, due to malnutrition, malaria, diarrhoea, dysentery, heat stress etc. The impacts of climate change on human health have become a focus for resource managers, medical fraternity, insurance companies, disaster management professionals and military forces. One of the greatest demand of the present century is to prepare common masses to adapt to the changing climate in order to reduce mitigation. An effective public health response to mitigate the risks of climate change is essential to preventing injuries and illnesses and enhancing overall public health prepare.

ROLE OF MATHEMATICS:

Mathematics has an important role in saving the world from changing climate. The accurate weather forecasts predict about the time and place where the extreme weather may strike. The modern weather forecasts rely on computers to solve the complex equations that stimulates the condition of the atmosphere. Mathematical models work with a set of equations which describe the atmosphere on the account of temperature, pressure and humidity. Mathematics has its contribution in research carried out for the demand and supply of energy supply and ensures the incorporation of higher percentage of weather dependent energy sources. Thus the role of mathematics becomes significant when it comes to our planet's rescue.

CONCLUSION:

The altering of the regularity and intensity of precipitation due to climate change, and increase in temperature caused by greenhouse gases increases the risk of many air and waterborne diseases which are killing numerous people every year. The health impacts of climate change are increasingly a matter of concern for the international public health policy community. Until and unless all nations unite to enforce strict laws to stop all the human activities responsible for climate change, the human health will be in jeopardy. Mathematics and Statistics in particular help us to quantify, organize and control our

world by quite accurate predictions of future climatic changes and thus makes our life easier. The recent advance technology uses mathematical modelling for designing weather forecasts and climate models, which gives the common men sufficient time to be ready for upcoming climatic changes.

REFERENCES:

1. climatechange.chicago.gov
2. The impact of climate change on human health: some... Kalkstein
3. Climate change and human health: present and future... McMichael
4. Climate change...Chris Riedy, Reseachgate, August 2016
5. What has Nature Ever Done For Us...Tony Juniper ,2013(Profile)