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Review Article

Climate change and health distress

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ABSTRACT

Climate change represents a significant health threat to human populations, particularly affecting impoverished and low-income nations, making it a global health concern in the 21st century. An extensive literature search was performed from June to September 2025, utilizing databases like PubMed, Scopus, Web of Science, and Google Scholar. The search strategy included pertinent keywords and MeSH terms such as “climate change,” “global warming,” “health effects,” “non-communicable diseases,” “infectious diseases,” “mental health,” and “vulnerable populations,” combined with Boolean operators (AND, OR). This narrative review explores the various health impacts of climate change on different organ systems, including both direct and indirect effects and their consequences. Increased temperatures, extreme weather events, altered precipitation patterns, and heightened air pollution are linked to numerous health issues, such as cardiovascular diseases, neurological disorders, kidney ailments, and respiratory problems. The detrimental effects of heat stress, dehydration, and air pollution elevate the risk of heart attacks, arrhythmias, strokes, and neurodegenerative conditions. Prolonged exposure to air pollution is associated with cognitive decline, anxiety, and depression. Tackling these intricate challenges necessitates coordinated multisectoral efforts that focus on climate resilience, strengthening health systems, and implementing equity-centred adaptation strategies.

Keywords: Climate change, Health effects, Vulnerable populations, Cardiovascular diseases, Mental health

INTRODUCTION

According to World Health Organization (WHO), around 3.6 billion people reside in the areas susceptible to climate change. It is estimated that climate change will cause around 250000 additional deaths per year between 2025 to 2030.This will count for economic loss of 2-4 billion dollars directly related to healthcare. The developing countries are at higher risk as compared to developed nations.[1] The people contributing least to the global emissions and climate change are at the higher risk of suffering adverse consequences.[2]

The changes in weather events such as heat waves, storms, changes in rainfall patterns, air pollution and rising sea levels are associated with many effects on the behavioural patterns of individuals such as dietary changes, changes in the levels of physical activity, and tendency for substance use. These in turn have effect on the health and wellbeing of humans.[3]

In a recently published report of UNICEF named – “Children’s Climate Risk Index”, draws our attention on the effect of climate change on children’s health and wellbeing. It shows that approximately one billion children and adolescents live in one of the 33 countries classified as being at extremely high risk. Around 240 million children and adolescents are highly exposed extreme weather conditions, and one billion to extremely high levels of air pollution.[4]

METHODS

An extensive literature search was performed from June to September 2025, utilizing databases like PubMed, Scopus, Web of Science, and Google Scholar. The search strategy included pertinent keywords and MeSH terms such as "climate change," "global warming," "health effects," "non-communicable diseases," "infectious diseases," "mental health," and "vulnerable populations," combined with Boolean operators (AND, OR).

EFFECT OF CLIMATE CHANGE ON HEALTH

Climate change has significant effects on various systems in the human body. Among these, the effects on neurological system include cognitive and behavioural problems, most likely due to prolonged exposure to the air pollutants. When we examine the effects of pollution, some mechanisms suggest that the exposure to pollutants trigger increase in cytokine levels which enter into brain circulation and cause neurotoxicity. Exposure to PM 2.5 and nitrogen dioxide also increase the risk of attention deficit hyperkinetic disorder (ADHD), Alzheimer's disease. Other pathways highlight the disturbance in gut microbiota leading to dysregulation of neurotransmitters and eventually, development of depression, anxiety, autism etc. Furthermore, there is some evidence from neuroimaging studies which reveal cortical changes in brain with exposure to air pollution exposure. These are associated with changes such as executive functions, motor system, and cognitive functions.[3]

Climate change can also influence the frequency of seizures in people with epilepsy through the induction of precipitating factors. Among these are fever, stress, and sleep deprivation (which can occur as a consequence of extreme temperatures, both excessive heat and cold). Infectious diseases transmitted by vectors (e.g.: dengue fever, zika, chikungunya, and malaria) or parasitic diseases (such as neuro cysticercosis) can increase their incidence in very hot temperatures. All of these tropical diseases have epileptic seizures as their main neurological clinical expression.[5]

The health impact of prolonged heat exposure includes heat stress, heat exhaustion, heat stroke, hyperthermia and multiorgan-dysfunction syndrome. In our body, the Heat shock proteins (HSPs) prevent misfolding of proteins and deal with misfolded ones. Any accumulation of these toxic misfolded proteins leads to the development of neurodegenerative diseases. The HSPs get damaged due to extreme heat and hence, making us more susceptible to develop the neurodegenerative diseases. Changes in heat exposure can disrupt the circadian rhythm of people. This becomes a major risk factor which can precipitate diseases such as dementia. A 1.5 increase in mean ambient temperature was correlated to a substantial increase in the risk of dementia-associated hospital admissions. The symptoms of Parkinson's disease are also exacerbated by heat waves.[6]

The cardiovascular system is also affected by the climate changes. It has been observed that the risk of cardiovascular mortality increases with every 1°C increase in heat exposure. This increased risk is around 15%. During extreme heatwaves, there is dehydration. It leads to haemoconcentration, hypercoagulability and electrolyte disturbances. Hypercoagulable states may lead to clot formation leading to acute coronary events or stroke. Electrolyte derangements may trigger different types of arrhythmias. Additionally, there is an activation of sympathetic nervous system with dehydration, leading to an increase in heart rate and cardiac metabolic demands. This can precipitate the conditions of patients having pre-existing cardiovascular diseases such as ischemic heart disease, congestive heart failure and stroke.[7]

The climate change can also affect CVS outcomes indirectly. Floods and resulting power out ages have both been associated with an increased risk of hospitalization for cardiovascular disease. The natural disasters may also make access to the emergency healthcare difficult, impacting CVS outcomes. Those having low socio-economic standing suffer more. In addition, the ambient air pollution (PM 2.5 and NO2) is one of the strongest environmental risk factors for cardiovascular diseases.[8]

Increased temperatures are proportionally related to an increasing risk of wildfires and, thus, to an excessive release of air pollutants. Additionally, a warming and dry climate leads to stagnant atmospheric conditions, increasing ground-level ozone, and limited dispersion of air pollutants. These air pollutants cardiovascular consequences such as myocardial infarction, arrhythmias etc. There is also a relevant association between air pollution and insulin resistance, which itself is a risk factor for diabetes, metabolic syndrome and CVD. Air pollution exposure also leads to increase in the blood pressure. Also, the chronic exposure to air pollution can induce systemic inflammatory states, destabilization of atherosclerotic plaques and triggering of arrhythmias.[9]

Mental health

The extreme weather conditions such as heatwaves, floods etc. disrupt the educational infrastructure and may hamper the educational process and access to healthcare. It affects the school attendance of children and eventually, education. The increased frequency of natural disasters can cause psychological distress, trauma and affect mental wellbeing.[3]

Among the vulnerable populations those at high risk are the poor, elderly and disabled, children, migrants, prisoners, slum dwellers and substance users. These groups suffer the most in various ways. Elderly and disabled are unable to access the healthcare facilities especially when a disaster strikes an area. There is a high suffering in the mental, bodily and emotional states. First of all, these marginalised populations are hit on a critical

spot when there is a delay in disaster response actions. Secondly, their social support might be damaged or hampered, which initially acted as an emotional and mental cushion for them. The adults may find it very difficult to deal with displacement, job insecurity, food insecurity and disruption of basic needs. Some communities may face discrimination on the basis of their caste, race, social circle. These factors tend to heighten the mental and psychological stressors. A competition for limited resources and uneven distribution pushes the poor people further down the ladder of suffering, affecting their quality of life. Children also become prone to the violence, bullying and mistreatment. Hence, the vulnerability increases and issues such as anxiety, depression and post-traumatic stress disorders may arise.[10,11]

Water and food-borne diseases

Several millions of children die each year from acute diarrheal diseases, and the majority of these deaths are likely due to contaminated food or water.[12,13] Climate change will alter the incidence of food-borne diseases, water-borne diseases and diarrheal diseases globally, by impacting enteric pathogens.[14,15] There is an increased concern about food insecurity and malnutrition all over the world, especially in the vulnerable populations. There is a change in rainfall patterns ranging from increasing runoff and flooding. Also, the rise in global temperature also contributes to this cause. This will alter the crop patterns and their timings as crop yields are sensitive to changes in water and sunlight. Increased temperatures cause the evaporation of soil moisture. It also damages the plants and crops directly. Also, the ground-level ozone is also a plant toxin, hindering crop photosynthesis and growth, as well as reducing grain weight and yields. Warming temperatures increase winter survival of insect pests and rates of herbivory. The weeds also thrive in these temperatures causing damage to the crops. Spatial mismatches between pests and natural predators can also undermine biological control systems. Climate change will also affect food production of flowering species by reducing the abundance of pollinating insects. This mismatch is harmful for the survival of both the plants and the pollinators. In addition to this, there is a decrease of labor manpower during extreme temperatures and humidity. So, human performance and health of crops will suffer eventually. Also, this will reduce economic productivity. Animal husbandry is also suffering as increased temperature and heat is found to be associated with decreased fertility of the cattle and pigs. For poultry, heat stress reduces growth, egg yield and quality, and meat quality. In addition, the climate change may exacerbate the social exclusion, putting the vulnerable communities at risk by increasing the competition of scarce resources and forcing the migration of populations.[16]

Infections

When viewed from an infectious disease lens, the extreme weather events have various impacts on the population. The populations tend to migrate to settle in better places. When they reach the new places, they are vulnerable to infections endemic in those areas. They may also carry their native infections (e.g. tuberculosis) to the new place, thereby making the already existing population susceptible to risk. The vaccination status is also affected if the migrants have come illegally. They are not able to get access to health care services, putting them at risk for many diseases.[17] Climate change is causing the modifications in vectors, their life cycles and feeding habits. Increased humidity and heat make it favourable for the mosquitos to breed and survive leading to an increase in various diseases such as dengue, malaria yellow fever, and Japanese encephalitis. Also, the changes in rainfall patterns such as high precipitation and runoff. leads to washing off of human and animal faeces containing zoonotic pathogens, and increased risk of outbreaks of diseases. Increased flooding can also cause risk in leptospirosis cases. Besides infectious diseases, further risk arises from high levels of mercury and persistent organic pollutants circulating within terrestrial and aquatic ecosystems which are a major concern for the re productive health of humans.[18]

Changing wild bird migration patterns and human proximity to infected birds will impact incidence rates. H7N9 infections have been strongly correlated with temperature and also with relative humidity of between 70% to 80%.[15]

Renal system

Heat related changes have also been shown to increase the cases of acute kidney injury (AKI) and chronic kidney disease (CKD). This is most likely triggered by the levels of dehydration and electrolyte imbalances, especially in elders and children. Those working outside in hot environment and children playing in heat are also at greater risk. Those affected are primarily young male laborers from rural communities required to perform strenuous work under very hot conditions (e.g., sugar cane harvesters). Hyperthermia and dehydration also precipitate the CVS conditions as well as cerebrovacular conditions. These all eventually may cause Multiorgan Failure and death.[19]

Increased ambient temperature and sunlight indices have also been recognized as major risk factors for kidney stone formation. Also, the Acute febrile illnesses from various vector-borne diseases are a major cause of AKI.[20]

Maternal and foetal outcomes

Climate change has negative effects on maternal and foetal health also. There have been recent studies highlighting the effect of forest fires and exposure to smoke during pregnancy. The results show that exposure is associated with worse outcomes in pregnancy such as low-birth-weight baby and preterm births.[2] High temperatures and ambient air pollution are known to be

associated with hypertensive disorders of pregnancy, gestational diabetes, poor mental health and poor access to health care. For the foetal part, it is associated with miscarriage, stillbirth, congenital anomalies and preterm birth. The natural disasters make it difficult to avail health care services, thereby causing poor health outcomes. They are also associated with anxiety, depression and trauma.[21]

There is a rise in food and water insecurity due to climate change. This in turn causes maternal and children's malnutrition. This itself is a risk factor for adverse pregnancy outcomes as well as triggering infection-malnutrition cycle.[13]

DISCUSSION

It is crucial to strengthen climate-resilient health systems, enhance disease surveillance, and incorporate environmental sustainability into health policies. Additionally, collaboration across sectors involving governments, public health agencies, and communities is vital to reduce health risks and build adaptive capacity. Public awareness, early warning systems, and community-based interventions can significantly contribute to reducing vulnerability and fostering resilience. Ultimately, addressing the health effects of climate change demands global solidarity, proactive policy implementation, and ongoing research to protect both planetary and human health for future generations.

CONCLUSION

Climate change poses an unprecedented threat to human health, affecting multiple organ systems, mental well-being, and the overall quality of life. The vulnerable populations suffer the most due to its effects. Mitigating these effects requires urgent global action through integrated policies that address environmental, social, and health determinants in a coordinated manner. Strengthening health systems, enhancing surveillance, and promoting climate resilience in communities are essential steps to safeguard public health in the face of a changing climate.

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