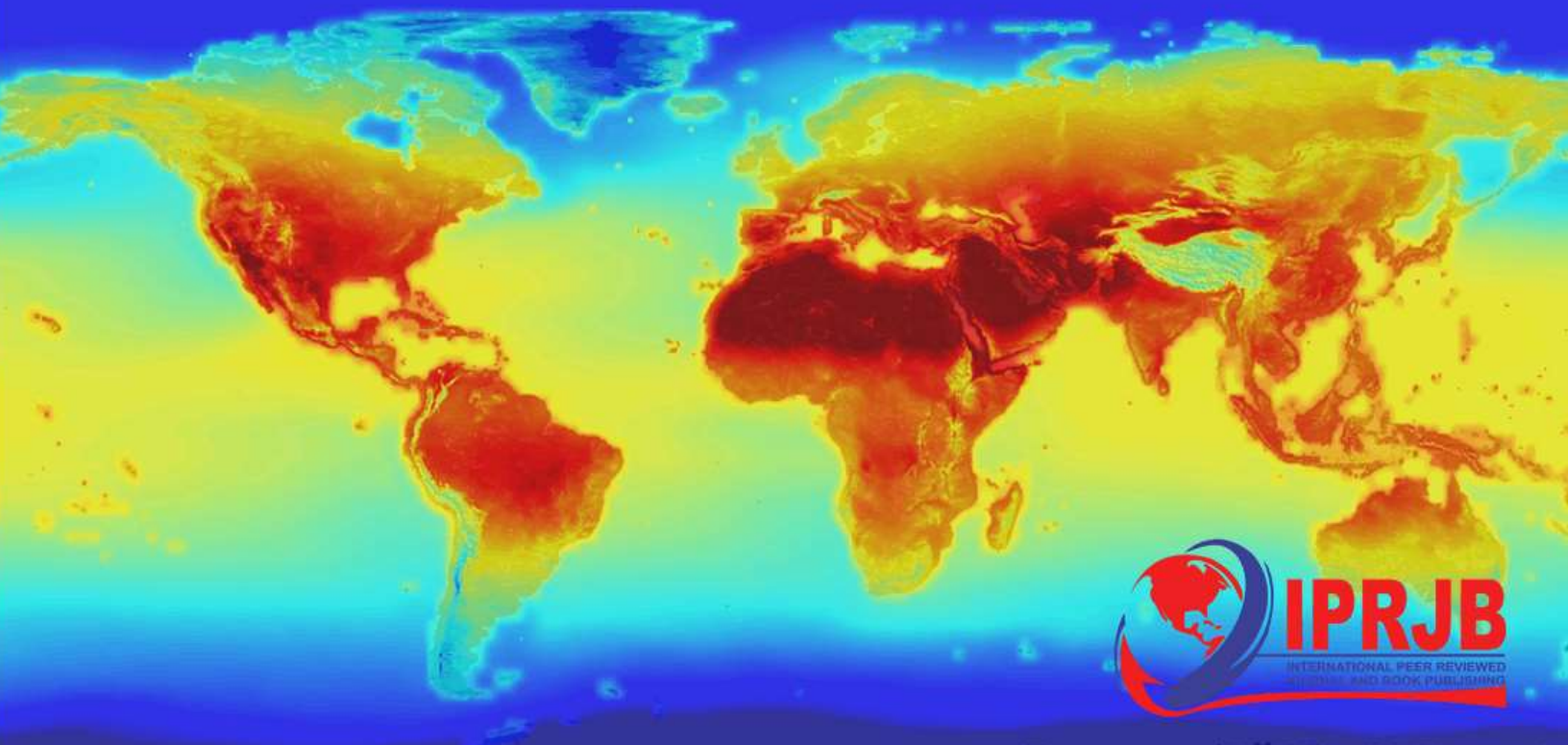


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**Global Climate Change and Health Concerns**  
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## Global Climate Change and Health Concerns



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### Abstract

**Purpose:** The purpose of the study is to evaluate the global climate change and its implication to health.

**Methodology:** The study adopted a desktop methodology. This study used secondary data from which include review of existing literature from already published studies and reports that was easily accessed through online journals and libraries.

**Findings:** The study concluded that weather-related disasters and related health effects, may cripple the already inadequate public health infrastructure in the country. Hence, there is an urgent need to respond to the situation.

**Unique Contribution to Theory, Practice and Policy:** The study used the agro-economic models and ricardian model for climate change assessment. The study recommends that physicians and the broader health care community throughout the world engage in environmentally sustainable practices that reduce carbon emissions; support efforts to mitigate and adapt to the effects of climate change; and educate the public, their colleagues, their community, and lawmakers about the health risks posed by climate change.

**Keywords:** *Global Climate Change, Health, Effects, Diseases*

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## INTRODUCTION

Climatic variability describes the ability of the weather to change significantly over long or short distances. For instance, the UK had an unusually cold winter in 2010, which broke records for the worldwide mean temperature (Seager, 2019). Changes in ordinary weather conditions as well as variations in the frequency and severity of extreme weather occurrences are signs of climate change (heat waves, flooding and cold winters). It is conceivable that under a changing climate, extreme records from the past (like high temperatures) will be broken more regularly (Rahmstorf and Coumou, 2011).

There is evidence of the effects of climate change on health in terms of direct death and injury (from natural disasters) and indirectly through the environment through vector-borne diseases, waterborne infections, malnutrition, and food insecurity, as well as taking displacement into account (Sandhu, 2016). Together with implications on vital infrastructure and healthcare systems, evidence of impacts on mental health is also provided. The potential connections between the changing environment and sexual and reproductive health and rights are given particular attention (SRHR). The increase in vector-borne and waterborne diseases, the nutrition consequences of food shortages due to longer dry spells, the rise in land-surface temperature, and the impact of water scarcity on agriculture are the most urgent risks to human health associated with climate change that are mentioned in this report.

Burning fossil fuels has a negative influence on people's respiratory health and chronic diseases, as well as GHG emissions (Farooq, 2020). Pollutants in the air interact with weather dynamics, which are impacted by the changing climate. This interaction either keeps pollutants circulating or blows them away from major urban centers. Household air pollution and GHG emissions have been linked to acute lower respiratory infections in children under five and mortality from ischemic disease, stroke, lung cancer, and chronic obstructive pulmonary disease in adults (WHO, 2015). The general trend is that the health of people will continue to be badly impacted by the emission of these pollutants.

There are both positive and (predominantly) negative climate-related influences on health and wellbeing in Northwest Alaska (Bronen, 2012). Injury, mental stress, and chronic and acute illness risks are rising in a population that is already at risk. Together with damage and interruption to the water and sanitation infrastructure, new threats relating to food and water security are beginning to emerge. Participatory health impact assessments are used to document local observations, identify vulnerabilities, and create effective solutions. It is difficult for the public health sector to determine how vulnerable a community is to climate change and to build the necessary capacity for effective health preventive measures. Limiting climate consequences through cutting greenhouse gas emissions or adapting to climate impacts are two examples of this. Adaptive engineering techniques, public awareness campaigns, disease surveillance, health forecasting, extreme weather early warning systems, health workforce preparation for disasters, and the inclusion of health-related issues in public policy are a few instances of adaptability. A comprehensive and multidisciplinary strategy that recognizes the breadth of health-impact manifestations of climate change in time, geography and by population is required in rural Alaska.

Rising temperatures have the potential to affect zoonotic illnesses (such as giardiasis), traditional plants or medicines, and infectious disorders linked to the preservation and preparation of traditional foods (such as gastroenteritis and food-borne botulism) (Ford, 2012). The documented health hazards related with climate change are substantially different; they are linked to employment in high-risk regions where we have a basic understanding of how the climate is changing. Cyclones, flooding, and extremely high temperatures are three extreme phenomena that raise serious health risks. The main threats affecting health have been recognized as rising sea levels, livability of settlements and infectious illness (including dengue, malaria and encephalitis). Given the connections relating to access to ancestral lands and mental health in Australia, the mental health implications of climate change are significant. The architecture and structure of health systems, the existing burden of illness, material circumstances, and behavioral characteristics, or the social determinants of health, all affect how sensitive people are to climate-related health consequences.

Overcrowding in homes has been linked to an increased risk of infectious diseases and a preference for the spread of respiratory and gastrointestinal illnesses among the people in Canada and Australia (Wu, 2016). Temperature projections that potentially have an impact on health outcomes. The likelihood of outbreaks of temperature-related waterborne diseases, such as diarrhea and parasite infections, is increased by insufficient water infrastructure, which is prevalent in most isolated settlements, especially in low-income countries. It is anticipated that among Inuit populations, a high prevalence of food insecurity linked to poverty and a high cost of living will increase sensitivity to nutritional deficiency brought on by stresses on traditional food systems related to climate change, with women and children identified as being at high risk.

The Batwa population in Central Africa, scarce resources, and a high illness burden are likely to make the region significantly more vulnerable to the predicted health effects of climate change (Labbe, 2016). These difficulties are likely to be exacerbated for Uganda's Batwa because they were forced from their traditional forest lands and relocated to crowded fixed settlements with poor sanitation, scant access to food and water, and increased exposure to climate-related health risks like malaria and parasitic infections. Additionally, access to formal health services is also hampered by violence and discrimination. As waterborne disease outbreaks (such as typhoid, bacillary dysentery, *Escherichia coli*, and cryptosporidiosis) typically follow heavy rainfall events and are linked to fecal matter being washed into local water sources, predictions of an increase in the frequency of high-intensity rainfall events could be particularly problematic.

Coastal storms, which particularly harm fishermen, flooding, droughts, extremely hot days, and strong winds are just a few of the environmental risks Kenya experiences as a result of the changing climate (Awuor, 2020). The main hazards to Kenyan communities are floods, droughts, and rising temperatures (Marigi, 2017). The elderly and people who live in cities are disproportionately affected by heat-related mortality. The death of children has also been linked to higher temperatures (Egondi, 2012). Urban heat island effect, which is known to be caused by the interaction of rising temperatures and air pollution in urban areas, is known to have a detrimental effect on people's health, especially those who live in informal settlements where there is typically less vegetation in the area to serve as a natural cooling system (Egondi, 2012). Kenya has many

high-altitude regions, therefore its workers may have less heat-related illness there than in other sub-Saharan African nations (ILO 2019).

Due to the vast amounts of greenhouse gases that have been released since the beginning of the industrial revolution, the energy balance of the earth has undergone a significant alteration. As a result, the climate is altering globally and will do so for at least the ensuing several decades. The health of the human population is impacted by climate changes both directly (for as by an increase in the frequency of heat waves) and indirectly (e.g., due to altered ranges of disease vectors). Existing health issues could become more (or less) acute, and previously unaffected areas could see the introduction of new health dangers (Gao, 2018).

### **Statement of the Problem**

According to the National Climate Change Action Strategy, understanding climate information has not been simple (NCCRS). So that the public can be motivated to adapt mitigation strategies, NCCRS has advised extensive awareness efforts. Numerous studies have been conducted to demonstrate how climate change affects agriculture, livestock, and transportation, but Kabir, (2018) and Padhy (2015) argue that this leaves a contextual gap because the study concentrates on the mental and psychological effects on health. As a result, the current study will concentrate on all health-related aspects of climate change. The study is necessary since this will aid nations and organizations in their search for mitigating measures.

### **Climate Change and Health**

Most systems in nature and in society are susceptible to climatic fluctuations. However, there are a number of ways why human health is different from other impact domains (Sellers, 2019). Climate change has an impact on human health through a number of lengthy, intricate processes that are loaded with uncertainty. Behavioral factors greatly impact the majority of health outcomes, as well as by socioeconomic aspects of the community, such as the status of the public health and sanitation systems and construction standards, as well as the general degree of economic development. Since there are many different variables that affect population health, including climate, determining the likelihood of illness occurrence takes careful consideration. Additionally, as human health typically rely on human cooperation and offers little room for controlled studies, data collection in this area is frequently more challenging than in other impact domains.

Although anthropogenic climate change is distinct from other environmental hazards to human health, unlike other industries that are climate-sensitive, human health is unique. (Jagals, 2021). The problem's wide spatial scope, the extremely long time horizon that must be taken into account, the uncertainty surrounding potential future climatic risks, and the intricacy of the interaction between climatic conditions and health outcomes are the most significant differences. As a result, the prevalent toxicological model of environmental health, which assumes that identifiable exposed groups experience negative health effects from defined exposure to a specific chemical, is frequently inapplicable to climate-sensitive health issues. In this circumstance, expert judgment, analogue studies, process-based and empirical modeling, and other integrated assessment approaches are frequently more relevant for assessing climate-health links than typical procedures for quantitative risk assessment.

In addition to being an environmental problem, climate change also has health implications (Hayes, 2018). Increases in the ability of the world to take in carbon as well as mitigation strategies that substantially reduce carbon emissions will all help us adapt to the health effects of climate change. This is a serious matter that requires immediate attention. However, we only pay attention to how we can adapt to and avoid the harmful effects of climate change on our health, which will still happen. Even with the strongest feasible mitigation measures, it may take 20 to 30 years for the full effects of carbon emissions, including deforestation and ecosystem destruction to manifest. In this article, we first examine the climate change consensus science before briefly examining its effects on human health. We discuss six aspects of how climate change may impact health: population and migration, extreme events, shifting patterns of disease and morbidity, food, water, and sanitation.

Strong evidence exists that regional climate changes, especially temperature rises, have affected a variety of physical and biological systems in numerous locations around the world (Cianconi) (2020). The retreat of plant and animal ranges to lower elevations, as well as the melting of lake and river ice. Positive feedback from the carbon cycle also increases the possibility of significant and possibly permanent alterations to earth systems, including slowed ocean circulation that transports water to the North Atlantic, extensive melting of the Greenland and west Antarctic ice sheets, and accelerated global warming.

More heat-related mortality occur in American cities with milder climates than in those with warmer climates. Populations can adjust to various temperatures to some extent (Howe (2019). Acclimatization will lessen the negative effects of climate change through a variety of physiological, behavioral, and technological factors. how much a rise in deaths from heat-related causes will be counterbalanced by falls in deaths from cold causes.

Due to occupation in high-risk locations like flood plains and coastal zones and their lack of public health infrastructure, populations in developing countries are particularly susceptible to flooding (Louw, 2019). Physical harm, an increase in diarrheal infections, and hunger are all effects on health. Increasing rates of psychiatric disorders including anxiety and sadness as well as overcrowding may be to blame for the rise in respiratory infection cases. There has been a reported rise in suicide, and children may see an increase in behavioral issues. Coastal towns will face more threats as a result of rising sea levels. Due to its detrimental effects on food production and cleanliness due to the water usage largely for cooking as opposed to cleansing, drought could affect emerging countries. As a result of changes in vector breeding locations, an outbreak of malaria can also happen during droughts.

In the west coast of Central America and Kenya, El Nino is linked to excessive rain and flooding (Anyamba, 2019). El Nino may have an impact on the prevalence of diseases like dengue, hantavirus infections, and cholera. The El Nino phenomenon and the effects of natural disasters, especially drought, on the population. Certain health pollutants seem to have a greater effect when the temperature is high.

In sections of Asia and Southern Europe, leishmaniasis has emerged as a significant co-infection with immunodeficiency (Badirzadeh, 2018). The susceptibility of various vectors to climate

change may vary. The geographic range of vectors in Southwest Asia and Latin America may expand due to climate change.

### **Theoretical Framework**

This study will be guided by the Agro economic model that was proposed by Van Leeuwen in 2009 and the Ricardian approach model proposed by David Ricardo in 1816.

### **Agro-Economic Model**

The agro-economic model, which analyzes the economic consequences of climate change utilizing the crop production function, it is an understatement since it ignores the indirect consequences of climate change, such as crop conversion and modifying input variables for adaptation. This model was created to address this issue, as mentioned in the paper's introduction (Seo, 2019). By calculating the current value of farmland pricing as the deferred value of future rent, this model evaluates the economic effects of climate change. The basic premise is that, in a long-term balanced condition where all production factors fluctuate along with climatic change, the price of farmland represents the quasi-rent, or the profit from using the farmland. It has a benefit when evaluating the effects of climate change since it can take adaptation into account that cannot be precisely measured or identified. As a result, this model will be used to evaluate the impact of climate change on health in light of alterations in climatic conditions. It examines the effects of climate change on health.

### **The Ricardian Approach Model**

The literature clearly demonstrates how susceptible agricultural industry in regards to both climate change and unpredictability. It is understandable that shifting temperatures and the precipitation they cause will alter water and land regimes, reducing agricultural production. Production function technique was used in early crop production models to take climate change's consequences on agriculture into consideration (Bajelj, 2014). These models overestimate how climate change's impacts will affect the economy. The approach was dependent on intricate crop-yield models, and it largely neglected to take into account all agricultural activities on farms (it only used major cereals and excluded livestock). Also, farmers who substituted or modified their inputs to lessen their susceptibility to climate change were intrinsically biased towards using adaptation measures. One strategy that considers adaptation is the Ricardian approach (Mendelsohn et al., 1994). The Ricardian model compares the net revenues of farmers in various climates across space to estimate the effects of the climate. The Ricardian approach implicitly captures it because farmers in various locations have adapted to their own situations. Initially, developed nations—and specifically American agriculture—applied the Ricardian model to their economies (Huong, 2019).

The approach has also been used in a larger African context. According to Pourzand (2011), the bulk of nonmarket valuation models, such as the Ricardian model, are evaluated using cross sectional methods and annual data analysis. Repeated cross sections imply that the results are rather steady, even though numerous years of data ought to increase the resilience of procedures like that. Repeated cross sections, according to Kurukulasuriya and Mendelsohn (2017), do not adequately describe the model. Due to the implicit consideration of the topic under study's

adaptation methods, the Ricardian model is hailed as the finest model to assess the effects of climate change on agricultural and livestock production.

In a study looking at how much agriculture has been impacted by climate change in Kenya, Kabubo-Mariara and Karanja (2018) used the Ricardian approach. According to the report, Kenya's agriculture is significantly impacted by climate change. It also demonstrates that, in contrast to a decrease in precipitation, medium and low potential zones have a higher likelihood of being further impacted by an increase in temperature resulting from global warming. This model will be applied in this study to evaluate how climate change will affect people's health. According to Kabir's (2018) research, the probability that drug usage will rise, family tension and alcohol consumption, amplified stressors relating to one's mental health and past trauma is raised due to climate change.

### **Empirical Review**

Padhy (2015) studied the consequences of climate change on mental health are likely to be similar to those on physical health. The study found that lengthy droughts brought on by climate change may lead to an increase in farmer suicides, but rising temperatures are likely to lead to an increase in violent crime and aggressive behavior. Droughts could, in the alternative, lead to stress and bad mental health. The increased frequency of disasters brought on by climate change can lead to the development of depression, adjustment disorders, and posttraumatic stress disorder. Acculturation stress, migration brought on by climate change and global warming can have this effect. Also, it may be subjected to increase in the prevalence of physical conditions, which are then connected to psychological anguish.

Casson (2023) examined how Canadians perceived the effects of climate change on their health. To facilitate the adoption of adaptive behaviors in Canada and to guide risk communication, it is essential to understand the health hazards posed by climate change. In a poll of Canadians, factors like prior consideration of the relationship between climate change and health, affective appraisal of climate health implications, understanding of those impacts without being asked and concern about a variety of effects were measured. According to the study, respondents were more worried about effects on the quality of the water, food, and air than they were about effects on mental health, infectious diseases, and illnesses brought on by the heat.

Crowley (2016) wrote about American health and climate change. Human and environmental health may suffer greatly as a result of climate change. According to the report, there could be a greater incidence of respiratory and heat-related illnesses, a rise in the prevalence of vector-borne and waterborne diseases, food and water shortages and malnutrition. Elderly, ill, and destitute people are more at risk from these potential effects. The study makes several recommendations, including that doctors and the larger health care industry engage in environmentally sound practices that lower carbon emissions, support initiatives to lessen the challenges associated with climate change and adapt to them, and inform the public, their peers, their communities, and lawmakers about the health risks associated with it.

Tong (2016) conducted a study to examine how China's food, water, and human health are impacted by climate change. Chinese food production may be significantly reduced as a result of



the overall consequences of climate change, land conversion, and decreased water availability. According to the report, climate change would significantly affect water supplies, causing changes in rainfall patterns as well as an increase in the frequency of droughts and floods in some regions of China. In many places, these effects would likely pose a threat to public health and well-being. Air pollution and temperature rise are anticipated to have a negative impact on population health in China. Only if all nations collaborate to significantly reduce the emission of so-called greenhouse gases and significantly raise the world's population's resilience to the hazards of climate unpredictability and change will the potentially catastrophic effects of climate change be avoided.

Schnitter (2019) studied the effects of climate change on Canada's food chain endanger public health. There are several knowledge gaps regarding the elements of the food system that are most sensitive to climate change as a result of the lack of focus on the relationship between climate change, food security, and human health. The ability of public health professionals and collaborators in other sectors to prepare Canadians for future health hazards is hampered by a lack of understanding of key mechanisms and potential future effects. The complicated paths through which the effects of climate change pass through the food system and affect the essential elements of food security to affect the implications for human health. Food security, a major factor in determining health, can be negatively impacted by climate-related disruptions in the food system, which can have an indirect effect on human health. The physical consequences of climate change on the food chain, particularly those affecting nutrition and foodborne infections, may also have an impact on human health.

Kabir (2018) conducted research on the impact of climate change on the mental health of Hill-Tracts. The study found that while knowledge of the relationships between climate change and psychological health is still limited, the evidence suggests that impacts can be felt at both the individual and community levels, with psychological health outcomes including psychological distress, depression, and anxiety, as well as an increase in addictions and suicide rates. The findings showed that the Hill-Tracts region of Bangladesh was more likely to use drugs, experience family stress and alcohol usage, exacerbated prior traumas and psychological health stresses, and was more likely to consider suicide.

Majra (2009) examined climate change and health in India, According to the report, inhabitants in poor countries are most vulnerable in coastal areas with a high density of people, desert regions, high mountain regions, and small island nations. The study demonstrates that diarrhea, malnutrition, and malaria are serious public health issues. The study also demonstrates how the already shoddy public health infrastructure in the nation could be severely harmed by weather-related calamities and their associated health repercussions. As a result, action is required immediately to address the situation.

Kjellstrom (2009) studied climate change's effects, vulnerabilities, adaptations, and mitigation in Australia. The study found that direct heat exposure, extreme weather, air pollution, decreased local food production, food- and vector-borne infectious diseases, and mental stress would have the most effects on health. The problem is crucial to the public's health. In order to limit detrimental health effects, adaptation to lessen the effects of climate change involves many different sectors.

It also takes extensive mitigation to lessen the effects of climate change. Future urban planning must also be altered to lessen and prepare for the effects of climate change. By lowering exposure to health hazards unrelated to climate change and supporting behaviors and lifestyles that are conducive to good health, mitigation and adaptation strategies can have positive effects on both individual and community health.

## **METHODOLOGY**

The study adopted a desktop methodology. Desk research refers to secondary data or that which can be collected without fieldwork. Desk research is basically involved in collecting data from existing resources. Thus, the study relied on already published studies, reports and statistics. This secondary data was easily accessed through the online journals and library.

## **RESULTS**

Majra (2009); Crowley (2016) there is contextual gap as these studies highlight the diseases that are associated with climate change such as malaria and diarrhea but fails to address both physical and mental health which the current study will address. Kjellstrom (2009); Schnitter (2019) study focusses on the causes of health issues due to climate change but the current study will focus on both causes and impacts of climate change on health, hence establish the relationship between the two. Tong (2016); Kabir, (2018), there is a contextual gap as each of these studies focusses on one aspect health that includes either physical or mental while the current study focusses on both.

## **CONCLUSION AND RECOMMENDATIONS**

### **Conclusion**

According to the study's findings, the nation's already shoddy public health infrastructure may be destroyed by weather-related calamities and the consequences for one's health that follow. Thus, immediate action is needed to handle the predicament. Population movement driven on by climate change and global warming may cause acculturation stress. Also, it might lead to an increase in physical conditions that are associated with psychological distress. The study came to the additional conclusion that the food system's disturbances caused by climate change may indirectly harm people's health by lowering food security, which is an important factor in health. The physical consequences of climate change on the food chain, particularly those affecting nutrition and foodborne infections, may also have an impact on human health. The study also concluded that increased family stress, increased alcohol use, magnified prior traumas, psychological health stresses, and higher propensity for suicidal ideation were all associated with climate change.

### **Recommendations**

The study made the recommendation that all nations cooperate in order to significantly reduce the production of so-called greenhouse gases and significantly boost the world's population's resilience to the hazards of climate unpredictability and change. The study makes several recommendations, including that doctors and the larger health care industry engage in environmentally sound practices that lower carbon emissions, support initiatives to lessen climate change implications and adapt to them, and inform the public, their peers, their communities, and lawmakers about the health risks associated with it.

## REFERENCES

- Anyamba, A., Chretien, J. P., Britch, S. C., Soebiyanto, R. P., Small, J. L., Jepsen, R., ... & Linthicum, K. J. (2019). Global disease outbreaks associated with the 2015–2016 El Niño event. *Scientific reports*, 9(1), 1-14.
- Awuor, L., Meldrum, R., & Liberda, E. N. (2020). Institutional engagement practices as barriers to public health capacity in climate change policy discourse: lessons from the Canadian Province of Ontario. *International Journal of Environmental Research and Public Health*, 17(17), 6338.
- Badirzadeh, A., Mohebal, M., Sabzevari, S., Ghafoori, M., Arzamani, K., Seyyed, M., & Hashemi, S. A. (2018). Case report: First coinfection report of mixed *Leishmania infantum/Leishmania major* and human immunodeficiency virus–acquired immune deficiency syndrome: report of a case of disseminated cutaneous leishmaniasis in Iran. *The American journal of tropical medicine and hygiene*, 98(1), 122.
- Bronen, R. (2012). *Climate-induced community relocations: Creating an adaptive governance framework based in human rights*. University of Alaska Fairbanks.
- Casson, N., Cameron, L., Mauro, I., Friesen-Hughes, K., & Rocque, R. (2023). Perceptions of the health impacts of climate change among Canadians. *BMC Public Health*, 23(1), 1-13.
- Cianconi, P., Betrò, S., & Janiri, L. (2020). The impact of climate change on mental health: a systematic descriptive review. *Frontiers in psychiatry*, 11, 74.
- Crowley, R. A., & Health and Public Policy Committee of the American College of Physicians\*. (2016). Climate change and health: a position paper of the American College of Physicians. *Annals of internal medicine*, 164(9), 608-610.
- Egondi, T., Kyobutungi, C., Kovats, S., Muindi, K., Ettarh, R., & Rocklöv, J. (2012). Time-series analysis of weather and mortality patterns in Nairobi's informal settlements. *Global health action*, 5(1), 19065.
- Farooq, M. U., Shahzad, U., Sarwar, S., & ZaiJun, L. (2019). The impact of carbon emission and forest activities on health outcomes: Empirical evidence from China. *Environmental Science and Pollution Research*, 26, 12894-12906.
- Ford, J. D. (2012). Indigenous health and climate change. *American journal of public health*, 102(7), 1260-1266.
- Hayes, K., Blashki, G., Wiseman, J., Burke, S., & Reifels, L. (2018). Climate change and mental health: Risks, impacts and priority actions. *International journal of mental health systems*, 12(1), 1-12.
- Howe, P. D., Marlon, J. R., Wang, X., & Leiserowitz, A. (2019). Public perceptions of the health risks of extreme heat across US states, counties, and neighborhoods. *Proceedings of the National Academy of Sciences*, 116(14), 6743-6748

- Jagals, P., & Ebi, K. (2021). Core competencies for health workers to deal with climate and environmental change. *International Journal of Environmental Research and Public Health*, 18(8), 3849.
- Kabir, S. M. S. (2018). Psychological health challenges of the hill-tracts region for climate change in Bangladesh. *Asian journal of psychiatry*, 34, 74-77.
- Kjellstrom, T., & Weaver, H. J. (2009). Climate change and health: impacts, vulnerability, adaptation and mitigation. *New South Wales public health bulletin*, 20(2), 5-9.
- Labbe, J., Ford, J. D., Berrang-Ford, L., Donnelly, B., Lwasa, S., Namanya, D. B., ... & Harper, S. L. (2016). Vulnerability to the health effects of climate variability in rural southwestern Uganda. *Mitigation and Adaptation Strategies for Global Change*, 21, 931-953.
- Louw, E., Olanrewaju, C. C., Olanrewaju, O. A., & Chitakira, M. (2019). Impacts of flood disasters in Nigeria: A critical evaluation of health implications and management. *Jàmbá: Journal of Disaster Risk Studies*, 11(1), 1-9.
- Majra, J. P., & Gur, A. (2009). Climate change and health: Why should India be concerned?. *Indian journal of occupational and environmental medicine*, 13(1), 11.
- Marigi, S. N. (2017). Climate change vulnerability and impacts analysis in Kenya. *American Journal of Climate Change*, 6(01), 52.
- Padhy, S. K., Sarkar, S., Panigrahi, M., & Paul, S. (2015). Mental health effects of climate change. *Indian journal of occupational and environmental medicine*, 19(1), 3.
- Rahmstorf, S., & Coumou, D. (2011). Increase of extreme events in a warming world. *Proceedings of the National Academy of Sciences*, 108(44), 17905-17909.
- Sandhu, K., & Singh, A. S. (2016). Impact of climatic change on human health. *Indian Research Journal of Extension Education*, 14(1), 36-48.
- Schnitter, R., & Berry, P. (2019). The climate change, food security and human health nexus in Canada: A framework to protect population health. *International journal of environmental research and public health*, 16(14), 2531.
- Seager, R., Osborn, T. J., Kushnir, Y., Simpson, I. R., Nakamura, J., & Liu, H. (2019). Climate variability and change of Mediterranean-type climates. *Journal of Climate*, 32(10), 2887-2915.
- Sellers, S., Ebi, K. L., & Hess, J. (2019). Climate change, human health, and social stability: addressing interlinkages. *Environmental health perspectives*, 127(04), 045002
- Tong, S., Berry, H. L., Ebi, K., Bambrick, H., Hu, W., Green, D., ... & Butler, C. D. (2016). Climate change, food, water and population health in China. *Bulletin of the World Health Organization*, 94(10), 759.
- Tong, S., Berry, H. L., Ebi, K., Bambrick, H., Hu, W., Green, D., ... & Butler, C. D. (2016). Climate change, food, water and population health in China. *Bulletin of the World Health Organization*, 94(10), 759.