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[Review Article](#)



## A Review on the Effect of Climate Change and Its Impact on Human Health and the Environment

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### Abstract

Climate change is one of the greatest global challenges of the 21st century, affecting ecosystems, economies, and human health worldwide. Rising global temperatures, extreme weather events, air pollution, water scarcity, biodiversity loss, and changing disease patterns are increasingly threatening environmental sustainability and public health. This review article examines the relationship between climate change, environmental degradation, and human health outcomes. The study highlights the direct and indirect effects of climate change, including heat-related illnesses, respiratory diseases, vector-borne diseases, food insecurity, mental health disorders, and displacement of populations. Additionally, the review explores the environmental consequences of climate change such as deforestation, rising sea levels, biodiversity loss, and ecosystem imbalance. The article emphasizes the importance of mitigation and adaptation strategies, sustainable development policies, renewable energy adoption, and strengthened healthcare systems to reduce climate-related risks. Addressing climate change requires coordinated global action, public awareness, and evidence-based policymaking to protect both human health and the environment.

**Keywords:** Climate change, human health, environment, global warming, pollution, public health, sustainability

### Introduction

Climate change refers to long-term alterations in temperature, precipitation, wind patterns, and other climatic conditions of the Earth. Climate change is “the biggest global health threat of the 21st century,” affecting the lives and wellbeing of billions of people worldwide (Costello, Anthony et al. 2009). Human activities such as industrialization, deforestation, urbanization, and the burning of fossil fuels have significantly increased greenhouse gas emissions, leading to global warming and environmental instability (IPCC.2023, *Climate Change 2023: Synthesis Report*. Geneva: Intergovernmental Panel on Climate Change). Global temperatures have risen rapidly over the past century, resulting in severe ecological and health-related consequences (Watts, Nick et al. 2023). The

effects of climate change are visible worldwide through rising sea levels, heat waves, floods, droughts, cyclones, wildfires, and changing disease patterns. Environmental changes have profound impacts on human health by increasing morbidity, mortality, malnutrition, and psychological stress. Vulnerable populations such as children, older adults, low-income communities, and people with chronic illnesses are disproportionately affected (Patz, Jonathan A. et al. 2005). Climate change not only damages ecosystems but also threatens food production, water availability, sanitation, and healthcare systems. Therefore, understanding the interconnectedness between climate change, environmental degradation, and public health is essential for developing sustainable strategies and effective interventions (Watts et al., 2023).

## Climate Change and Environmental Impact –

### a. Rising Global Temperature-

Global warming is primarily caused by increased concentrations of greenhouse gases such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Industrial activities, transportation, and energy production contribute heavily to these emissions. Rising temperatures lead to melting glaciers, shrinking ice caps, and increased sea levels. Heat waves have become more frequent and intense, especially in urban regions. Elevated temperatures also affect agriculture, reduce water resources, and increase the likelihood of droughts and forest fires. Rising global temperatures are mainly caused by greenhouse gas emissions from industrial activities, transportation, and energy production (Costello, Anthony et al., 2009). Increased concentrations of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O) contribute significantly to global warming, leading to melting glaciers, sea-level rise, heatwaves, droughts, and forest fires (IPCC.2023, *Climate Change 2023: Synthesis Report*. Geneva: Intergovernmental Panel on Climate Change).

### b. Air Pollution

Climate change and air pollution are closely connected. The combustion of fossil fuels releases pollutants including particulate matter, sulphur dioxide, and nitrogen oxides into the atmosphere. These pollutants contribute to smog formation and poor air quality. Poor air quality harms both the environment and human health. Environmental impacts include acid rain, reduced crop productivity, and ecosystem degradation. Urban industrial regions are particularly vulnerable to worsening air pollution. Climate change and air pollution are closely connected because fossil fuel combustion releases pollutants and greenhouse gases into the atmosphere (Ramanathan & Feng, 2009). These pollutants contribute to smog formation, poor air quality, ecosystem degradation, and reduced agricultural productivity. Climate change and air pollution are closely interconnected because the combustion of fossil fuels releases pollutants such as particulate matter (PM), sulphur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>), which contribute to smog formation and poor air quality (Jacob & Winner, 2009). Poor air quality negatively affects ecosystems, reduces crop productivity, and increases health risks in urban and industrial regions (Ebi & McGregor, 2009).

### c. Water Scarcity and Flooding

Changes in rainfall patterns have resulted in water shortages in some regions and severe flooding in others. Drought conditions reduce freshwater availability, affecting agriculture, sanitation, and drinking water supplies. Floods contaminate water sources, spread infectious diseases, and destroy infrastructure. Changes in rainfall patterns have resulted in water shortages in some regions and severe flooding in others (Trenberth, Kevin E. et al., 2014). Drought conditions reduce

freshwater availability, affecting agriculture, sanitation, and drinking water supplies (Patz, Jonathan A. et al., 2005). Floods contaminate water sources, spread infectious diseases, and destroy infrastructure (Confalonieri, Ulisses et al., 2007). Climate-induced floods and cyclones have become increasingly common in coastal and low-lying regions, leading to displacement of populations and environmental destruction .

### d. Biodiversity Loss

Climate change significantly threatens biodiversity and ecosystem stability (Thomas, Chris D. et al., 2004). Many species are unable to adapt quickly to changing climatic conditions, resulting in habitat loss and extinction (Bellard, Céline et al., 2012). Coral reefs, forests, wetlands, and polar ecosystems are particularly vulnerable to rising temperatures and environmental changes (IPCC, 2023). Loss of biodiversity disrupts ecological balance and affects food chains, pollination, and natural disease control mechanisms (Cardinale, Bradley J. et al., 2012). Deforestation and habitat destruction further accelerate climate change by reducing the Earth's carbon absorption capacity (Food and Agriculture Organization, 2020).

## Impact of Climate Change on Human Health-

### a. Heat-Related Illnesses

Rising temperatures increase the risk of heat exhaustion, dehydration, heatstroke, and cardiovascular complications (Kovats, R. Sari & Hajat, Shakoor, 2008). Older adults, outdoor workers, and individuals with chronic diseases are highly susceptible to heat-related illnesses. Heat waves also increase mortality rates, especially in densely populated urban areas where the urban heat island effect intensifies temperature exposure (Patz, Jonathan A. et al., 2005).

### b. Respiratory Diseases

Climate change worsens respiratory health through increased air pollution, pollen levels, and wildfire smoke exposure (Ebi, Kristie L. & McGregor, Glenn, 2009). Conditions such as asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and allergies have become more prevalent. Exposure to polluted air can weaken lung function and increase hospital admissions, particularly among children and older adults (Jacob, Daniel J. & Winner, Darrell A., 2009).

### c. Vector-Borne and Infectious Diseases

Climate change influences the spread of infectious diseases by altering the habitats and survival rates of disease-carrying vectors such as mosquitoes and ticks (Patz, Jonathan A. et al., 2005). Rising temperatures and humidity promote the transmission of diseases including malaria, dengue fever, chikungunya, Lyme disease, and Zika virus infection. Flooding and poor sanitation further increase the risk of

waterborne diseases such as cholera and diarrheal illnesses (Confalonieri, Ulisses et al., 2007).

#### **d. Food Insecurity and Malnutrition**

Agricultural productivity is heavily affected by changing weather conditions, droughts, and soil degradation, leading to reduced crop yields and food insecurity (Lobell, David B. et al., 2008). Climate change threatens global food security by affecting staple crops such as wheat, rice, and maize. Malnutrition particularly affects children in low- and middle-income countries (Food and Agriculture Organization, 2018).

#### **e. Mental Health Effects**

Climate-related disasters such as floods, wildfires, hurricanes, and displacement are strongly linked to psychological distress, anxiety, depression, and post-traumatic stress disorder (PTSD) (Berry, Helen L. et al., 2010). Economic instability, loss of livelihoods, and environmental uncertainty further contribute to long-term mental health burdens, especially in repeatedly affected communities (Clayton, Susan et al., 2017).

#### **Climate Change and Health care Systems**

Healthcare systems worldwide face increasing pressure due to climate-related diseases and emergencies. Hospitals and healthcare facilities may become overwhelmed during heat waves, disease outbreaks, and natural disasters. Developing countries face greater challenges because of inadequate healthcare infrastructure, limited emergency preparedness, and resource shortages. Strengthening healthcare resilience, improving surveillance systems, and investing in climate-adaptive healthcare infrastructure are essential to protect public health. Healthcare professionals also play a vital role in climate awareness, disease prevention, and emergency response planning.

#### **Mitigation and Adaptation Strategies**

##### **Transition to Renewable Energy**

Reducing greenhouse gas emissions through renewable energy sources such as solar, wind, and hydroelectric power is essential to combat climate change. Clean energy reduces dependence on fossil fuels and improves air quality.

##### **Sustainable Development**

Sustainable urban planning, forestation, water conservation, waste management, and environmentally friendly agricultural practices can reduce environmental degradation. Governments and industries should adopt policies that support carbon reduction, energy efficiency, and sustainable transportation.

#### **Public Health Preparedness**

Strengthening healthcare systems and public health programs is crucial for managing climate-related health risks. Early warning systems, disaster preparedness, vaccination programs, and community awareness campaigns can improve resilience.

#### **International Cooperation**

Climate change is a global issue requiring international collaboration. Agreements such as the Paris Climate Agreement aim to reduce global emissions and limit temperature rise. Cooperation among governments, researchers, healthcare institutions, and environmental organizations is necessary for long-term sustainability.

#### **Conclusion**

Climate change has emerged as a major threat to human health and environmental sustainability. Rising temperatures, air pollution, extreme weather events, biodiversity loss, and water scarcity are increasingly affecting ecosystems and human populations worldwide. Climate-related health problems such as respiratory illnesses, infectious diseases, malnutrition, and mental health disorders continue to rise, particularly among vulnerable populations. Addressing climate change requires urgent global action through sustainable environmental policies, renewable energy adoption, healthcare preparedness, and public awareness initiatives. Governments, healthcare professionals, environmental organizations, and individuals all have important roles in mitigating climate change and protecting future generations. A comprehensive and coordinated approach is essential to achieve environmental sustainability and improve global health outcomes.

#### **Author Contributions**

The author has significantly contributed to the study's conception, design, data collection, analysis, and interpretation. All authors were involved in writing the manuscript or critically reviewing it for its intellectual value. They have reviewed and approved the final version for submission and publication and accept full responsibility for the content and integrity of the work.

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#### **Conflicts of Interest**

The authors state that there are no financial, personal, or professional conflicts of interest associated with this research.

## Ethical Approvals

This research did not involve the use of human participants or animal subjects and therefore did not require ethical clearance

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