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The Medical Emergency of the Century: A Comprehensive Review of Climate Change and Global Public Health

Dr. Aarti Rani
Assistant Professor, Lucknow Public College of Professional Studies, Lucknow

Abstract: ***Health and climate change are closely related. Professionals must understand this relationship in order to educate the public and discuss relevant health risks with their patients. Scientists agree that the world's climate is changing due to increasing sea levels, melting ice and snow, rising surface temperatures, and increased climate unpredictability. These changes are expected to have a major influence on human health. Human health is being directly and indirectly threatened by climate change in a number of ways, including heat stress, deteriorating air quality, rising sea levels, food and water security, extreme weather events, vulnerable shelter, and population movement. The indirect effects of climate change—such as mental health problems brought on by stress, homelessness, unstable economies, and forced migration—are unquestionably important. The most vulnerable groups to the negative consequences of climate change include children, the old, and impoverished communities. The scientific data supporting the effects of climate change on human health has been examined in this article, along with an analysis of the numerous diseases linked to changes in the atmosphere and climate conditions.***
Keywords: Climate change, Reason and Impact of climate change, Issues on Health.

I. INTRODUCTION

A serious worldwide concern that has a big influence on public health is climate change. Climate change is linked to health hazards, such as heat-related illnesses and the expansion of vector-borne diseases, according to research from institutions including the United Nations, the World Health Organization, and the European Union [1]. People's health is seriously threatened by climate change worldwide. Since the middle of the 20th century, changes in the climate have been attributed to human activity, particularly the use of fossil fuels. These actions are changing the ecosystem that we rely on and endangering our future as a society by having detrimental consequences on human health. The way people comprehend and interact with the health implications of climate change has received more attention throughout the past ten years [2]. Many believe that raising public knowledge of the connection between health and climate change is essential to boosting support for climate action and motivating people to take more environmentally friendly actions. There is scientific consensus that the global climate is changing, with rising surface temperatures, melting ice and snow, rising sea levels, and increasing climate variability. These changes are expected to have substantial impacts on human health. There are known, effective public health responses for many of these impacts, but the scope, timeline, and complexity of climate change are unprecedented. We propose a public health approach to climate change, based on the essential public health services, that extends to both clinical and population health services and emphasizes the coordination of government agencies (federal, state and local), academia, the private sector and non-governmental organizations. Since Hippocrates' time, human health has been known to be impacted by weather and climate. Famine results from droughts, hypothermia from cold and hyperthermia from heat. Floods, hurricanes, tornadoes, and forest fires cause deaths, injuries, and displacement. environment and weather have an impact on the distribution and danger of many vector-borne diseases, including dengue fever, Rift Valley fever, malaria, and plague. A whole class of diseases known as tropical diseases is named after a specific environment. The danger of foodborne and waterborne illnesses, as well as newly developing infectious diseases like West Nile virus, Hantavirus, and Ebola haemorrhagic fever, is also influenced by the weather. Weather and mortality from respiratory and cardiovascular diseases are known to be correlated, albeit this relationship is less obvious [3, 4, 5]. For thousands of years, the global climate has been comparatively stable, with a strong temperate central tendency and a practically constant atmospheric carbon dioxide (CO2) level. However, levels of CO2, methane, and other greenhouse gases have been increasing for over a century; this trend has been linked to changes in the climate and other earth systems. For instance, since 1860, the average world temperature has risen by about 0.6°C, rainfall patterns have altered in many areas, and sea levels have increased.

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Although there is conflicting scientific information, it appears that severe storms have become more frequent. Public health intervention is now necessary to predict, control, and lessen the health impacts that climate change may impose.

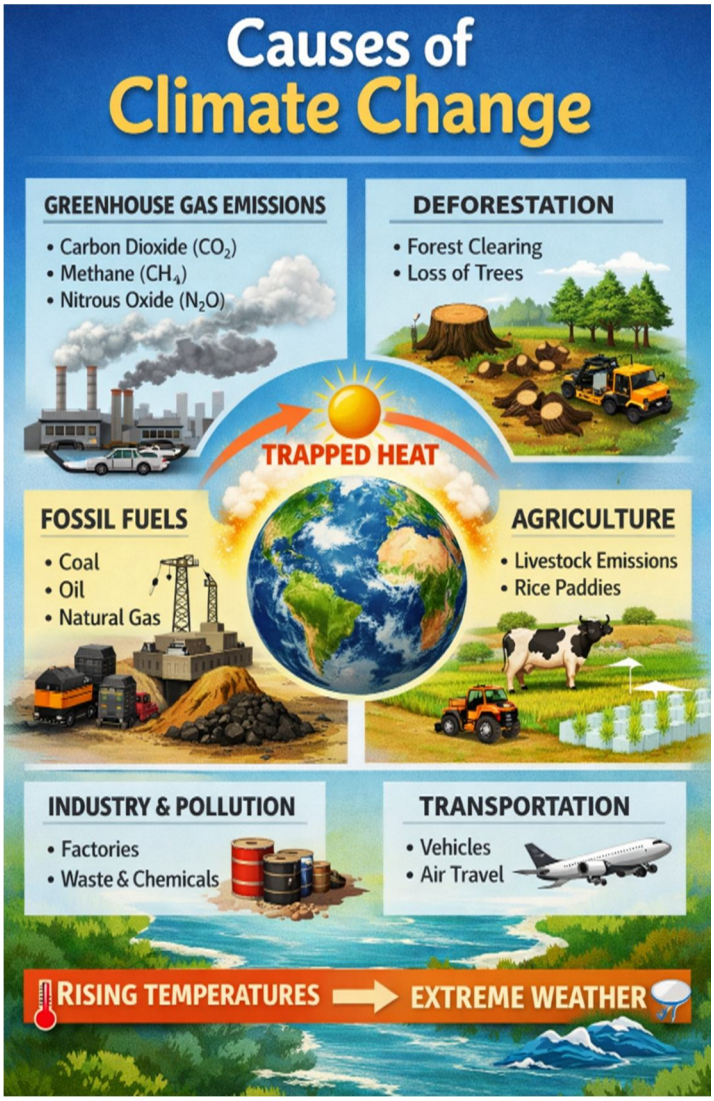


Fig 1: Causes of Climate Change

II. REASON BEHIND THE CLIMATE CHANGE

The amount of carbon dioxide (Co2) in the atmosphere has increased over the past century due to the burning of fossil fuels like coal and oil. This rise results from the combustion of coal or oil, which produces Co2 by combining carbon and oxygen in the atmosphere. Greenhouse gas concentrations have somewhat increased as a result of land clearance for industry, agriculture, and other human endeavours. The Intergovernmental Panel on Climate Change, which is made up of scientists from all over the world, came to the conclusion in its Sixth Assessment Report that it is indisputable that human activity is to blame for the rise in Co2, methane and nitrous oxide in the atmosphere during the industrial era and that human influence is the primary cause of many changes seen in the atmosphere, ocean, cryosphere, and biosphere [6]. Approximately 68% of greenhouse gas emissions and almost 90% of carbon dioxide emissions worldwide are caused by fossil fuels, which include coal, oil, and gas. These fuels are by far the biggest contributors to climate change. Heat from the sun is trapped as greenhouse gas emissions cover the planet. As a result, the climate is shifting and the earth is warming. The current rate of global warming is higher than it has ever been. Over time, rising temperatures are altering weather patterns and upsetting the natural equilibrium. All life on Earth, including humans, is at great risk from this.

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Table1: Reason due to Climate Change

REASON BEHIND CLIMATE CHANGE	
Producing Energy	Burning fossil fuels to generate heat and power accounts for a significant portion of the world's emissions. The majority of electricity is still produced by burning coal, oil, or gas, which releases nitrous oxide and carbon dioxide, two potent greenhouse gases that cover the planet and trap solar heat. Unlike fossil fuels, which release little to no pollutants or greenhouse gases into the atmosphere, wind, solar, and other renewable energy sources provide one-third of the world's electricity.
Producing Products	Emissions from manufacturing and industry are mostly caused by burning fossil fuels to produce the energy required to build products like electronics, plastics, clothing, iron, steel, cement, and other items. Gases are also released by the construction sector, mining, and other industrial operations. Coal, oil, or gas are frequently utilized to power manufacturing machinery. Chemicals derived from fossil fuels are used to make some products, such as plastics. One of the biggest global producers to greenhouse gas emissions is the manufacturing sector.
Destroying Forests	Because trees release the carbon they were storing when they are chopped down, clearing forests for farms, pastures, or other purposes results in emissions. Roughly 10 million hectares of forest are destroyed annually. Destroying trees also reduces nature's capacity to prevent emissions from entering the atmosphere because they absorb carbon dioxide. Approximately one-third of the world's greenhouse gas emissions are caused by deforestation, agriculture, and other land use changes.
Transportation	Fossil fuels power the majority of automobiles, trucks, ships, and aircraft. Because of this, transportation is a significant source of greenhouse gas emissions, particularly carbon dioxide. The majority is produced by road cars since internal combustion engines burn petroleum-based fuels like gasoline. However, emissions from aircraft and ships are still increasing. Almost 25% of carbon dioxide emissions connected to energy worldwide are caused by transportation. Additionally, statistics indicate that transportation-related energy consumption would rise significantly in the upcoming years.
Preparing Food	Methane, carbon dioxide, and other greenhouse gases are released throughout the food production process. The production and use of fertilizers and manure for growing crops, the use of fossil fuels to power agricultural machinery or fishing boats, the deforestation and clearing of land for agriculture and grazing, and the digestion of cows and sheep are some of the causes of this. Because of all of this, food production is a significant cause of climate change. Food distribution and packaging also contribute to greenhouse gas emissions.
Providing Energy for Constructions	Almost 60% of all electricity used worldwide is consumed by residential and commercial structures. They continue to produce large amounts of greenhouse gas emissions because they rely on coal, oil, and natural gas for heating and cooling. Carbon dioxide emissions from buildings have increased in recent years due to growing energy demand for heating and cooling, expanding air conditioner ownership, and increased electrical use for lighting, appliances, and connected devices.
Overindulging	Our earth may be significantly impacted by the way we live. The amount of energy we use at home, the manner we travel, the food we eat, and the amount of trash we discard all contribute to greenhouse gas emissions. Consumption of products like apparel, electronics, and plastics also increases. The richest people are most accountable; about 80% of global emissions come from the 20 biggest economies.

These are some reason behind the climate change. Now discussed some issue due to climate change:

Table 2: Effects of Climate Change

EFFECTS OF CLIMATE CHANGES	
Increased Temperatures	The global surface temperature rises in tandem with greenhouse gas concentrations. The warmest decade on record is from 2015 to 2024. Every decade since the 1980s has been warmer than the one before it. There are more hot days and heat waves in almost every land location. Higher temperatures make working outside more challenging and raise the risk of heat-related illnesses. In hotter weather, wildfires are easier to start and spread more quickly. The Arctic's temperature has risen at least twice as quickly as the rest of the world.
Violent Storms	In many areas, destructive storms have increased in frequency and intensity. More moisture evaporates at higher temperatures. This exacerbates extreme rainfall and flooding, causing more destructive storms. The frequency and extent of tropical storms is also affected by ocean warming. Typhoons, hurricanes, and cyclones all consume warm ocean surface waters. Homes and villages are frequently destroyed by such storms, resulting in fatalities and significant financial losses.
Drought	Climate change is changing water availability, making it scarcer in more regions. Water scarcity in areas under stress is made worse by global warming. It also leads to higher risk of agricultural droughts affecting crops and ecological droughts making ecosystems more vulnerable. Additionally, devastating sand and dust storms that can transport billions of tons of sand across continents can be triggered by droughts. The amount of land available for food production is decreasing as deserts rise. Nowadays, a lot of individuals regularly worry about running out of water.
A Rising, scorching ocean	Most of the heat caused by global warming is absorbed by the ocean. Over the previous 20 years, the pace of ocean warming has significantly accelerated at all ocean depths. Because water expands with temperature, the ocean's volume rises as it warms. Sea levels increase as a result of ice sheet melting, endangering island and coastal communities. Furthermore, carbon dioxide is absorbed by the water, increasing its acidity and jeopardizing coral reefs and marine life.
The extinction of species	The survival of marine and terrestrial animals is at stake due to climate change. As temperatures rise, so do these threats. The globe is losing species at a rate 1,000 times faster than at any other point in recorded human history, which is made worse by climate change. Within the next few decades, one million species could go extinct. Among the numerous risks associated with climate change are invasive pests and illnesses, forest fires, and extreme weather. Some species will be able to relocate and survive, but others will not.
Insufficient Food	Hunger and poor nutrition are on the rise worldwide due to a number of factors, including climate change and an increase in extreme weather occurrences. Livestock, crops, and fisheries might all be destroyed or become less productive. Marine resources that provide food for billions of people are at danger due to the ocean's increasing acidity. Food sources from fishing, hunting, and herding have been impacted by changes in snow and ice cover in many Arctic regions. Heat stress can reduce the amount of water and grasslands available for grazing, which can lower crop yields and have an impact on cattle.
Migration and poverty	The variables that cause and maintain poverty are exacerbated by climate change. Urban slums may be swept away by floods, destroying homes and means of subsistence. It can be challenging to perform outside tasks in the heat. Crops may be impacted by water scarcity. Weather-related calamities caused 45.8 million people to be displaced in 2024. The majority of displacements occur in nations that are most at risk and least prepared to deal with the effects of climate change [7].

III. HEALTH ISSUES DUE TO CLIMATE CHANGE

Human health is fundamentally threatened by climate change. It impacts every facet of human and environmental systems, including social and economic circumstances and the operation of health systems, in addition to the physical environment. As a result, it is a threat multiplier that might undo decades of advancements in health. Storms, high heat, floods, droughts and wildfires are among the weather and climate phenomena that are becoming more common and intense as climatic conditions change. The risk of mortality, no communicable diseases, the appearance and spread of infectious diseases, and medical emergencies are all increased by these weather and climate risks, which have a direct and indirect impact on health. According to the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report (AR6), climate threats are emerging more quickly, will worsen sooner than anticipated, and will be more difficult to adapt to as global temperatures rise [8].



Fig 2: Reason behind the Climate Change





Fig 3: Area wise issues with affect health

Heat waves are sometimes called the "silent killer." They disproportionately impact the elderly, as Maslin discussed. Because elderly adults cannot consciously control their body temperature while they sleep, prolonged night time temperatures are the primary cause of death [9]. Another significant killer is drought. Droughts, which can last for months or years, are typically brought on by persistently below-average rainfall in a region. Droughts damage cattle and lower crop yields. Significant injury and damage can result from even a brief, severe drought. Humanitarian catastrophes, mass migrations, and famine have been brought on by prolonged drought. Two of the biggest natural threats are storms and floods. They have been accountable for more than half of the deaths and financial losses caused by natural disasters throughout the last 20 years [10]. In addition to posing physical risks, flooding and extreme weather have serious negative effects on mental health. Among those impacted, psychological effects like stress and anxiety are frequently more common than physical injuries. These effects can last long after the incident, with many people still feeling anxious when it rains. In addition to posing physical risks, flooding and extreme weather have serious negative effects on mental health. Among those impacted, psychological effects like stress and anxiety are frequently more common than physical injuries. These effects can last long after the incident, with many people still feeling anxious when it rains [11]. The impact of climate change on agriculture is one of the main concerns [12].

Climate change has significant potential health effects, and addressing those effects is extremely difficult. In addition to the direct effects mentioned above on the healthy, those with pre-existing medical disorders are usually at the forefront of the vulnerable because many chronic illnesses make them less resilient to changes and obstacles. The burden of pre-existing health issues on individuals and society may intensify, in addition to the possibility that their prevalence may rise.

Prolonged heat waves, retreating glaciers, and a rise in the frequency of extreme weather events are all negatively impacting human health, ecosystems, and economic stability in India. Over the past 30 years, there have been three more heat wave days annually, which has led to a notable increase in hospitalizations and mortality. Intense heat waves caused approximately 450 premature fatalities in India in 2024. Additionally, severe flooding is caused by shifting monsoon patterns and an increase in daily rainfall, which disproportionately affects communities of poor, rural, and informal workers. On July 30, 2024, a single large landslide caused by excessive rainfall in Wayanad, Kerala, resulted in approximately 350 fatalities [13, 14].

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Fig 4: Risk Mitigation and National Programme on Climate Change

Table 3: Government initiatives

MAJOR GOVERNMENT INITIATIVES (2025–2026)
• National Action Plan on Climate Change (NAPCC) o Covers nine national missions: agriculture, energy efficiency, human health, solar energy, sustainable habitat, water, Himalayan ecosystem, strategic knowledge, and Green India. o Six missions emphasize adaptation and resilience for vulnerable communities. • National Mission on Human Health o Focuses on health impacts of climate change such as air pollution, vector-borne diseases, and heat stress. o Strengthens surveillance systems and integrates climate-health data into public health planning. • State Action Plans on Climate Change (SAPCCs) o 34 States/UTs updated plans to address local climate-health challenges (e.g., floods, droughts, heat waves). o Includes climate-resilient infrastructure and health-focused adaptation strategies. • Green India Mission (GIM) o Plantation and eco-restoration projects to reduce air pollution and heat stress. o Over ₹619.79 crore released (2020–2025) for activities in 16 States/UTs. • India–UNDP Partnership o Aligns with SDG 3 (Good Health) and SDG 13 (Climate Action). o Supports healthcare resilience, livelihoods, and climate adaptation through government-led systems

IV. CONCLUSION AND FUTURE SCOPE

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· HEALTH-FOCUSED MEASURES

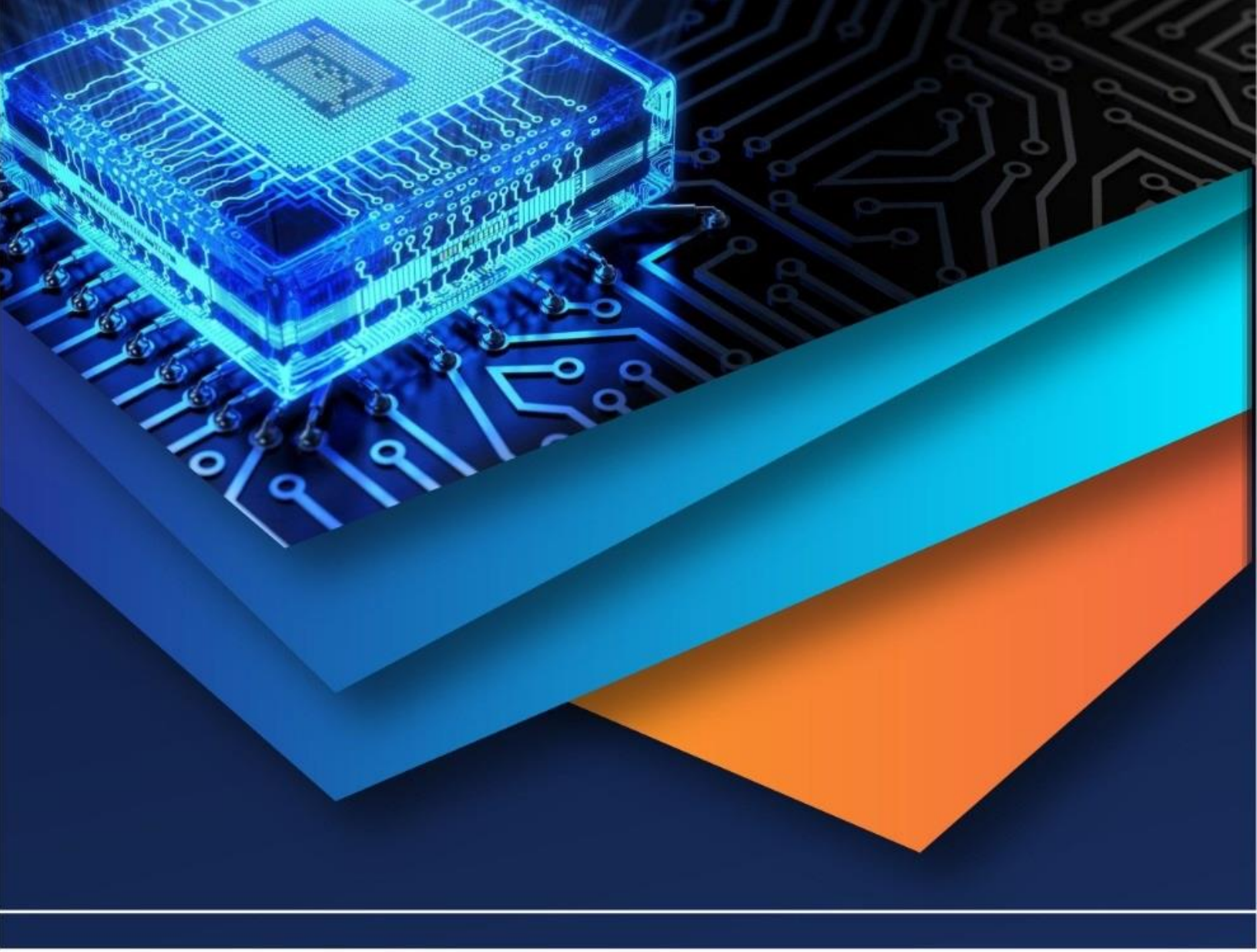
- Air Pollution Control: Stricter monitoring of ozone and particulate matter, linked to respiratory diseases.
- Heat wave Preparedness: Early warning systems, urban cooling strategies, and public awareness campaigns.
- Vector-Borne Disease Management: Expanded surveillance for dengue, malaria, and chikungunya in new climate-affected regions.
- Food & Water Security: Integrated farming systems, micro-irrigation, and safe water initiatives to reduce diarrheal diseases.
- Mental Health Programs: Addressing stress, trauma, and anxiety from extreme weather events.



The health of people, animals, and plants is greatly impacted by climate change, rising temperatures, wildfires, urbanization, increased pollution, biodiversity loss, and changes in lifestyle. The epidemic rise in the frequency and severity of allergies, asthma, and infectious diseases is directly caused by the exposure's distortion. The most significant hazard to human health at the moment is climate change.16th as the planet's temperature rises, the effects of climate change will become more severe. Global biodiversity and the welfare of billions of people are at risk due to climate change. However, there are other ways to combat climate change, including ensuring that global emissions are rapidly reduced, achieving net zero emissions by 2050, and protecting and adapting to the most vulnerable members of our society. Investments in public health systems, better access to care, stricter control of environmental contaminants, and—above all—addressing climate change itself are ways to make progress. To protect health, there are a number of holistic and interdisciplinary strategies, such as One Health, Eco Health, or Planetary Health. In order to address environmental concerns and put appropriate measures in place, an integrated approach based on high-quality evidence is required. In order to do this, the Academia must provide a superior foundation in the form of evidence-based guidelines. In order to achieve "health for all," the One Health concept aims to involve all relevant parties, including human and veterinary medicine, environmental scientists, consumers and patients, climate activists, landscape and urban planning, media, policy makers, health insurance, and planning.

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