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Climate Wellness: Understanding the Impact on Human Health

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Climate change is a critical global health challenge, disproportionately affecting vulnerable populations and exacerbating health disparities. With international initiatives aiming to cap the rise in global temperatures at 1.5 degrees Celsius. the urgency for effective mitigation and adaptation strategies is paramount. Despite these efforts, greenhouse gas (GHG) emissions have surged by 50% since 1990, intensifying the direct impact of climate change, especially in rural and underserved communities. Objectives were to identify the health effects of climate change, assess the vulnerability of specific populations, and propose community -driven interventions to mitigate these effects. Methods involved collecting qualitative data on greenhouse gas emissions, severe weather conditions, and the prevalence of climate-related illnesses. The study also investigated the mental health impacts of climate-induced stress and trauma, especially affecting high-risk groups like young children, senior citizens, and postpartum women. Findings indicate a notable rise in the prevalence of vector-borne and waterborne diseases, malnutrition, and heat-related illnesses within these communities, highlighting the multifaceted health risks linked with climate change. Higher global temperatures and severe weather conditions are linked to higher rates of respiratory and cardiovascular diseases, while the mental health burden is reflected in increased cases of anxiety, depression, and trauma. Among postpartum women, exposure to climate -induced trauma elevates the risk of postpartum depression (15%), postpartum anxiety (20%), and post-traumatic stress disorder (40%). The study concludes that addressing climate-driven health issues requires a multidisciplinary approach, integrating public health strategies with climate resilience measures. community-driven initiatives, such as climate –smart health education, sustainable resource management, and early warning systems, are essential to enhance adaptive capacity and promote sustainable development in line with sustainable development goal (SDG) 13.

1. Introduction

Climate change is widely acknowledged as a serious public health threat by major global organizations such as the World Health Organization (WHO) and the Intergovernmental Panel on Climate Change (IPCC), with estimates linking it to over 250,000 deaths each year (Haines et al., 2006). During the decade from 2011 to 2020, average global temperatures increased by approximately 1.09°C compared to pre-industrial levels (1850–1900). This temperature rise has triggered significant disturbances in atmospheric and oceanic systems, elevated sea levels, and a surge in extreme weather events, including wildfires, droughts, and floods. These environmental shifts underscore the pressing need for robust policy interventions and adaptive strategies (Quantifying the Impact of Climate Change on Human Health, January 2024, in collaboration with Oliver Wyman). The projected escalation in the frequency and severity of extreme weather events presents growing health hazards. These risks are evident through direct impacts—such as heatwaves, storms, and floods—as well as indirect consequences like reduced food availability, deterioration of air and water quality, and damage to essential ecological systems (Delpla et al., 2021). Studies have extensively well -documented the health effects of climate change, connecting it to increased morbidity, mortality, and the spread of disease vectors (Ebi & Hess, 2020). This study is intended to provide a through overview of systematic reviews:

- To examine the immediate and long-term impacts of climate change on health.
- To assess vulnerability of specific populations.
- To propose community-led interventions and projects to mitigate these effects.
- To provide recommendations for healthcare policy and adaptation initiatives

2. Literature Review

Climate change causes a significant risk to the health of communities. Climate change is causing environmental effects like rising sea levels, higher temperatures, more intense weather events, as well as frequent occurrences of droughts, floods, and wildfires — all of which are negatively impacting human health and well-being (Watts N,2021). Previous studies and reviews have emphasized the wide-ranging health impacts of climate change, including the rise in infectious diseases, respiratory conditions, heat-related illnesses and fatalities, malnutrition driven by food insecurity, and negative health outcomes linked to heightened sociopolitical instability and conflict (Hsiang SM, 2014).. Some of the impacts of climate change are relatively direct —for example , heatwaves or tropical storms can directly result in physical harms , illnesses, and deaths. Other impacts are more indirect, involving shift in ecosystem that eventually influence human health and well being . For example, variations in temperature and rainfall patterns and weather trends can disturb the life cycles of disease vector species , such as those responsible for spreading Lyme disease and West Nile virus, potentially causing emerging or shifting outbreaks. Many experts and researchers predict that global warming will lead to substantial and potentially severe changes in human health. (Rossati ,A. 2017). The relation between global warming and heat strokes is quite obvious. However, it

should not be underestimated. People suffering from heat strokes may exhibit symptoms such as headaches, dizziness, extreme thirst, high fever, loss of consciousness, a drop in blood pressure, and cyanosis (Leon, 2010). Climate change also brings numerous serious threats to human health. The World Health Organization (WHO) reports that air pollution is responsible for around seven million deaths globally each year, presenting a significant risk to both human health and the environment (Bouwmeester, 2015). Notably, air pollution affects individuals across all income groups—low, middle, and high. WHO's global research in 2016 found that 58% of premature deaths linked to outdoor air pollution were due to ischemic heart disease and strokes, while 18% were attributed to chronic obstructive pulmonary disease and lower respiratory infections, and 6% were caused by lung cancer (Solanki, 2016). While some regions experience increased rainfall, other areas face prolonged droughts, which can heighten the risk of vector-borne diseases transmitted by mosquitoes that breed in stagnant water, especially in communities with limited access to clean water (Chretien, 2007). Droughts also reduce crop yields and their nutritional value, leading to food insecurity, malnutrition, hunger, and large-scale displacement. In 2017, nearly 22 million people were forced to leave their homes due to "sudden onset" weather events like flooding, wildfires, droughts, and stronger storms (Podesta, 2019). The World Health Organization (WHO) projects that climate change will lead to approximately 250,000 deaths per year worldwide between 2030 and 2050 (Kendrovski, 2019).

The study concludes that climate change will prolong the transmission season in numerous regions, leading to a 16–28% rise in the total number of person-months of exposure. (Tanser, 2003). Furthermore, rising sea levels can intensify hurricane-related flooding in coastal regions, elevating the risk of exposure to polluted water, hazardous chemicals, and toxic waste (Crimmins A,2016). In 2019, there were 396 climate-induced catastrophs that resulted in 11,755 deaths, affected 95 million people, and caused nearly $130 billion in losses. Asia was the most affected continent, accounting for 40% of disasters, 45% of fatalities, and 74% of affected communities. Floods and storms alone impacted 68% of those affected worldwide, highlighting the disproportionate burden on developing nations **(**Ebi et al., 2025). Studies of the 2003 heatwave in Europe have concluded that it was an exceptionally severe event, with the summer of 2003 probably being the hottest in the region since 1500. Climatologists now believe it is "highly probable" that human activity has at least doubled the likelihood of undergoing a heatwave similar to the one in 2003 (Stott, PA.2003). Temperature is a key factor influencing ozone levels and modifying its health effects (Wilson, A. 2017). Higher temperatures due to climate change could lead to higher ozone concentrations and related health risks (Orru, 2017). Without a reduction in ozone precursor chemicals, primarily from fossil fuel combustion, warmer temperatures could cause up to 9 more days of harmful ozone levels annually in the Northeast, Midwest, and Southwest by the 2050s, compared to the 2000–2009 period (Shen, 2016). Significantly, the number of individuals facing annual heat waves is increasing: In 2018, 220 million people worldwide were affected by heat waves, a figure well beyond previous records. Severe weather and climate events are

linked to increased rates of post-traumatic stress disorder (PTSD), depression, anxiety, intense psychological strain, substance abuse, and suicidal tendencies. (Bryant RA, 2014). Among postpartum women, exposure to climate -induced trauma elevates the risk of postpartum depression (15%), postpartum anxiety (20%), and post-traumatic stress disorder (40%). Since the climate crisis affects everyone, climate change should be appropriately addressed in both education and the media (Godsmark, 2020). The 2015 Paris Agreement on Climate is seen as an crucial milestone in the global effort to reduce the risks of climate change (Haines, 2017). This agreement called upon countries to adopt ambitious adaptation and mitigation measures and actions and ensure their execution (Hoegh-Guldberg, O.2019) In response, the Intergovernmental Panel on Climate Change urged nations to take steps to limit the temperature increase to 1.5 C to avoid, significant risks to human health (Maibach, 2019). The global COVID-19 pandemic has clearly demonstrated that both society and healthcare professionals must be well-prepared to address sudden health crises (Pandve, 2011) While climate change tends to have more gradual effects, it already leads to extreme weather events that require well-prepared healthcare systems (Majra, 2009). Physicians should be trained in mitigation, adaptation, and policymaking related to climate change (Purcell, 2014).

3. Methodology

3.1 Inclusion Criteria

- Studies related to climate change and health, specifically in Asia, South Asia, and the Middle East.
- Articles published in English between 2019 and 2024.

3.2 Exclusion Criteria

- Studies published before 2019 were excluded.
- Articles involving primary research were omitted, as the focus was on secondary research.

3.3 Database and Search Strategy

- The search incorporated various databases such as PubMed, Web of Science, and Google Scholar.
- Articles were selected using expert tagging to identify relevant studies on climate change exposure and health impacts.

3.4 Ethical Considerations

- No ethical approval was required, as only secondary data was analyzed.
- Public was not the part of this study.

3.5 Article Selection and Screening

- A total of 40 published journal articles were initially identified.
- A total of 20 articles on adaptation strategies were selected for a full-text review.

- Another 20 studies were excluded because they did not focus on health-related adaptations.

4. Findings From Literature and Discussions

4.1 Health impacts of climate change

Human activities are the primary driver of climate change (Vicedo-Cabrera et al., 2021), which exacerbates air pollution and contributes to a rise in respiratory illnesses such as asthma and chronic obstructive pulmonary disease (COPD). In areas affected by wildfires, pollution has led to a 30% increase in respiratory hospitalizations. These concerning figures underscore the critical need for climate adaptation and mitigation strategies to safeguard public health (Ferreira, 2025). Climate change exacerbates a range of health issues, including respiratory conditions linked to air pollution, heat-related illnesses, and the growing incidence of vector-borne diseases like malaria and dengue. Additionally, rising temperatures are associated with mental health concerns, such as stress, depression, and anxiety. The combined impact of these health challenges calls for urgent public health interventions and climate adaptation actions (Zyoud & Zyoud, 2024). Extreme weather events, such as heatwaves, floods, and droughts, have both immediate and long-term effects on mortality (Ahern M, 2005).

4.2 Social and economic disparities

Low-income communities and marginalized groups face disproportionate health risks due to climate change. Limited access to healthcare, inadequate housing, and economic instability intensifies their risk to extreme weather events and climate-induced diseases. Climate related disasters negatively impact economies and ecosystem by damaging buildings, crops and roads and heatwaves, as well as causing mortality. Climate change is expected to lead to a rise in the frequency of heatwaves. During the significant European heatwave, over 2,000 additional deaths were reported in England and Wales (Okuyama, 2022). Projections indicate that between 2030 and 2050, climate change will contribute to an additional 250,000 deaths each year, primarily due to heat stress, malnutrition, malaria, and diarrheal diseases. Rising temperatures have increased vector-borne diseases like malaria and dengue, while air pollution contributes to 7 million deaths per year from respiratory and cardiovascular illnesses (Haines et al., 2006) . Mosquito vectors responsible for transmitting infectious diseases are spreading across continents, driven by global trade and travel. As a result, they are establishing themselves in areas that were once free from diseases like dengue and malaria (George et al., 2024). Wildfires, which have doubled in occurrence since 1980, contribute to worsening air quality, with over 339,000 premature deaths annually attributed to wildfire smoke exposure.

Additionally, floods and hurricanes are responsible for over 60% of all disaster-related deaths worldwide**, (**Ahdoot et al., n.d.). Climate extremes escalate mortality and morbidity through floods, drowning and cyclones and pathogenic diseases and malnutrition (Mora et a1., 2022). Besides physical health, climate change also has adverse impacts on psychological health (Obradovich et a1., 2018) Addressing these disparities requires targeted policies that incorporate climate justice and fair healthcare principles. Studies show that the adoption of residential air

conditioning has led to a 75% reduction in heat-related mortality. Additionally, climate control measures can help reduce the impact of extreme heat on workers' productivity (Somanathan et al., 2021).

4.3 Mental health problems related to climate change

Climate change poses a significant challenge to nations striving for universal healthcare by increasing both mental and physical health demands, while also disrupting healthcare services and infrastructure.(Lawrance et al., 2022). 36% of flood survivors develop PTSD, 28.3% suffer from anxiety, and 20% experience depression (Lawrance et al., 2022) .One in six hurricane survivors develop PTSD, with 50% suffering from mood or anxiety disorders. (Cianconi et al., 2020) Heat waves increase suicide rates by 0.7% to 2% for every 1°C rise in temperature. 42% of Australian wildfire survivors reported psychiatric symptoms one year after the disaster (Lawrance et al., 2022).

Severe climatic conditions have been linked to an increase in:

- PTSD, depression, and anxiety across all age groups, including disaster relief workers.
- Substance use and suicidality in climate-affected regions (Lawrance et al., 2022) .
  Among postpartum women, exposure to climate-induced trauma elevates risks:
  - Postpartum depression (15%)
  - Postpartum anxiety (20%)
  - Post-traumatic stress disorder (40%)
- The impact of media in influencing public opinion can either lead political action or exacerbate climate anxiety, affecting both individual well-being and policy responses (Cianconi et al., 2020).

4.4 Global and regional disparities

In 2019, there were 396 climate-related disasters, which led to 11,755 deaths, affected 95 million people, and resulted in nearly $130 billion in damages. Asia was the hardest-hit continent, accounting for 40% of the disasters, 45% of the fatalities, and 74% of the affected populations. Floods and storms alone impacted 68% of those affected globally, underscoring the disproportionate impact on developing countries (Ebi et al., 2025). The mental health consequences of climate change are an emerging field of study, with these impacts likely to be felt unevenly, especially among vulnerable populations (Delpla et al., 2021). Climate change is also exacerbating global food and water crises. The number of people suffering from chronic hunger increased from 797 million in 2016 to over 821 million in 2018 (Haines et al., 2006). Currently, around two billion people lack consistent access to safe and nutritious food, with approximately 149 million children under five experiencing stunting, while 40 million are overweight (Ebi & Hess, 2020). The World Health Organization (WHO) estimates that climate change is responsible for around 150,000 deaths annually, with this number expected to rise despite ongoing adaptation measures (Bartlett et al., 2024). From 1992 to 2001, 2,257 climate-related disasters were recorded, including droughts, extreme temperatures, floods, wildfires, cyclones, and windstorms. Among these, floods were the most common, representing 43% of the events, affecting more than 1.2

billion people and causing nearly 100,000 deaths. Research into the health impacts of climate change surged eightfold from 2007 to 2019, highlighting the increasing urgency of addressing this issue (Haines et al., 2006).

4.5 Vector Borne Diseases Related to Climate Change

Climate change has accelerated the transmission of vector-borne diseases, with malaria and dengue cases rising by up to 10% in some regions due to favorable conditions for mosquito breeding. Waterborne diseases are also on the rise, as extreme weather events like floods contaminate drinking water sources, leading to higher outbreaks of cholera and digestive system infections. (Ferreira, 2025). Climate change alters the patterns of transmission of vector-borne infectious diseases through shifts in temperature, humidity, rainfall, and sea levels. However, transmission depends on demographic and societal factors, requiring the presence of reservoir hosts, competent vectors, and sufficient quantity of pathogens for disease outbreaks to occur. (Ebi & Hess, 2020).

4.6 Economic and Productivity Declines

Climate change significantly affects the global economy. Even with global warming restricted to 1.5°C, the cumulative economic loss from climate change by 2030 is projected to reach $2.4 trillion (Oliver Wyman Analysis). Rising temperatures are anticipated to reduce global productivity, with over 2% of total working hours lost annually due to intense heat exposure. In South Asia and Sub-Saharan Africa, productivity losses could reach 5%, worsening economic challenges .By 2050, up to 1.2 billion people could be displaced, and nearly half the world's population may suffer from water shortage due to climate induced stress (Bartlett et al., 2024). By 2050, nearly two-thirds of the global population is expected to reside in urban areas, making cities central to both climate change impacts and resilience strategies (Malhi et al., 2020).

4.7 Policy and Adaptation Strategies

The IPCC's 2013 report confirmed that human activities are the primary driver of global temperature rise. In 2015, the Paris Agreement was accepted by 196 countries, with the goal of keeping the global temperature increase well above 2°C rise, and ideally limiting it to 1.5°C above pre-industrial levels. However, studies indicate that current policies are inadequate, potentially leading to a 3°C rise by 2100. Organizations such as *The Lancet Countdown* provide valuable insights into current and future health risks and threats linked with climate change, underscoring the need for urgent action. (Bartlett et al., 2024). Research confirms that greenhouse gas (GHG) emissions are rising due to fossil fuel combustion, deforestation, and industrial expansion (Delpla et al., 2021). Renewable energy expansion is crucial, with solar and wind power at the forefront of the energy transition. However, deployment challenges persist, requiring policy interventions such as carbon pricing, subsidies, and incentives to accelerate implementation. Negative emissions technologies (NETs) like bioenergy with carbon capture and storage (BECCS) and afforestation have potential, but land competition and high costs hinder scalability (Fawzy et al., 2020). Geoengineering solutions, such as stratospheric aerosol injection (SAI), remain highly

controversial due to unpredictable consequences and ethical dilemmas. Specialists emphasize that mitigation strategies should prioritize an integrated approach combining renewable energy, carbon sequestration, and climate-adaptive policies (Fawzy et al., 2020).

Enhancing policy frameworks requires:

- Integration of climate and public health policies
- Investment in renewable energy and sustainable agricultural practices
- International collaboration to address global climate challenges

Reducing greenhouse gas emissions has direct health benefits. A WHO analysis found that reducing indoor air pollution in China through improved energy efficiency resulted in economic benefits that far exceeded the costs. Strengthening policies and addressing implementation barriers will enhance the sector's contribution to building climate-resilient societies (Brink et al., 2024).

4.7.1 Adaptation Strategies

Effective adaptation strategies are essential to reduce risks, including:

- Seawalls to combat rising sea levels
- Drought-resistant crops for food security
- Advanced warning systems for natural disasters (Heath, 2025).

However, adaptation efforts that focus solely on hazard mitigation and financial outcomes may lead to unintended social consequences, disproportionately affecting marginalized communities by increasing psychological distress and societal division (Heath, 2025). Preparing for climate extremes requires comprehensive data on current and projected health risks to inform adaptation strategies (Johnson et al., 2021). Formulating a Health National Adaptation Plan (HNAP) with vulnerability assessments is vital for prioritizing climate-related health risks across governance levels. Merging HNAP with broader adaptation planning in sectors like disaster risk management, agriculture, and water enhances resilience and coordination (Ebi et al., 2025). Climate change is progressing, and in the future decades, societies and ecosystems will either face significantly higher temperatures or implement major measures to curb warming (Malhi et al., 2020)

5: Conclusion

Systematic reviews highlight a significant link between climate change and the exacerbation of health disparities, particularly driven by increasing temperatures, extreme weather conditions, and deteriorating air quality. This study has mainly focused on physical health impacts, with gaps in understanding psychosocial effects, especially in low-income countries that face the greatest risks. Addressing these disparities and conducting inclusive and diverse research are essential to mitigating climate change's role in worsening global health disparities (Rocque et al., 2021). Risk assessments and budget friendly adaptation strategies in the health and related sectors are crucial for sustainable resilience. Early planning and mitigation efforts, such as utilizing sustainable energy sources, can lessen future health effects and enhance overall well-being.

5.1 Recommendations

- Invest in Climate-Resilient Health Infrastructure: Develop and reinforce health systems that can withstand extreme weather events, including establishing climate-resilient hospitals and emergency response units.
- Enhance Workforce Training: Train healthcare professionals on climate-induced health threats and appropriate response strategies to better prepare them for emerging health challenges
- Promote Climate-Smart Health Education: Conduct community-based educational programs to increase awareness about health effects of climate change and promote preventive measures.
- Establish early warning system: Develop early warning systems for extreme weather events to improve preparedness and ensure timely action, especially in at-risk and underserved communities.
- Formulate Inclusive Policies: Design and implement policies that integrate climate justice and health equity principles to protect marginalized populations from disproportionate health risks.
- Improve Access to Healthcare: Increase accessibility to healthcare services, particularly for low-income communities, to reduce vulnerabilities to climate-induced health issues**.**
  Provide Mental Health Services: Establish mental health support services to address climate-induced stress, anxiety, and trauma, with a focus on vulnerable groups such as children, the elderly, and postpartum women.
- Integrate Mental Health in Disaster Response: Incorporate mental health considerations into disaster response plans to ensure comprehensive support for affected individuals.
- Adopt Renewable Energy Sources: Advocate for the shift toward renewable energy options, such as solar and wind power, to lower greenhouse gas emissions and improve air quality.
- Implement Sustainable Resource Management: Develop and promote sustainable practices in agriculture, water management, and urban planning to enhance climate resilience.

4.8 Limitations

This study consolidates findings from multiple research reviews to present a holistic perspective of climate change's health impacts rather than depending on individual studies. Although the comprehensive search approach and interdisciplinary analysis add significant value, the broad scope of climate change and mental health research may have resulted in the omission of some important subtopics.

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