

IMPACT OF CLIMATE CHANGE ON MENTAL HEALTH AMONG VULNERABLE GROUPS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Objective: This study aims to explore the impact of climate change on mental health among vulnerable groups, including low-income populations, Indigenous communities, children, women, and the elderly, to highlight their unique vulnerabilities and mental health outcomes. This aligns with the United Nations' Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) and SDG 13 (Climate Action), addressing the need for climate resilience and mental health equity.

Theoretical Framework: The research is grounded in social vulnerability theory, emphasizing how structural inequalities exacerbate the impact of climate change on mental health. The framework integrates psychological theories of eco-anxiety and solastalgia, which explain the mental distress caused by environmental changes.

Method: A systematic literature review was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology. This involved a comprehensive search of academic databases, screening studies, and qualitatively synthesizing data from 35 peer-reviewed articles published between 2000 and 2023.

Results and Discussion: Findings reveal that climate change exacerbates mental health issues such as anxiety, depression, and PTSD among vulnerable groups due to their limited adaptive capacity and exposure to climate-related hazards. Vulnerable communities, including Indigenous groups and low-income populations, experience heightened psychological impacts such as eco-anxiety and solastalgia. The results underscore the importance of integrating mental health considerations into climate adaptation policies and developing targeted interventions to enhance resilience among these populations. This study also supports global efforts toward achieving SDG 10 (Reduced Inequalities) and SDG 11 (Sustainable Cities and Communities).

Research Implication: The study suggests the need for comprehensive and equitable mental health strategies that prioritize vulnerable groups in climate change adaptation planning. Policymakers must consider social equity and community-based approaches to mitigate the mental health impacts of climate change.

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Originality/Value: This review uniquely addresses the intersection of climate change and mental health within marginalized populations, emphasizing the need for mental health integration in climate adaptation frameworks. The study highlights the underexplored psychological dimensions of climate change, providing valuable insights for developing inclusive and sustainable adaptation strategies.

sustainability

Keywords: climate change, mental health, vulnerable groups, adaptation, sdgs, eco-anxiety, resilience, inequality, sustainable development goals (SDGs).

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1 INTRODUCTION

Climate change presents significant challenges that affect vulnerable communities psychologically and socially. Marginalized groups, such as low-income populations, Indigenous communities, children, women, and the elderly, often face disproportionate impacts due to limited adaptive capacity and increased exposure to climate-related hazards (Ferreira, 2023). Understanding these vulnerabilities is critical for developing targeted interventions to support mental health and resilience among these populations (McDowell *et al.*, 2016).

Climate change presents significant challenges to vulnerable communities, affecting them psychologically and socially. Vulnerability to climate change is determined by exposure to its impacts, the sensitivity of natural resource systems, and adaptive capacity (Allison *et al.*, 2009). Social vulnerability, encompassing structural forces and human dimensions, can lead to certain groups facing unequal risks from climate change (Barrett & Bosak, 2018). Marginalized communities, such as low-income groups and Indigenous populations, often experience the greatest impacts of climate change (Ferreira, 2023). Vulnerability research is essential for comprehending how and why individuals are impacted by climate change (McDowell *et al.*, 2016).

Coastal communities are particularly susceptible to climate change, with impacts distributed unevenly among human populations (Nelson *et al.*, 2023). Vulnerability assessments take into account both biophysical and social

dynamics (Debortoli *et al.*, 2018). Indigenous communities in rural areas are especially vulnerable to climate change (Khanal *et al.*, 2019). Communities reliant on natural resources are more severely affected by climate change (Kaján, 2014). Inclusion and social equity are crucial in adaptation planning to tackle the disproportionate impacts of climate change on vulnerable groups (Dulal *et al.*, 2009).

Awareness and adaptive capacity are vital for vulnerable communities to prepare for the impacts of climate change (Okeke, 2022). Sustainable adaptation policies are necessary to effectively manage vulnerability (Huq *et al.*, 2015). Coastal adaptation poses a significant challenge for vulnerable coastal communities (Adityawitari *et al.*, 2020). Understanding climate vulnerability and capacity analysis is crucial for regional and local development efforts (Zachary, Kisang, Lino & Yin, 2022).

2 METHODOLOGY

2.1 PRISMA FRAMEWORK

This review was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology to ensure a systematic approach to data collection, screening, and synthesis. The PRISMA framework involves a four-step process: identification, screening, eligibility, and inclusion.

2.2 SEARCH STRATEGY

Databases such as PubMed, Scopus, and Google Scholar were searched for articles published between 2000 and 2023. Keywords included "climate change," "mental health," "vulnerable groups," "anxiety," "depression," and "Indigenous communities."

2.3 INCLUSION AND EXCLUSION CRITERIA

Studies were included if they focused on the mental health impacts of climate change on vulnerable groups. Articles were excluded if they were not peer-reviewed, focused solely on physical health impacts, or did not address vulnerable populations.

2.4 DATA EXTRACTION AND ANALYSIS

Data extraction was performed using a standardized form to collect information on study characteristics, participant demographics, climate-related stressors, and mental health outcomes. Qualitative synthesis was employed to integrate findings from various studies.

3 RESULTS

3.1 OVERVIEW OF INCLUDED STUDIES

A total of 35 studies met the inclusion criteria, highlighting the impacts of climate change on mental health across various vulnerable groups. The studies spanned multiple geographic locations, with a significant focus on low-income communities, Indigenous populations, coastal regions, children, women, and the elderly.

3.2 KEY MENTAL HEALTH IMPACTS

Climate change has significant implications for vulnerable populations, exacerbating existing inequalities and impacting health, livelihoods, and social well-being. Vulnerable groups, such as low-income individuals, Indigenous communities, and marginalized populations, are disproportionately affected by climate change (Khine & Langkulsen, 2023)Ferreira, 2023; Khanal *et al.*, 2019). The climate crisis places these groups in socially and economically vulnerable positions, hindering their ability to cope with and recover from climate-related

hazards (Khine & Langkulsen, 2023). Additionally, vulnerable communities, such as those in coastal regions like Bangladesh and rural areas like the mid-hills of Nepal, face challenges in coping with the impacts of climate change due to limited resources and adaptive capacity (Tashmin *et al.*, 2018; Khanal *et al.*, 2019). Gender dynamics also play a role, with certain groups like small-scale fisherfolk being particularly vulnerable to climate variability (Onyango *et al.*, 2020).

Understanding the specific vulnerabilities and adaptation strategies of these communities is crucial for developing targeted interventions and policies to enhance resilience and mitigate the adverse effects of climate change. By integrating considerations of equity, social vulnerability, and community engagement, it is possible to foster equitable resilience and support vulnerable populations in facing the challenges posed by climate change.

Climate change has significant implications for mental health, particularly affecting vulnerable populations disproportionately. The perception of psychological distance towards climate change can impede public engagement Jones *et al.* (2016). Climate change not only directly impacts mental health through disruptions in social, economic, and environmental determinants but also leads to future distress and anxiety, especially in vulnerable communities (Berry *et al.*, 2009). The potential adverse effects of climate change highlight the necessity of a precautionary approach to address its psychological consequences (Doherty & Clayton, 2011).

The mental health repercussions of climate change encompass various aspects of well-being, including eco-anxiety and solastalgia, which refer to mental distress and grief induced by environmental changes (Hayes & Poland, 2018). Vulnerable populations, notably in Asia and Africa, are highly conscious of the escalating health risks linked to changing climatic conditions (Hathaway & Maibach, 2018). Climate change-related stressors like income insecurity and food scarcity can have implications for psychological and social well-being (Hayes & Poland, 2018).

Climate change has given rise to psychological phenomena such as climate anxiety, characterized by a chronic fear of environmental catastrophe (Reyes *et al.*, 2021). Understanding the psycho-social implications of climate

change is crucial for informed action to avert its hazardous consequences (Fritze *et al.*, 2008). The intricate nature of climate change as a stressor necessitates a multidisciplinary approach to effectively tackle its impacts on mental health (Reser & Swim, 2011).

Climate change has been identified as a significant factor affecting mental health through various direct and indirect pathways (Berry *et al.*, 2009). The impacts of climate change on mental health can be acute or chronic, leading to a range of mental health issues, including increased suicide mortality (Nicholas *et al.*, 2020). Extreme weather events, which are occurring with higher frequency due to climate change, have been identified as one of the main triggers for mental health issues (Lai *et al.*, 2023). Additionally, gradual effects of climate change, such as temperature increases and heat waves, have been associated with a range of mental health effects, from increased stress to exacerbation of pre-existing mental health conditions (Brooks & Greenberg, 2022). Furthermore, mere awareness and anticipation of the consequences of the climate crisis have been found to negatively affect emotional well-being, which in turn can affect overall health and psychosocial functioning (Marczak *et al.*, 2021).

It has been suggested that addressing mental health in the context of a changing climate requires the integration of mental health indicators into climate change and health vulnerability assessments (Hayes & Poland, 2018). This integration is crucial, as mental health is often overlooked in these assessments due to challenges related to attribution and a lack of guidance on measuring and monitoring mental health effects related to climate change (Hayes *et al.*, 2019). Moreover, it has been proposed that integrating climate change considerations into policies and programs for mental health is essential to better prepare for and respond to the climate crisis (Corvalán *et al.*, 2022). Additionally, building upon global commitments and implementing multisectoral and community-based approaches have been recommended to reduce vulnerabilities and address the mental health and psychosocial impacts of climate change (Corvalán *et al.*, 2022).



Table 1.

Key Vulnerability Factors Affecting Climate Change Impacts

Vulnerability Factor	Description	Impacted Groups	Key Findings and Examples
Socio-Economic Status	Low income, lack of resources, and economic instability increase vulnerability to climate impacts.	Low-income individuals, rural communities	Economic disparities limit access to adaptation resources, increasing mental health issues like stress and depression due to economic insecurity (Khine & Langkulsen, 2023).
Geographical Location	Living in areas prone to natural disasters, such as coastal or rural regions, heightens exposure to climate risks.	Coastal communities, rural populations	Coastal and rural areas face higher risks due to flooding, sea level rise, and agricultural impacts, leading to greater psychological distress (Nelson et al., 2023).
Cultural and Spiritual Ties	Deep cultural and spiritual connections to the environment make climate impacts more personal and distressing.	Indigenous communities	Loss of traditional lands and environmental changes cause solastalgia and heightened anxiety (Mugambiwa, 2018).
Health and Age	Pre-existing health conditions, age-related vulnerabilities, and mobility issues increase sensitivity to climate change.	Elderly, people with disabilities	Older adults and those with disabilities are more susceptible to heat stress and extreme weather, leading to increased mental health challenges (Kıñay et al., 2019).
Gender Inequality	Gender roles and unequal access to resources place women at a higher risk of climate-related mental health impacts.	Women, particularly in low-income and rural settings	Women bear greater burdens in caregiving and resource management, leading to increased anxiety and depression (Patel et al., 2019).
Social Isolation and Marginalization	Socially isolated and marginalized groups have less support and access to adaptive resources.	Elderly, minority groups, migrant populations	Isolation reduces the ability to cope with climate stressors, worsening mental health outcomes (Nyahunda & Tirivangasi, 2021).
Dependence on Natural Resources	Communities heavily reliant on natural resources face greater economic and mental stress due to environmental changes.	Farmers, fishermen, Indigenous groups	Resource-dependent communities experience severe impacts on livelihoods, leading to increased stress, anxiety, and depression (Kaján, 2014).
Lack of Access to Healthcare	Limited access to mental health and medical services exacerbates the psychological impacts of climate change.	Low-income communities, rural and remote areas	Inadequate healthcare access worsens the mental health impacts of climate stressors, leading to untreated anxiety and depression (Berry et al., 2009).
Psychological Distance	Perception of climate change as a distant issue can reduce engagement.	General populations, particularly in	Lower perception of immediate risk reduces preparedness, increasing

Vulnerability Factor	Description	Impacted Groups	Key Findings and Examples
	in adaptation behaviors, worsening impacts.	developed countries	vulnerability to psychological impacts once events occur (Jones <i>et al.</i> , 2016).
Adaptive Capacity	The ability to adapt is influenced by resources, education, governance, community resilience.	All vulnerable groups	Lower adaptive capacity, due to limited resources and governance support, exacerbates mental health impacts (Debortoli <i>et al.</i> , 2018).

This table summarizes the key vulnerability factors that affect how different groups experience and respond to climate change impacts. These factors highlight the need for targeted interventions and inclusive adaptation strategies that address the unique challenges faced by vulnerable communities.

3.3 IMPACT ON VULNERABLE GROUPS

The impact of climate change on vulnerable populations, particularly concerning mental health, is a critical area of concern. The literature highlights the pathways linking climate change to mental health, including direct impacts such as extreme weather events and indirect consequences like economic loss and displacement (Hayes & Poland, 2018). Moreover, the disproportionate impacts of climate change on vulnerable populations have been emphasized, with a focus on the potential exacerbation of existing inequities in mental health and well-being across nations (Martin, 2024). Additionally, climate change has been identified as a significant factor in increasing multidimensional inequalities and exacerbating health consequences among vulnerable populations (Khine & Langkulsen, 2023). The concept of equitable resilience has been proposed as a framework to address the disproportionate impacts of climate change and disasters on vulnerable populations, emphasizing the need for a more equitable approach to resilience (Ferreira, 2023).

Furthermore, the development of climate change vulnerability assessments using a public health lens has been suggested to determine local health vulnerabilities, including exposure to climate hazards, sensitivity, and adaptive capacity (Levison *et al.*, 2018). Additionally, a hypothetical analysis has highlighted the potential for climate change to lead to significant mental

health effects, such as anxiety, PTSD, and chronic psychological dysfunctions (Obande-Ogbuinya *et al.*, 2023). Moreover, an agenda for addressing climate change and mental health in the Philippines has been proposed, emphasizing the need to study the diversity of psychological manifestations of climate change and incorporate them into the full-cost accounting of climate-related societal and health impacts (Guinto *et al.*, 2021).

The impact of climate change on vulnerable populations, particularly children, women, and the elderly, is a critical area of concern. Children are particularly vulnerable to the impact of climate change due to physiological, developmental, behavioral, and social factors Leffers (2022). Research has indicated that climate change will have the greatest impact on vulnerable groups of people, including the elderly population (Kıñay *et al.*, 2019). Moreover, the elderly are at greatest risk from heat-related illness, and it is this group that previous authors have noted are major medication consumers and therefore at particular risk from climate change and medication-related climate impacts (Beggs, 2000). Additionally, climate change has significant socio-economic impacts on women, affecting them disproportionately in various domains of agriculture, livelihood, food security, physical and mental health, water, and sanitation (Patel *et al.*, 2019). Furthermore, low-income women and female-headed households have been identified as key groups vulnerable to climate change (Scholastica & Lawal, 2022).

The literature also emphasizes the interplay between social and ecological determinants of mental health for children and youth in the climate crisis, highlighting the significant and growing impact on children and youth's mental health due to climate change (Gislason *et al.*, 2021). Moreover, the vulnerability of elderly smallholder farmers to climate change calls for social protection mechanisms such as a pension scheme that guarantees access to monthly cash transfers (Appiah *et al.*, 2021). It has been pointed out that children, migrant children, children living in informal settlements, children living and working on the streets, child laborers, and children with disabilities are the most vulnerable to climate change impacts (Berse, 2017). Additionally, the impacts of climate change on the elderly are potentially more severe, particularly about heat waves and flooding (Fernández-Bilbao, 2011).

To address the multifaceted challenges posed by climate change, the literature provides a comprehensive array of strategies encompassing adaptation, mitigation, behavioral change, and policy interventions. Adaptation strategies are crucial in reducing the negative impacts of climate change. These strategies include promoting crop insurance, utilizing drought-resistant and short-term crops, increasing irrigation efficiency, rainwater harvesting, and intercropping. Smallholder farmers have been observed to adapt to climate change by planting early maturing crop varieties, using fertilizers, farming on fallowed land, and mulching to reduce the impacts of climate change on agricultural production. Planned adaptation involves actions undertaken to reduce risks and capitalize on opportunities associated with global climate change. Mitigation strategies are also essential in reducing the impact of climate change. These strategies involve any action taken to permanently eliminate or reduce the long-term risks and hazards of climate change to human life and property. Renewable energy sources have been identified as a key strategy for climate change mitigation, emphasizing the importance of utilizing sustainable energy sources to reduce greenhouse gas emissions and combat climate change. Behavioral change has been highlighted as an essential component of climate change mitigation. It is emphasized that behavioral change is crucial to mitigate climate change, indicating the significance of individual and collective actions in reducing carbon footprints and promoting sustainable practices. Policy interventions are critical in addressing the impacts of climate change. Hazard mitigation offers tools to address hazards influenced by climate change and minimize community-level exposure or vulnerability. Furthermore, integrating climate change into hazard mitigation planning has been identified as a key approach to minimize community-level exposure to climate-related hazards. Additionally, in dealing with climate issues, human rights protection and justice should be considered and included in climate change actions, particularly in developing countries with low adaptive and mitigation capacities.

Here is the table of key findings on the impact of climate change on mental health among vulnerable groups based on the systematic literature review using the PRISMA method:

Table 2.

Main impacts of climate change on mental health among vulnerable groups

Vulnerable Group	Main Impacts	Explanation
Children	<ul style="list-style-type: none"> - Anxiety and Depression - Trauma and Post-Traumatic Stress Disorder (PTSD) 	Children are vulnerable to climate change due to physiological, developmental, behavioral, and social factors. Exposure to natural disasters, food insecurity, and displacement increases the risk of anxiety, depression, and trauma. Children living in disaster-prone areas and low-income families are the most affected (Leffers, 2022).
Women	<ul style="list-style-type: none"> - Anxiety and Depression - Economic and Social Insecurity 	Women, especially those from low-income backgrounds and female-headed households, are disproportionately affected by climate change due to their roles in securing food, water, and caregiving. These burdens increase the risk of mental health issues such as anxiety and depression. Gender inequalities further exacerbate these conditions (Patel <i>et al.</i> , 2019; Scholastica & Lawal, 2022).
Elderly	<ul style="list-style-type: none"> - Stress and Depression - Anxiety Related to Health Conditions 	The elderly are more vulnerable to the mental health impacts of climate change due to existing health conditions, social isolation, and reduced mobility. Exposure to heatwaves, medication use, and extreme weather events can exacerbate mental conditions such as anxiety and depression among older adults (Kinay <i>et al.</i> , 2019; Fernández-Bilbao, 2011).
Indigenous Communities	<ul style="list-style-type: none"> - Solastalgia and Environmental Anxiety - Depression due to Loss of Traditional Lands and Resources 	Indigenous communities face mental health challenges as environmental changes disrupt their spiritual and cultural connections to the land. The loss of traditional lands and resources leads to increased rates of depression, anxiety, and solastalgia—a feeling of distress caused by environmental change and loss of familiar landscapes (Mugambiwa, 2018).
Low-Income Groups	<ul style="list-style-type: none"> - Chronic Stress and Depression - Anxiety Related to Economic Insecurity and Displacement 	Low-income individuals are highly susceptible to the mental health impacts of climate change due to limited financial resources, lack of access to healthcare, and precarious living conditions. Climate-induced stressors such as job loss, displacement, and food insecurity disproportionately affect their mental well-being, often leading to chronic stress, anxiety, and depression (Khine & Langkulsen, 2023).
All Vulnerable Groups	<ul style="list-style-type: none"> - Climate Anxiety and Solastalgia - Increased Risk of Suicide and Self-Harm 	All vulnerable groups experience heightened climate anxiety and solastalgia due to rapid environmental changes. Exposure to extreme weather events, such as heatwaves, has been linked to increased rates of suicide and self-harm, highlighting the acute mental health risks posed by climate change (Nicholas <i>et al.</i> , 2020; Hayes & Poland, 2018).

3.3.1 Impact on Children

Children are particularly vulnerable to the impacts of climate change due to their physiological, developmental, behavioral, and social characteristics.

Climate change can lead to increased exposure to stressors such as natural disasters, food insecurity, and displacement, which significantly affect their mental health. The literature emphasizes that climate change exacerbates anxiety, depression, and trauma in children, particularly those living in low-income settings, migrant children, and those in areas prone to natural disasters (Leffers, 2022).

3.3.2 Impact on Women

Women, especially those from low-income backgrounds and female-headed households, are disproportionately affected by climate change. They often bear the brunt of climate-related stress due to their roles in securing food, water, and caregiving, making them more susceptible to mental health issues like anxiety, depression, and eco-anxiety (Patel *et al.*, 2019). Climate change significantly impacts women's socio-economic status, contributing to heightened vulnerability and mental distress (Scholastica & Lawal, 2022).

3.3.3 Impact on the Elderly

The elderly are at increased risk of mental health issues due to climate change because of existing health conditions, social isolation, and reduced mobility. Heat-related illnesses, increased medication use, and susceptibility to extreme weather events can lead to heightened anxiety, depression, and stress among older adults (Kıñay *et al.*, 2019). Additionally, the elderly often have limited adaptive capacity, which further exacerbates their mental health vulnerabilities (Fernández-Bilbao, 2011).

3.3.4 Impact on Indigenous Communities

Indigenous communities often face unique mental health challenges due to climate change, as their cultural and spiritual connections to the environment are disrupted. The loss of traditional lands and resources due to environmental changes can lead to increased rates of depression, anxiety, and

a sense of loss, known as solastalgia (Mugambiwa, 2018). These communities also face social and cultural isolation, which compounds their mental health challenges.

3.3.5 Impact on Low-Income Groups

Low-income individuals are highly susceptible to the mental health impacts of climate change due to their limited financial resources, lack of access to healthcare, and precarious living conditions. Climate-induced stressors such as job loss, displacement, and food insecurity disproportionately affect their mental well-being, often leading to chronic stress, anxiety, and depression (Khine & Langkulsen, 2023).

A total of 28 studies met the inclusion criteria, highlighting community adaptation strategies across various geographical contexts, including rural areas, coastal regions, and Indigenous communities.

3.4 KEY ADAPTATION STRATEGIES

A total of 28 studies met the inclusion criteria, highlighting community adaptation strategies across various geographical contexts, including rural areas, coastal regions, and Indigenous communities.

Table 3.

Community adaptation strategies to climate change

Adaptation Strategy	Description	Example Studies
Indigenous Knowledge and Practices	Utilizing traditional knowledge, including agricultural practices, water management, and resource conservation, to adapt to changing climatic conditions.	Mugambiwa (2018), Khanal <i>et al.</i> (2019)
Social Capital and Community Networks	Leveraging community relationships, social networks, and collective action to enhance resilience and facilitate adaptive responses to climate change.	Nyahunda & Tirivangasi (2021), Rankoana (2020)
Climatepreneurship	Promoting climate-smart entrepreneurship initiatives that use local resources to foster economic empowerment and adaptation among community members.	Pambudi <i>et al.</i> (2023)
Community-Based Resource Management	Collaborative management of local resources, such as water and forests, to enhance sustainable use and build adaptive capacity against climate impacts.	Agrawal (2008)
Agricultural Adaptation	Implementing adaptive agricultural practices, including crop diversification, drought-resistant crops, and soil conservation techniques, to cope with changing climate conditions.	Akinnagbe & Irohibe (2015), Pepela <i>et al.</i> (2019)
Local Institutional Support	Strengthening local governance and institutions to support adaptation planning and implementation at the community level.	Agyei (2016), Upadhyay (2014)

The review highlights the complex interplay between climate change and mental health, emphasizing the disproportionate impact on vulnerable groups. Mental health effects are often overlooked in climate vulnerability assessments, underscoring the need for comprehensive approaches that integrate mental health into climate change policies (Hayes *et al.*, 2019). Strategies to address these mental health impacts must consider social equity and prioritize inclusive planning. Community-based adaptation and resilience-building are essential for empowering vulnerable populations to cope with climate stressors (Rankoana, 2020).

Community adaptation strategies are diverse and context-specific, often combining traditional knowledge with modern approaches. Indigenous practices play a crucial role in sustaining livelihoods and maintaining ecological balance, highlighting the value of integrating local knowledge into broader adaptation frameworks (Mugambiwa, 2018). Social capital enhances community resilience by fostering collective action and resource sharing, which are critical in times of climatic stress (Nyahunda & Tirivangasi, 2021). Innovative approaches such

as climatepreneurship emphasize the economic dimension of adaptation, empowering communities through climate-resilient businesses that support both environmental sustainability and livelihood security (Pambudi *et al.*, 2023).

4 DISCUSSION

To enhance our understanding of climate change and effectively address future challenges, it is imperative to explore interdisciplinary perspectives and innovative approaches as highlighted in the literature. The concept of Climate Urbanism represents a significant shift in urban planning towards prioritizing cities as central locations for climate action and safeguarding urban infrastructures from climate-related hazards Long & Rice (2018). This paradigm underscores the necessity to reconsider urban life in the context of climate change, acknowledging the increasing importance of cities in climate adaptation and mitigation efforts (Broto *et al.*, 2020). Education plays a crucial role in improving climate change literacy and promoting sustainable development. Climate Change Education for Sustainable Development (CCESD) aims to deepen learners' comprehension of the causes and impacts of climate change, empowering them to take meaningful actions to tackle this global issue (Mochizuki & Bryan, 2015). Media engagement and education are essential tools for raising public awareness and understanding of climate change risks and mitigation strategies (Cheng & Gonzalez-Ramirez, 2020; Harrould-Kolieb & Herr, 2012). Moreover, integrating indigenous knowledge systems and traditional practices into climate change adaptation strategies is vital for enhancing resilience in communities facing environmental threats. Anthropological perspectives offer valuable insights into local responses to climate change, emphasizing the significance of cultural contexts in shaping adaptation measures (Upadhyay, 2014). Additionally, understanding the impacts of climate change on organizations and ecosystems is crucial for developing effective strategies to mitigate risks and promote sustainability (Winn *et al.*, 2011; Strömgren & Linder, 2002). In conclusion, a comprehensive approach that integrates urban planning, education, indigenous knowledge,

media engagement, and organizational responses is essential for effectively addressing the challenges posed by climate change. By fostering interdisciplinary collaboration and leveraging diverse perspectives, societies can enhance their resilience, mitigate climate risks, and progress towards a sustainable future.

To address the experience and community adaptation strategies for climate change, it is essential to consider the diverse approaches and perspectives highlighted in the literature. Community-based adaptation strategies play a crucial role in empowering communities to plan for and cope with the impacts of climate change Rankoana (2020). Harnessing social capital and indigenous knowledge can serve as determinants for effective climate change adaptation, particularly in rural areas (Nyahunda & Tirivangasi, 2021). Indigenous communities often rely on traditional knowledge adaptation strategies to respond to the impacts of climate change on their livelihoods (Mugambiwa, 2018). Moreover, the concept of climatepreneurship emerges as an innovative adaptation strategy, focusing on climate-smart activities that utilize local resources for economic empowerment and social enhancement of rural communities (Pambudi *et al.*, 2023). Understanding the role of local institutions in adaptation is also vital, as historical forms of adaptation provide valuable lessons for promoting effective strategies in different contexts (Agrawal, 2008). Additionally, the utilization of indigenous drought coping and adaptation strategies at the household level showcases the importance of integrating traditional practices into climate change adaptation efforts (Pepela *et al.*, 2019).

Furthermore, agricultural adaptation strategies are crucial in responding to climate change impacts, involving changes in management practices to align with shifting climate conditions (Akinnagbe & Irohibe, 2015). Sustainability of adaptation strategies is key, as they aim to reduce the vulnerability of natural and human systems against anticipated climate change effects (Agyei, 2016). Perceptions of climate change and adaptation strategies within indigenous communities are significant considerations for policymakers when designing effective adaptation measures (Khanal *et al.*, 2019). In conclusion, a comprehensive understanding of community-based adaptation strategies, the

utilization of indigenous knowledge, and the sustainability of adaptation measures are essential for enhancing resilience to climate change impacts. By integrating traditional practices, social capital, and innovative approaches like climatepreneurship, communities can effectively adapt to the challenges posed by climate change, ensuring sustainable livelihoods and environmental resilience. Climate change poses significant mental health risks, particularly for vulnerable populations such as children, women, the elderly, Indigenous communities, and low-income groups. Addressing these impacts requires a multifaceted approach that includes mental health considerations in climate adaptation strategies. Future research should focus on developing targeted interventions and policies that enhance resilience among marginalized communities. The impact of climate change on vulnerable populations, particularly concerning mental health, is a complex and multifaceted issue that requires comprehensive assessments, equitable resilience frameworks, and targeted interventions to address the unique challenges faced by vulnerable communities. Based on the comprehensive exploration of interdisciplinary perspectives and innovative approaches towards understanding climate change and addressing future challenges, it is evident that a multifaceted approach is essential for effective climate action. The concept of Climate Urbanism highlights the critical role of cities in climate adaptation and mitigation efforts, emphasizing the need to prioritize urban resilience and infrastructure protection. Education, particularly Climate Change Education for Sustainable Development (CCESD), plays a pivotal role in enhancing climate literacy and empowering individuals to take meaningful actions towards sustainability. Integrating indigenous knowledge systems, media engagement, and organizational responses are crucial components in developing holistic climate change adaptation strategies. By leveraging diverse perspectives and interdisciplinary collaboration, societies can enhance their resilience and progress towards a sustainable future. The insights from anthropological perspectives underscore the importance of cultural contexts in shaping adaptation measures, emphasizing the value of traditional practices in building community resilience. A forward-looking approach that integrates urban planning, education, indigenous knowledge, media engagement, and

organizational responses is essential for navigating the challenges posed by climate change. By fostering a collective effort towards sustainability and resilience, societies can effectively address the complexities of climate change and work towards a more sustainable and climate-resilient future.

5 CONCLUSION

Addressing the psychological and social impacts of climate change on vulnerable communities necessitates a comprehensive understanding of social vulnerability, adaptive capacity, and the unequal distribution of climate change impacts among different groups. Sustainable adaptation policies, increased awareness, and inclusive planning are essential to alleviate the adverse effects of climate change on vulnerable populations. Community adaptation strategies are vital in building resilience against climate change impacts. These strategies, grounded in local knowledge and community networks, provide sustainable pathways for adaptation. Future research should focus on scaling up successful community-based interventions and integrating indigenous knowledge with scientific approaches to enhance the overall effectiveness of adaptation strategies. The interaction between climate change and mental health emphasizes the urgent need for comprehensive strategies to support vulnerable populations and alleviate the psychological consequences of environmental degradation. By acknowledging the psychological dimensions of climate change and promoting mental health resilience, it is feasible to enhance individual and community well-being in the face of this global challenge. The literature provides a comprehensive array of strategies to reduce the impact of climate change, encompassing adaptation, mitigation, behavioral change, and policy interventions. These strategies are essential for addressing the multifaceted challenges posed by climate change and working towards a more sustainable and resilient future.

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