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Mental Health Risks of Climate Change Exposure: Evidence from Flood-Affected Populations in Pakistan

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Abstract

Climate change poses not only an environmental and economic threat but also a profound psychological risk, especially for vulnerable populations. This study explores the relationship between climate change exposure and mental health outcomes, specifically stress, anxiety, and depression, among individuals affected by flooding in rural areas of Pakistan. Employing a quantitative research design, data were collected using the DASS-21 and Climate Change Exposure Scale from 130 participants. Results showed a weak but positive correlation between climate change exposure and psychological distress, indicating potential mental health implications. These findings suggest the importance of integrating mental health considerations into climate resilience and adaptation policies. Specifically, the results can guide policymakers and community leaders in designing culturally sensitive, gender-responsive mental health interventions for flood-prone rural populations, ensuring that psychosocial support becomes an integral part of disaster preparedness and recovery programs.

Keywords: Mental, Risk, Climate, Food, Population, Pakistan

Introduction

Climate change is one of the most pressing challenges of the 21st century, with far-reaching implications not only for ecosystems and economies but also for human health and psychological well-being. The primary drivers of climate change, greenhouse gas emissions from fossil fuels, deforestation, and industrial activities, have led to global warming, sea level rise, extreme weather events, droughts, floods, and temperature anomalies (Stone et al., 2022). While substantial attention has been paid to the physical and economic impacts of these phenomena, the psychological consequences remain underexplored, particularly in low- and middle-income countries (LMICs), where infrastructure and mental health resources are limited.

Mental health is a fundamental component of overall health, yet it often receives inadequate focus in climate discourse. Psychological responses to climate change can include acute stress, anxiety, depression, trauma, and post-traumatic stress disorder (PTSD), particularly following events such as floods, heatwaves, or displacement. These responses are further exacerbated in vulnerable populations, including children, the elderly, women, low-income communities, and individuals with pre-existing health conditions, who are disproportionately affected due to limited adaptive capacities (Fahrudin et al., 2024; Crimmins et al., 2016).

In Pakistan, the effects of climate change have been particularly devastating in recent years, as exemplified by the 2022 floods that affected over 33 million people, displaced millions, and caused immense economic and psychological distress. Rural and agrarian communities in regions such as D.G. Khan, Rajanpur, and the Malakand Division are on the frontlines of these changes. These populations often lack access to mental health services and social safety nets, making them more susceptible to long-term psychological damage (Alam et al., 2024).

Emerging research suggests that repeated exposure to environmental disasters not only harms physical health but also undermines

emotional resilience, social cohesion, and community well-being. The concept of **climate anxiety**, a chronic fear of environmental doom, is gaining recognition among researchers, especially among youth who perceive a future threatened by environmental collapse (Hickman et al., 2021). Similarly, older adults face heightened vulnerability due to age-related health risks and isolation, making climate-related mental health outcomes a growing area of concern globally and locally (Mehta & Johnson, 2024).

Theoretical models such as the **Vulnerable Populations Conceptual Model (VPCM)** and **Social Support Theory** help explain how socio-environmental determinants—poverty, inadequate access to health care, marginalization, and environmental stressors—interact to exacerbate psychological distress. These frameworks underscore the importance of integrating mental health support within climate adaptation strategies and emergency preparedness plans (Flaskerud & Winslow, 1998; Vaux, 1988).

This study focuses on the mental health outcomes of populations affected by climate-induced flooding in Pakistan. By examining stress, anxiety, and depression among these groups, the research seeks to highlight overlooked psychological impacts of climate change and advocate for evidence-based, context-specific interventions to support at-risk communities. Addressing these issues aligns with international commitments under the **Sustainable Development Goals (SDGs)**, particularly **SDG 3** (Good Health and Well-Being) and **SDG 13** (Climate Action), which stress the need for mental health equity in the face of environmental challenges.

Goals

- To assess the prevalence of stress, anxiety, and depression in climate-affected populations.
- To measure the correlation between climate change exposure and mental health outcomes.

- To identify which demographic groups are more vulnerable to psychological distress.

Research Questions

1. What is the prevalence of mental health conditions in flood-affected communities?
2. How is climate change exposure linked to stress, anxiety, and depression?
3. Which demographic groups face higher psychological risks?

Innovation

This study is among the few quantitative investigations in Pakistan that explicitly link climate-induced flooding with mental health outcomes. By providing localized, empirical evidence, it offers valuable insights for the design of culturally appropriate mental health interventions and climate adaptation policies. The findings can inform both national and provincial strategies, ensuring that mental health is integrated into disaster preparedness and recovery plans.

Methodology

Research Design

This study adopted a **quantitative cross-sectional design** based on structured self-report measures. The research focuses on individuals impacted by flooding, a consequence of climate change, using validated psychometric scales.

Participants & Sampling

The study included 130 participants from flood-affected communities in Bayt Bakhtiari (D.G. Khan) and villages near the Satluj River, Pakistan. Purposive sampling was used to ensure inclusion of individuals with direct experience of climate-related flooding. Participants were identified through local community leaders and NGOs working in post-flood recovery. Eligibility criteria included:

1. Age ≥ 17 years.
2. Residence in a flood-affected area for at least 6 months before data collection.
3. Direct experience of a significant flooding event within the past two years.

This sampling method was appropriate for targeting a hard-to-reach population with specific lived experiences relevant to the study's aims.

Demographics Collected

- Age (17–80 years)
- Gender
- Occupation
- Education
- Monthly Income
- Family Size

Sample Size

The total sample comprised $N = 130$ participants.

Instruments

1. Climate Change Exposure Scale

A 5-item self-report scale measuring frequency, intensity, and duration of exposure to climate-related disasters (Middleton et al., 2020).

2. DASS-21 (Depression, Anxiety, and Stress Scale)

A 21-item validated tool measuring emotional distress across three domains: depression, anxiety, and stress (Lovibond & Lovibond, 1995). A widely used 21-item scale assessing emotional distress across three domains: depression, anxiety, and stress (Lovibond & Lovibond, 1995). Items are rated on a 4-point Likert scale. The tool demonstrates high reliability in diverse settings (Cronbach's α : Depression = .91, Anxiety = .84, Stress = .90). In the present study, Cronbach's α coefficients were: Depression = .89, Anxiety = .85, Stress = .88.

Data Collection Procedure

Data collection was carried out over three months by trained field researchers fluent in the local language. After obtaining informed consent, questionnaires were administered face-to-face in participants' homes or community centers to ensure accessibility for individuals with limited literacy. Ethical approval was obtained from the relevant institutional review board before commencement of the study.

Data Analysis

Statistical Analysis

SPSS was used to compute Pearson correlations to examine relationships between climate change exposure and mental health indicators.

Results

Table 1: Correlation

	climate change	Depression	Anxiety	Stress
climate change	1			
Depression	.028	1		
Anxiety	.071	.509**	1	
Stress	.112	.482**	.567**	1

**Correlation is significant at the 0.01 level (2-tailed).

Table 2: Age Distribution

The majority (59.2%) of respondents were between 17–22 years old. Age range: 17–80 years

Table 3: Gender Distribution

- Male: 47 (36.2%)
- Female: 83 (63.8%)

Discussion

The present study examined the relationship between climate change exposure, particularly flooding, and mental health indicators, stress, anxiety, and depression among vulnerable populations in rural Pakistan. Although weak positive correlations were observed between climate change exposure and the three psychological variables, these relationships were statistically insignificant. This contrasts with several international studies that have reported stronger associations. For example, [Crandon et al. \(2022\)](#) and [Clayton \(2020\)](#) found elevated depression, anxiety, and PTSD following extreme weather events; [Nitschke et al. \(2011\)](#) observed increased psychiatric hospitalizations during Australian heatwaves; and [Singh et al. \(2020\)](#) reported significant emotional distress among rural Indian farmers affected by climate-induced crop failures.

The comparatively weaker associations in the present study may be explained by several contextual factors. Persistent socioeconomic challenges such as poverty, food insecurity, and inadequate healthcare may be perceived by participants as more immediate stressors than

climate change. Cultural coping mechanisms, fatalistic beliefs, and the normalization of hardship could also reduce the tendency to attribute distress directly to environmental changes. Furthermore, the predominance of young participants (17–22 years) may mean that long-term psychological effects have not yet fully manifested.

The higher representation of female respondents aligns with global evidence that women, particularly in rural contexts, face disproportionate impacts during climate-related disasters ([Tronto et al., 2023](#); [Khan et al., 2024](#)). Gender inequality, caregiving responsibilities, and economic dependency contribute to heightened vulnerability, even when not fully captured by standardized tools like the DASS-21.

These findings can be interpreted through several theoretical lenses. The Social Support Theory ([Vaux, 1988](#)) suggests that community and familial support can buffer psychological distress. The Vulnerable Populations Model ([Flaskerud & Winslow, 1998](#)) explains how systemic disadvantages increase susceptibility to health risks. The Children's Adjustment and Adaptation Model ([McCubbin & Patterson, 1988](#)) highlights that younger individuals may show subtle immediate effects but face long-term developmental challenges.

Limitations include the sample's limited size and geographic scope, reliance on self-reported data (potentially influenced by stigma or limited mental health literacy), and the cultural limitations of the DASS-21 in capturing local expressions of distress. Additionally, the timing of data collection relative to flooding events may have affected recall accuracy.

Despite these limitations, the findings emphasize the importance of integrating mental health into climate adaptation and disaster preparedness strategies. Interventions should prioritize community-based psychosocial support for women and youth, enhance mental health awareness, and address structural socioeconomic vulnerabilities to build resilience against both direct and indirect impacts of climate change.

Conclusion

This study explored the association between climate change exposure and mental health outcomes among vulnerable rural populations in Pakistan. Although the results revealed weak positive correlations between exposure and symptoms of depression, anxiety, and stress, these associations were not statistically significant. The findings suggest that climate change, while emotionally distressing, may not independently predict psychological disorders in vulnerable populations without the interplay of additional stressors.

The study contributes to existing literature by providing context-specific insights into mental health and climate vulnerability in a developing country setting. Importantly, it highlights the need for multidimensional approaches that integrate mental health into climate adaptation and disaster response planning.

Recommendations for Future Research and Policy

1. Longitudinal studies should be conducted to explore the long-term psychological consequences of repeated or chronic exposure to climate-related events.
2. Mental health interventions should be integrated into climate adaptation policies, especially in rural regions with low service availability.
3. Future research should focus on subgroups within vulnerable populations (e.g., children, the elderly, disabled individuals) to identify targeted support needs.
4. Mixed-methods approaches may be valuable for capturing both quantitative symptoms and qualitative lived experiences of climate distress.
5. Strengthening community-based support systems and training local health workers in psychological first aid can enhance resilience in high-risk zones.

In conclusion, while this study found only a modest link between climate change exposure and psychological outcomes, it underscores the importance of addressing mental health equity in climate policy frameworks, particularly for populations facing compounded.

Vulnerabilities.

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