Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

Psychological Impacts Of Climate Change On Vulnerable Populations: Exploring The Effects In The Desert Regions Of Sindh, Pakistan

Abdul Razzaque Nohri
Health Department, Government of Sindh, Pakistan

Kirsh Kumar
Jinnah Sindh Medical University, Karachi, Sindh, Pakistan

Sajan Sarang
Health Department, Government of Sindh, Pakistan

Ume Zuhra Bughio
Health Services Academy, Islamabad, Pakistan

Anchal Kumari
Liaquat National Medical College, Karachi, Sindh, Pakistan

Hira Jamil
Department of Pharmacy Practice, Faculty of Pharmacy, Jinnah University for Women, Karachi, Pakistan

Corresponding Author: Dr Abdul Razzaque Nohri
Email: razaquenohri@gmail.com

Abstract

Background: Climate change poses a significant global health risk, affecting ecosystems, economies, and human well-being. In Pakistan, one of the countries most vulnerable to climate hazards, desert regions like Sindh are particularly impacted by frequent extreme weather events, with dire mental health consequences for local populations.

Objective: This study aimed to assess the psychological impacts of climate change on vulnerable populations, focusing on anxiety, depression, and stress.

Methods: A cross-sectional survey design was used to collect data from 280 participants, including low-income groups, agricultural workers, and women. The Generalized Anxiety Disorder-7 (GAD-7), Patient Health Questionnaire-9 (PHQ-9), and Perceived Stress Scale (PSS) were utilized to assess anxiety, depression, and stress levels. Data were analyzed using descriptive and inferential statistics, controlling for socio-economic factors, using SPSS.

Results: The results revealed high levels of psychological distress among the participants. Specifically, 53% experienced moderate to severe anxiety, 60% suffered from moderate to severe depression, and 86% reported moderate to high stress. Exposure to climate-related stressors, including droughts and heatwaves, was strongly correlated with these mental health issues, with individuals from low-income backgrounds reporting significantly higher distress levels.

Conclusion: Climate change has a profound mental health impact on vulnerable populations in Sindh, requiring urgent mental health support and resilience-building interventions.

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

Keywords: Climate Change, Mental Health, Vulnerable Populations, Stress, Pakistan.

Introduction

Climate change is increasingly seen as a major global health issue. It impacts not only ecosystems and economies, but also human emotional well-being. Pakistan is one of the top nine countries most at risk from climate hazards. It ranks fifth for extreme weather events between 1999 and 2018. Over the last twenty years, the country has faced 152 extreme events, leading to nearly 10,000 deaths and $3.8 billion in economic losses. Sindh's desert belt, including Tharparkar, has been hit hard. This area regularly suffers from droughts, high temperatures, and ongoing water shortages.[1]

The mental health impacts of climate change include anxiety, depression, PTSD, and eco-anxiety. These effects are documented, particularly among economically disadvantaged groups. [2][3] In rural Pakistan, the impact is especially noticeable among women and children. Rural women often handle household survival alone when men migrate for work. This situation creates significant psychological stress. Studies show that 72% of these women experience stress, 68% have anxiety, and 56% suffer from depression. [4] Environmental hardships, poor access to healthcare, and social isolation make their situation even worse. [5]

Children are also very vulnerable. Climate-related disasters lead to PTSD, sleep problems, anxiety, and learning difficulties in children.[6][7] These issues threaten their growth and long-term mental health. As droughts and environmental instability worsen, many families must migrate seasonally. This movement disrupts community bonds and contributes to feelings of loss and social breakdown.[1]

Farming communities, low-income families, and indigenous groups face combined challenges, including environmental stress, food scarcity, malnutrition, and limited healthcare access. All these factors weaken mental resilience.[5] In areas severely impacted like Thar and Umerkot, rising temperatures and droughts have also been linked to higher rates of aggression, domestic violence, and suicide.[2]

Despite rising concern, there is little community-focused research on climate-related mental health in desert regions of Pakistan. We urgently need integrated climate adaptation strategies that focus on mental resilience and mental health support services.[3][8]

Climate change severely affects mental health in vulnerable desert communities of Sindh, yet local data is scarce. This study aims to assess anxiety, depression, and stress among low-income groups, women, and children using validated tools, and to examine links with climate-related stressors. The goal is to inform targeted mental health support and resilience planning.

Methods

This quantitative study aimed to explore the psychological impacts of climate change on vulnerable populations in the desert regions of Sindh, Pakistan. The research utilized a cross-sectional survey design to collect data from individuals living in these regions who were identified as being particularly vulnerable to climate change, including those from low-income communities, agricultural workers, and women.

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

The key psychological outcomes assessed in this study included anxiety, depression, and stress levels, using validated scales such as the Generalized Anxiety Disorder-7 (GAD-7), the Patient Health Questionnaire-9 (PHQ-9), and the Perceived Stress Scale (PSS). Climate change-related variables, such as frequency of extreme weather events (droughts, heatwaves, etc), temperature changes, and environmental degradation, were also considered in the analysis.

A stratified random sampling method was used to select participants, ensuring a diverse representation across different age groups, genders, and socioeconomic backgrounds. Descriptive statistics, including frequencies and percentages, were used to summarize the demographic data and psychological health outcomes. Inferential statistics, such as Pearson correlation and multiple regression analyses, were employed to explore the relationships between exposure to climate change stressors and psychological distress among the participants.

Potential confounders, including pre-existing mental health conditions, socio-economic status, and access to social support, were controlled for in the analysis.

The study also conducted a series of interviews to provide contextual understanding of the experiences and perceptions of the affected populations, complementing the quantitative data. All ethical considerations were adhered to, with informed consent obtained from all participants.

Results

The results section of this study presents the demographic characteristics of the 280 participants, along with an analysis of the relationship between climate change and psychological impact. The sample consisted of diverse age groups.

Table 1 provides a comprehensive overview of the demographic characteristics of the study sample, consisting of 280 participants. The majority of participants were between the ages of 30 and 44 years (42%), followed by those under 30 years (23%), and an equal distribution (17.5%) in the 45-59 years and 60+ years age groups. The sample had a gender imbalance, with 42% females and 58% males. Educationally, 50% of participants held a bachelor's degree, 25% had a Master's, and 25% had a High School education. In terms of occupation, 71% were employed, and 29% were unemployed. Regarding income, 50% of participants were in the medium-income bracket, 32% in the low-income category, and 18% in the high-income group. This demographic profile suggests a younger, predominantly male, educated, and employed sample, with a mix of income levels that may influence the study's findings.

Table 1: Demographic Variables of the Study Sample

Variable	Category	Frequency	Percentage
Age Group	< 30 years	64	23%
	30-44 years	118	42%
	45-59 years	49	17.5%
	60+ years	49	17.5%
Gender	Male	162	58%
	Female	118	42%
Education Level	High School	70	25%
	Bachelor's	140	50%
	Master's	70	25%
Occupation	Employed	200	71%
	Unemployed	80	29%
Income Level	Low	90	32%

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

	Medium	140	50%
	High	50	18%

The Generalized Anxiety Disorder-7 (GAD-7) scale assessed the participants' anxiety levels. As presented in **Table 2**, 18% of participants reported minimal anxiety (GAD-7 score 0-4), 29% exhibited mild anxiety (scores 5-9), 32% experienced moderate anxiety (scores 10-14), and 21% had severe anxiety (scores 15-21). These findings suggest that a significant proportion of the study population suffers from moderate to severe anxiety, indicating a considerable mental health burden due to climate-related stressors in this vulnerable population.

Table 2: Anxiety Levels (Measured using GAD-7)

GAD-7 Score Range	**Frequency**	**Percentage (%)**
0-4 (Minimal)	50	18%
5-9 (Mild)	80	29%
10-14 (Moderate)	90	32%
15-21 (Severe)	60	21%

The Patient Health Questionnaire-9 (PHQ-9) was used to measure the depression levels of the participants. The results, as shown in **Table 3**, revealed that 14% of participants had minimal depression (PHQ-9 score 0-4), 25% experienced mild depression (scores 5-9), 36% had moderate depression (scores 10-14), 18% were severely depressed (scores 15-19), and 7% exhibited very severe depression (scores 20+). These findings suggest a high prevalence of depression among participants, with nearly 60% reporting at least moderate to severe levels of depression.

Table 3: Depression Levels (Measured using PHQ-9)

PHQ-9 Score Range	**Frequency**	**Percentage (%)**
0-4 (Minimal)	40	14%
5-9 (Mild)	70	25%
10-14 (Moderate)	100	36%
15-19 (Severe)	50	18%
20+ (Very Severe)	20	7%

The Perceived Stress Scale (PSS) measured participants' overall perceived stress. As shown in **Table 4**, 14% of participants reported low stress (PSS score 0-13), 54% experienced moderate stress (scores 14-26), and 32% reported high stress (scores 27+). The majority of the participants (86%) were found to be experiencing moderate to high levels of stress, which reflects the heightened pressure of dealing with environmental stressors such as droughts, heatwaves, and food scarcity.

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

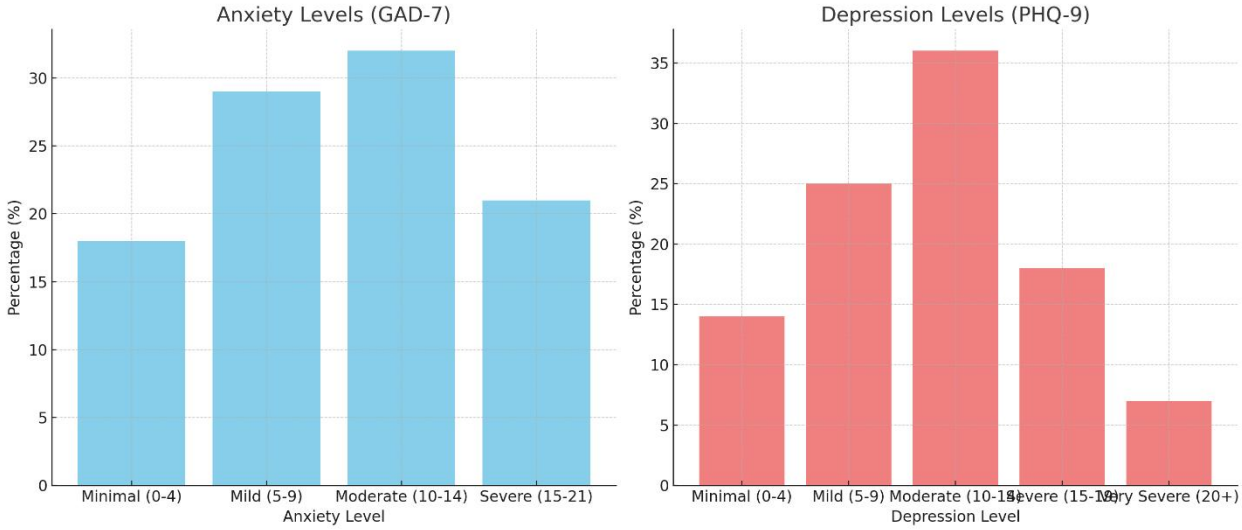
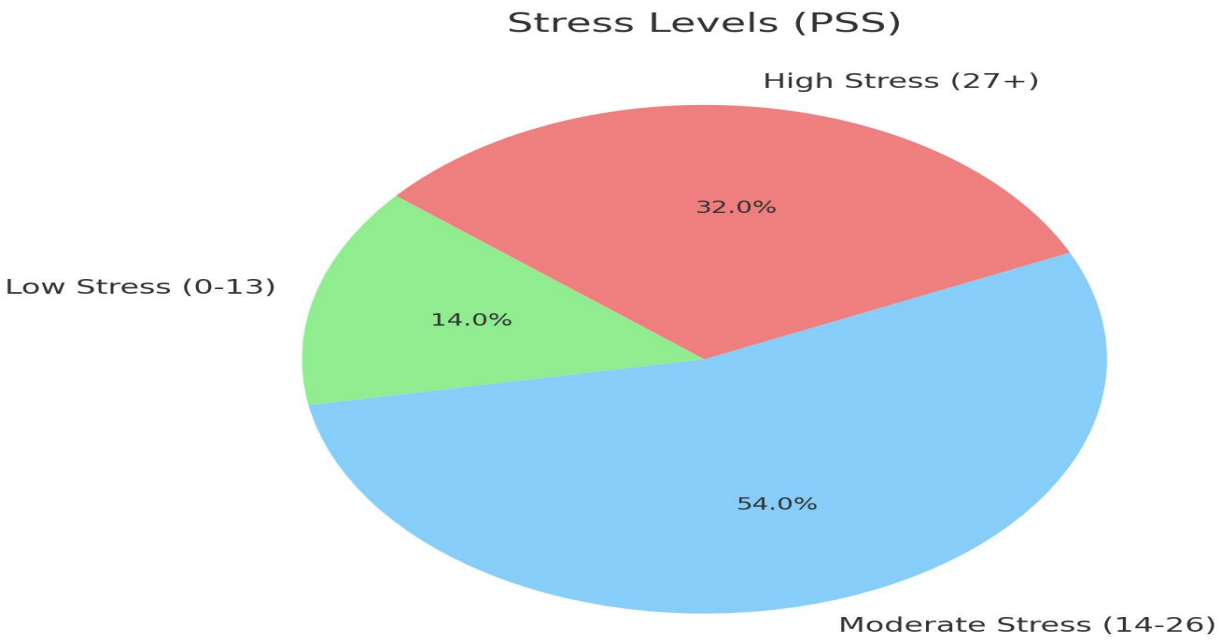


Table 4: Stress Levels (Measured using PSS)

PSS Score Range	Frequency	Percentage (%)
0-13 (Low Stress)	40	14%
14-26 (Moderate)	150	54%
27+ (High Stress)	90	32%



The analyses indicate that the psychological distress (anxiety, depression, and stress) experienced by the participants is strongly correlated with exposure to climate-related stressors, such as extreme weather events, temperature changes, and environmental degradation. Participants who had more frequent exposure to these stressors reported higher levels of anxiety, depression, and stress,

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

underscoring the direct mental health consequences of climate change in vulnerable populations.

While the study controlled for potential confounders such as socio-economic status, pre-existing mental health conditions, and social support, the results reveal that low-income participants and those with limited access to healthcare reported significantly higher levels of psychological distress. These findings suggest that socioeconomic vulnerability amplifies the mental health impact of climate change, as individuals in lower income groups face compounded challenges related to environmental degradation and lack of resources to cope.

Discussion

The findings of this study highlight the significant psychological toll that climate change imposes on vulnerable populations in the desert regions of Sindh, Pakistan.

The study revealed a high prevalence of mental health challenges such as anxiety, depression, and stress, with substantial correlations between these psychological outcomes and exposure to climate-related stressors, including extreme weather events, droughts, heatwaves, and environmental degradation. Specifically, 53% of participants experienced moderate to severe anxiety, 59% reported moderate to severe depression, and 86% were dealing with moderate to high levels of stress. These findings underscore the considerable mental health burden faced by individuals living in areas heavily impacted by climate change. These results are consistent with broader research, which has repeatedly shown that environmental stressors like extreme weather events are strongly linked to mental health issues. [9,10,11,12]

Climate change affects both immediate and long-term psychological well-being, often exacerbating pre-existing vulnerabilities and creating new mental health challenges. Vulnerable groups such as women and children are especially at risk, as demonstrated in this study. Women, often responsible for household survival and caregiving, experience heightened stress, anxiety, and depression, particularly when male family members migrate for work. This aligns with the notion that women in rural areas face unique stressors related to climate change, due to their roles in managing household resources and ensuring family welfare amidst environmental instability. [13,14,15]

Moreover, the findings suggest that socio-economic vulnerability amplifies the psychological impact of climate change. Participants from low-income backgrounds, with limited access to healthcare and social services, reported significantly higher levels of distress compared to their wealthier counterparts. This reflects the broader pattern seen in many climate-affected regions, where marginalized and economically disadvantaged groups bear the brunt of both physical and mental health impacts. These communities face compounded challenges like food insecurity, poor living conditions, and a lack of resources to cope with climate-related stress, making them more susceptible to mental health disorders. [16]

Even participants in higher income brackets reported significant levels of psychological distress, highlighting that climate change impacts mental health across all socio-economic groups. While access to resources and support systems may mitigate some of the stress, the pervasive nature of climate-related challenges means that no group is entirely immune to its mental health effects.

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 7 (July) (2025)

This points to the broader, far-reaching implications of climate change, which cannot be contained within socio-economic boundaries. [17,18,19]

The findings of this study have important implications for mental health and climate adaptation strategies. Policymakers and mental health professionals must recognize the intersection of climate change and mental health, particularly in vulnerable populations. Integrated adaptation strategies should include mental health support as a core component, ensuring that services are accessible to those most in need. Furthermore, this study calls for greater investment in community-based interventions that build resilience, not only in terms of physical infrastructure but also by addressing the psychological needs of affected populations.

While this study provides valuable insights into the psychological impacts of climate change in vulnerable populations, it has several limitations. First, the cross-sectional nature of the study limits the ability to draw causal inferences about the relationship between climate change and mental health outcomes. Additionally, the study's reliance on self-reported data may introduce biases related to participants' subjective perceptions of their mental health.

Conclusion

The study highlights the significant psychological toll of climate change on vulnerable populations. The high prevalence of anxiety, depression, and stress highlights the urgent need for targeted mental health support and integrated climate adaptation strategies. Addressing the mental health impacts of climate change is crucial for building resilience and ensuring the well-being of these populations in the face of increasing environmental instability.

References

1. Ajani A, van der Geest K. Climate change in rural Pakistan: evidence and experiences from a people-centered perspective. Sustainability Science. 2021 Oct 6;16(6):1999–2011.
2. Manning C, Clayton S. 9 - Threats to mental health and wellbeing associated with climate change [Internet]. Clayton S, Manning C, editors. ScienceDirect. Academic Press; 2018. p. 217–44. Available from: https://www.sciencedirect.com/science/article/abs/pii/B9780128131305000096
3. Fatima E. Impact of Climate Change on Individual and Community Mental Health. Journal of Development Policy Research & Practice (JoDPRP). 2022 Dec 31;6(1):85–103.
4. Daraz U, Khan Y, Alsawalqa RO, Alrawashdeh MN, Alnajdawi AM. Impact of climate change on women mental health in rural hinterland of Pakistan. Front Psychiatry. 2024 Dec 12;15:1450943. doi: 10.3389/fpsyt.2024.1450943. PMID: 39735428; PMCID: PMC11674845.
5. Khan K, Khan M, Parveen T, Hussain S. Impacts of climate change in vulnerable communities in Sindh, Pakistan: Voices from the community. Climate and Environmental Changes [Internet]. 2021 Oct 1; Available from: https://knowledgecommons.popcouncil.org/focus_climate-change/1/
6. Burke SEL, Sanson AV, Van Hoorn J. The Psychological Effects of Climate Change on Children. Curr Psychiatry Rep. 2018 Apr 11;20(5):35. doi: 10.1007/s11920-018-0896-9. PMID: 29637319.
7. Lai BS, La Greca AM, Colgan CA, Herge W, Chan S, Medzhitova J, Short M, Auslander B. Sleep Problems and Posttraumatic Stress: Children Exposed to a

ISSN Online: 3007-3154
ISSN Print: 3007-3146

Natural Disaster. J Pediatr Psychol. 2020 Oct 1;45(9):1016-1026. doi: 10.1093/jpepsy/jsaa061. PMID: 32885231; PMCID: PMC7778448.

8. Soomro S, Zhou D, Charan IA. Investigating associations between climate change anxiety and mental health impact on vulnerable populations: A qualitative analysis. Afr J Reprod Health. 2024 Aug 31;28(8):108-121. doi: 10.29063/ajrh2024/v28i8.11. PMID: 39225510.
9. Soomro S, Zhou D, Charan IA. The effects of climate change on mental health and psychological well-being: Impacts and priority actions. Glob Ment Health (Camb). 2024 Dec 5;11:e118. doi: 10.1017/gmh.2024.65. PMID: 39776988; PMCID: PMC11704568.
10. Walinski A, Sander J, Gerlinger G, Clemens V, Meyer-Lindenberg A, Heinz A. The Effects of Climate Change on Mental Health. Dtsch Arztebl Int. 2023 Feb 24;120(8):117-124. doi: 10.3238/arztebl.m2022.0403. PMID: 36647584; PMCID: PMC10154789.
11. Wahid SS, Raza WA, Mahmud I, Kohrt BA. Climate-related shocks and other stressors associated with depression and anxiety in Bangladesh: a nationally representative panel study. The Lancet Planetary Health. 2023 Feb;7(2):e137–46.
12. Lawrance, E. L., Thompson, R., Newberry Le Vay, J., Page, L., & Jennings, N. (2022). The Impact of Climate Change on Mental Health and Emotional Wellbeing: A Narrative Review of Current Evidence, and its Implications. *International Review of Psychiatry*, *34*(5), 443–498. https://doi.org/10.1080/09540261.2022.2128725
13. Hayes, K., Blashki, G., Wiseman, J. *et al.* Climate change and mental health: risks, impacts and priority actions. *Int J Ment Health Syst* **12**, 28 (2018). https://doi.org/10.1186/s13033-018-0210-6
14. Nushka Marinova, Calabria L, Marks E. A meta-ethnography of global research on the mental health and emotional impacts of climate change on older adults. Journal of Environmental Psychology. 2024 Dec 1;102511–1.
15. Anjum G, Aziz M. Climate change and gendered vulnerability: A systematic review of women's health. Women's Health [Internet]. 2025 Jan;21. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11905046/
16. Joshi P, O'Neill P, Bodnar S. Socioeconomic Status, Climate Change, and Mental Health: An Interdisciplinary Perspective. Zenodo (CERN European Organization for Nuclear Research). 2023 Sep 6;
17. Amin S. Climate-Related Psychological Distress: Exploring the Global Nexus of Climate Change and Mental Health. Sustainable Development. 2025 Apr 10;
18. White BP, Breakey S, Brown MJ, Smith JR, Tarbet A, Nicholas PK, Ros AMV. Mental Health Impacts of Climate Change Among Vulnerable Populations Globally: An Integrative Review. Ann Glob Health. 2023 Oct 6;89(1):66. doi: 10.5334/aogh.4105. PMID: 37810609; PMCID: PMC10558031.
19. Cosh, S., Ryan, R., Fallander, K. *et al.* The relationship between climate change and mental health: a systematic review of the association between eco-anxiety, psychological distress, and symptoms of major affective disorders. *BMC Psychiatry* **24**, 833 (2024). https://doi.org/10.1186/s12888-024-06274-1