Assessing the Effects of Climate Change on Mental Health of Smallholder Farmers: A Case Study of Njolwe Camp, Palabana Farming Block. Chongwe, Zambia

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ABSTRACT

This study was designed to assess the effects of climate change like droughts and erratic rainfall on mental health of smallholder farmers in Palabana Farming Block. The study employed a mixed-method approach using both quantitative and qualitative techniques to gather data from 125 smallholder farmers. Quantitative methods consisted of Mini International Neuropsychiatric Interview as a structured questionnaire, surveys and statistical analysis. The responses from the questionnaires were coded and analyzed using STATA Statistical Package. Qualitative approaches consisted of interviews to assess the farmers' experiences with climate-related challenges and their mental health. Additionally, the study explored coping mechanisms employed by farmers, including community-based support systems and adaptive farming strategies. Results showed high rates of depression (26.4%), anxiety (25.6%), trouble sleeping (24 %), and stress (21.6%) among smallholder farmers. Coping strategies such as alternative income activities and emotional support were common, yet not significantly linked to better mental health outcomes. Community programs like the Farmer Input Support Program (FISP) and savings groups were widely accessed but mental health services remained underutilized (5.6%). However, 70% of the farmers perceived community support as helpful. The findings suggest urgent need for integrated mental health and climate resilience programs to support farmers' psychological well-being in the midst of climate variability.

Key words: Climate Change; mental health; coping mechanisms; Climate resilience; Smallholder Farmers.

INTRODUCTION

Climate change has emerged as one of the most pressing global challenges, affecting both environmental stability and human livelihoods. While its physical consequences, such as extreme weather events and reduced agricultural yields, have been widely studied, the psychological toll it exerts on vulnerable populations remains underexplored. Smallholder farmers, who depend directly on climate-sensitive agricultural practices for survival, are particularly susceptible to the mental health impacts of climate change. In many African countries, including Zambia, a large segment of the population depends on land for their daily survival. In Zambia, land serves multiple purposes, with agriculture being the predominant use, particularly in rural areas (Chisenga *et. al.,* 2024). The agriculture sector generates about 18% to 20% of the country's GDP and provides a livelihood for more than 60% of the population (Kunda, 2022). These rural regions are often characterized by high poverty rates and rising unemployment, highlighting the importance of smallholder farming. Smallholder farmers depend heavily on rain-fed agriculture, are particularly vulnerable to climate variability, experiencing prolonged droughts, erratic rainfall, and extreme weather events (Jain, 2007). These environmental stressors can lead to crop failures, food insecurity, and financial instability, which in turn contribute to psychological distress, anxiety, and depression among farming communities (Clayton *et. al.,* 2023).

Climate Change and Agricultural Vulnerability

In Africa, particularly in sub-Saharan regions, rising temperatures and declining rainfall patterns pose significant threats to small-scale agriculture (Jacqueline & Mubanga, 2020). These climatic shifts are expected to reduce crop yields and overall agricultural productivity, exacerbating food insecurity, particularly among rural

households that rely on subsistence farming (Siamachoka & Kabwe Harnadih Mubanga, 2024, Jacqueline & Mubanga, 2020). The increasing frequency of extreme weather events further compounds these challenges, highlighting the urgent need for adaptive strategies to enhance agricultural resilience.

In sub-Saharan Africa, staple crops such as maize, sorghum, and millet are particularly vulnerable to climatic variability (Adan *et. al*., 2023, Siamachoka & Kabwe Harnadih Mubanga, 2024). Empirical evidence suggests that the yields of most crops could decline by 2050 due to rising temperatures and shifting rainfall patterns (Jain, 2007). Furthermore, erratic weather conditions increase the prevalence of pests and diseases, further threatening food production and rural livelihoods. Climate change has led to prolonged droughts, erratic rainfall, and extreme temperatures, significantly impacting crop yields and livestock health (IPCC, 2022).

In Zambia, smallholder farmers in areas like Chongwe District's semi-rural Palabana Farming Block depend on the region's seasonal rainfall. Food insecurity and economic suffering have resulted from decreased agricultural yields and animal losses brought on by increasing climate unpredictability (Kunda, 2022). Many farmers consequently suffer from increased stress, depression, and other mental health issues (Talukder *et. al.,* 2021). There is currently little research on how Zambian climate change is affecting mental health, especially among smallholder farmers. Studies that are now accessible mostly concentrate on financial losses and adaptation tactics, overlooking the mental health of farmers.

Psychological Stressors Induced by Climate Variability

Research has shown that climate-induced hardships contribute to increased anxiety, depression, and emotional distress among farming communities (Berry *et. al.,* 2018). The unpredictability of weather patterns creates uncertainty, leading to chronic stress, feelings of helplessness, and a loss of control over one's livelihood (Massazza *et. al.,* 2022 & Yazd *et. al.,* 2019). Studies have established a strong correlation between climate change-induced stressors and heightened levels of anxiety and depression among smallholder farmers. Research by Berry *et. al.,* (2011) emphasizes that persistent exposure to climatic stressors, such as prolonged droughts and unexpected floods, leads to chronic worry about crop yields, food security, and economic sustainability.

In Zambia, a study by Phiri *et. al.,* (2019) found that farmers experiencing crop failures due to erratic rainfall reported symptoms of depression and generalized anxiety. Extreme weather events such as floods and prolonged droughts can be traumatic experiences for farmers. A study conducted by Clayton *et. al.,* (2017) noted that natural disasters lead to Post Traumatic Stress Disorder (PTSD) among affected populations, particularly farmers whose livelihoods are directly tied to land productivity. Research indicates a disturbing trend in increased suicide rates among farmers facing extreme climate challenges. Studies in India and Australia (Hanigan *et. al.,* 2012) have found a link between prolonged droughts and increased suicide rates among farmers. While specific data for Zambia is limited, anecdotal evidence suggests that economic hardships caused by climate change can lead to hopelessness and suicidal thoughts among smallholder farmers.

Socio-economic and Cultural Factors Influencing Mental Health

Mental health among farmers is shaped by a complex interplay of socio-economic and cultural factors. Due to the nature of agricultural work, farmers face unique stressors that impact their mental well-being. These factors include financial insecurity, climate variability, social expectations, and cultural beliefs about mental health. Smallholder farmers worldwide face significant economic struggles and financial insecurity due to their heavy reliance on seasonal rainfall, making them highly susceptible to climate variability. Small holder farmers' livelihoods are being adversely affected by the increasing effects of climate change on agricultural productivity (Schramski *et. al.,* 2015). Farmers with limited access to financial aid or insurance schemes are particularly vulnerable to mental health challenges. The severe droughts in Zambia have led to significant economic hardships for smallholder farmers (Chisenga *et. al.,* 2024).

Coping Mechanisms

Collaboration and Social support play a crucial role in mitigating the mental health challenges among farmers. According to Koutsouris (2014), "strong social networks among farmers contribute to better mental health outcomes by providing emotional support and reducing stress levels." Family, friends, and community

organizations can offer moral and financial support, helping farmers navigate economic hardships and emotional struggles. Furthermore, adaptive coping mechanisms such as participation in cooperative farming, financial literacy programs, and peer support groups can provide farmers with practical ways to manage stress.

A study by Bryant & Garnham (2015) highlighted that "engaging in group discussions about farming-related challenges significantly reduces anxiety and promotes mental resilience." Implementing community-based mental health initiatives tailored to farmers' needs can enhance their psychological well-being and reduce the risk of severe mental health conditions. The presence of strong community networks and support systems can mitigate the psychological burden of climate change.

Research by Tschakert *et. al.,* (2014) highlights the role of social capital in helping farmers adapt to climate stress. However, in areas like Palabana, where rural communities are often underserved in mental health services, the lack of professional psychological support exacerbates farmers' distress.

Problem Statement

Climate change has significantly impacted agricultural productivity worldwide, and smallholder farmers in Zambia are no exception. The region has experienced erratic rainfall patterns, prolonged droughts, and increasing temperatures, all of which contribute to reduced crop yields and livestock productivity (Jacqueline & Mubanga, 2020). Smallholder Farmers are reported to have increased stress, anxiety, and depressive symptoms, particularly during prolonged dry spells or after experiencing heavy financial losses due to climate-induced crop failure (Touch *et. al.,* 2024, Abunyewah *et. al.,* 2024). However, there is limited research on the specific mental health effects of climate change on mental health among farmers and how they cope with psychological distress. This study seeks to bridge this gap by assessing the effects of climate change on the mental health of farmers in Palabana Farming Block of Chongwe.

Objectives

Main Objective

To assess the impacts of climate change on the mental health of small holder farmers in Njolwe camp, Palabana farming block.

Specific Objectives

1. Evaluate the prevalence of mental health disorders among smallholder farmers affected by climate change over the last decade.

2. To analyze the relationship between climate change (e.g., droughts, floods, erratic rainfall) and farmers' mental well-being.

3. Explore the coping strategies employed by farmers to manage psychological stress related to climate variability.

4. Evaluate the effectiveness of community networks and support systems (e.g. FISP, mental health services) in mitigating the mental impacts like depression, anxiety and stress experienced by farmers due to climate change.

Research Questions

1. What is the prevalence of mental health disorders among smallholder farmers in the Palabana farming block as a result of climate change over the last decade?

2. How have changing weather patterns (e.g., droughts, floods, erratic rainfall) affected farmers' mental well-being?

3. What coping mechanisms do smallholder farmers employ to deal with the mental stress associated with climate variability?

4. How effective are community networks and support systems (e.g. FISP, mental health services) in alleviating the mental impacts of climate change on smallholder farmers?

Conceptual Framework

With a particular focus on how stressors affect psychological well-being (e.g., stress, anxiety, depression, PTSD), the conceptual framework explains how climate change stressors (e.g., extreme weather events, drought, flooding) affect the mental health of smallholder farmers in the Palabana Farming Block. The dependent variable (mental health impacts), which is impacted by coping techniques and adaptation tactics, is influenced by the independent factors (social disruptions, economic effects, and stressors associated with climate change). The relationships described in the framework are shown below (Figure 1).

The conceptual framework suggests important connections between environmental stresses, psychological impacts, and coping strategies. These connections are obtainable by synthesizing the body of research on the subject regarding climate change and smallholder farmers' mental health.

Figure 1: Conceptual Model Diagram:
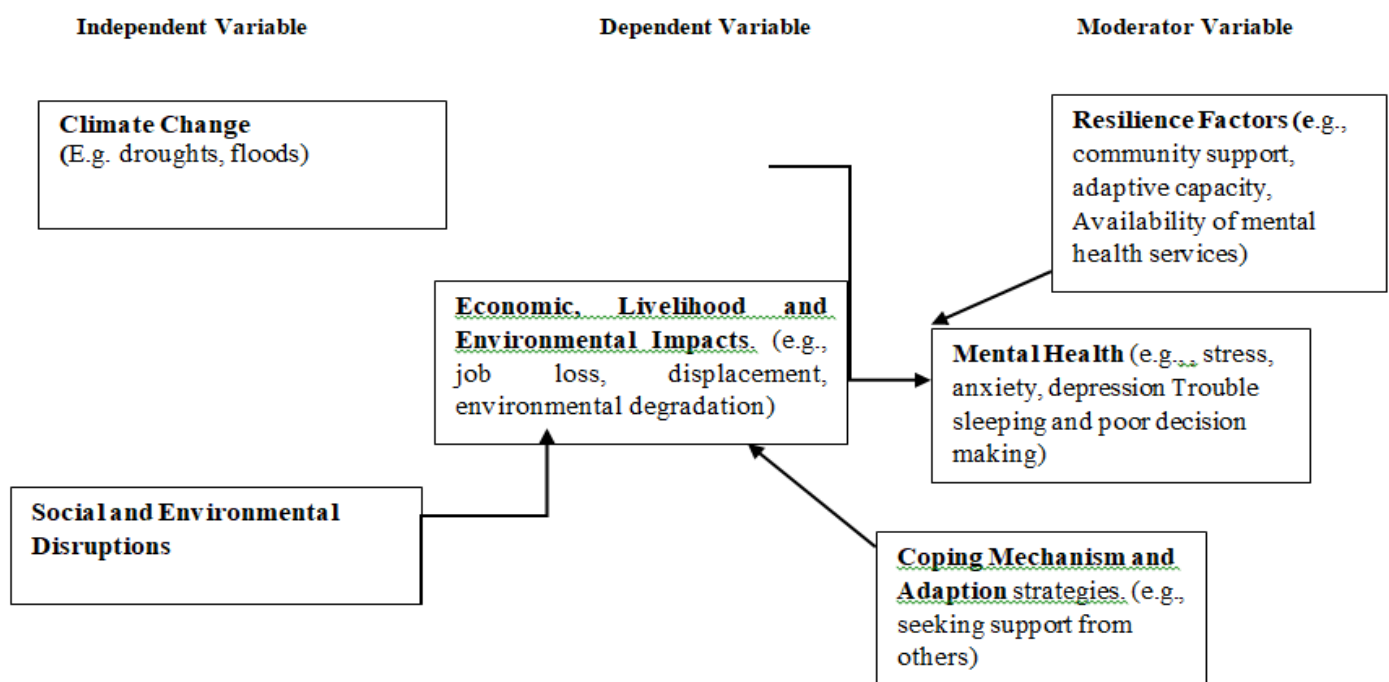
Operational Definition of terms

Climate Change

Climate change refers to a significant alteration in the climate system, identified by changes in temperature, precipitation, or wind patterns, lasting for decades or longer. These changes may be due to natural processes or human activities, such as deforestation and the emission of greenhouse gases. (IPCC, 2021)

Mental Health

Mental health refers to a person's emotional, psychological, and social well-being. It affects how individuals think, feel, and act, as well as how they handle stress, relate to others, and make decisions. Good mental health is essential for overall health and functioning. (World Health Organization (WHO, 2022)

Smallholder Farmers

Smallholder farmers are individuals or households who manage small plots of land, typically less than two hectares, primarily for subsistence. They often rely on family labor, have limited access to resources and markets, and are highly vulnerable to climate variability. (Food and Agriculture Organization (FAO, 2021)

Adaptation

Adaptation refers to the process of adjusting to actual or expected climate and its effects. In human systems, it seeks to moderate or avoid harm or exploit beneficial opportunities to enhance resilience. (IPCC, 2021)

Resilience

Resilience is the capacity of individuals, communities, or systems to anticipate, prepare for, respond to, and recover from adverse events—such as climate shocks—while maintaining essential functions and structures. (IPCC, 2021)

Livelihood

A livelihood comprises the capabilities, assets, and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks while maintaining or enhancing its capabilities and assets. (Chambers & Conway, 1992)

Climate Variability

Climate variability refers to short- to medium-term fluctuations in climate patterns, such as temperature and rainfall that occur naturally over months, years, or decades. It is different from long-term climate change but can still have significant impacts on agriculture and livelihoods. (IPCC, 2021)

Expected relationships between Concepts

Climate Change and Mental Health Outcomes

Drought, flooding, erratic rainfall patterns, and crop failure are examples of climate stress that worsens smallholder farmers' mental health. Feelings of tension, worry, and helplessness can result from these stresses (Berry *et. al*., 2018). Climate change's unpredictability could lead to a persistent worry of crop failure in the future, which would make anxiety and despair even worse (Uppal, 2016).

Mental Health Outcomes and Coping mechanisms

A farmer's decision-making and capacity to handle climate shocks are adversely affected by poor mental health (Chandran *et. al.,* 2020). Depression, for instance, might make it more difficult for them to run their farm efficiently, which would result in lower yields and a poorer ability to adapt to climate change. Additionally, mental health problems weaken resilience, which limits a farmer's ability to adjust to economic uncertainty and climatic change (Mertz *et. al.,* 2009).

METHODOLOGY

Research Design

This study employed a mixed-method research design. This method involved the integration of qualitative and quantitative approaches that allowed for a comprehensive understanding of both statistical trends and personal experiences. The rationale for using the mixed method was that it was expected that by combining qualitative and quantitative approaches, the study would provide a holistic analysis of the impact of mental health on smallholder farmers as the methods do complement one another to enable us to understand the effects of climate change.

Study Site

The study was conducted in Njolwe camp in Palabana farming block of Chongwe district. Njolwe camp is a semi-rural agricultural zone about 60 km east of Lusaka in Chongwe District, Lusaka Province, Zambia. It is an agro-ecological Zone area, which is defined by moderate rainfall (800–1,000 mm per year) and temperature range between 15°C to 30°C (Siamachoka & Kabwe Harnadih Mubanga, 2024).

Figure 1 A Map Showing Chongwe District in Lusaka Province of Zambia
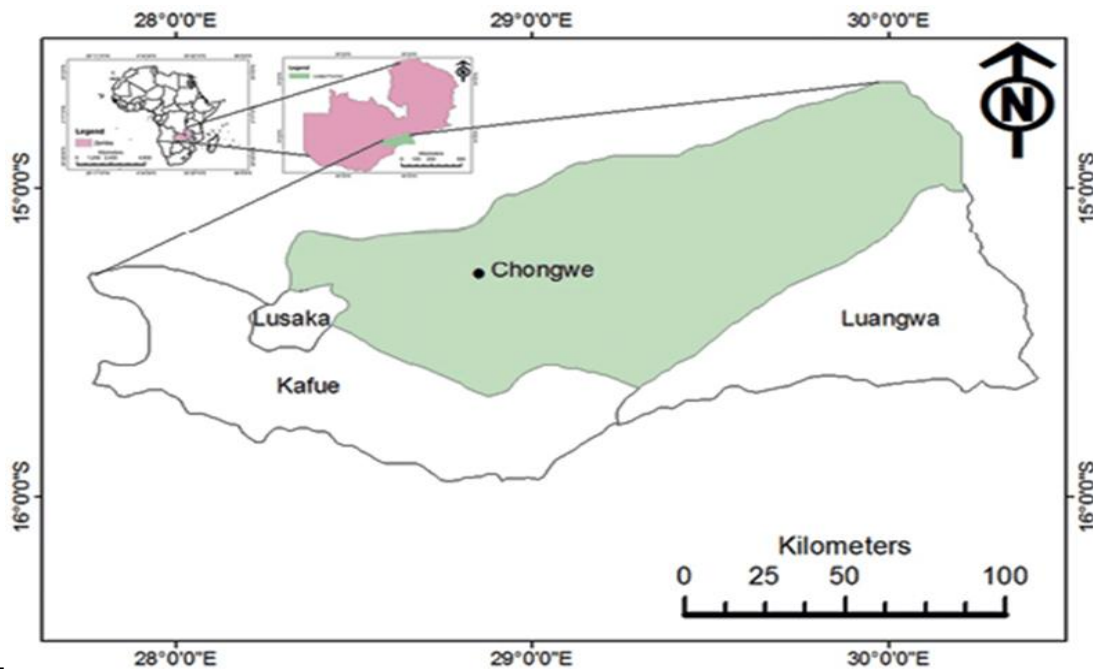
Sampling Techniques and Sample size calculations

A purposive sampling technique was used to select key informants who included Agricultural extension officers (02) and Health worker (01). The officers were considered due to their role of being directly involved in the education and monitoring of the farmers in Njolwe camp. In addition, 125 out of 180 smallholder farmers who were beneficiaries of the FISP were selected using simple random sampling. A large proportion of the participants were involved in mixed farming. The participants were involved in livestock farming and had been actively engaged in small-scale crop production for at least two consecutive farming seasons The following Slovin formula was used to come up with the sample size:

$$n = \frac{N}{1+Ne^2}$$

Where:

- **n** = sample size

- **N** = total population (180 farmers)

- **e** = margin of error (commonly 5% or 0.05)

Calculation (with 5% margin of error)

Final Sample Size: 125 farmers (with a 5% margin of error).

This sample was chosen to ensure representativeness in terms of gender, age, farming experience, and geographic location within Chongwe district, which are relevant factors for understanding the implementation and outcomes of the FISP in the community.

Data Collection

Both primary and secondary sources of data were collected. For the purpose of this study, questionnaires, interviews and focused group discussions were simultaneously used in collecting primary data. The data collection instruments were analysed by experts pretested to yield reliability and face validity. Secondary data was gathered from various sources. In addition, peer-reviewed journal articles from databases such as PubMed and Science Direct, reports from world health organization were reviewed and data extracted.

Data Analysis

STATA version 8 statistical package was used for data analysis, as it was the only one readily available. Both qualitative and quantitative data collected were manually coded and analyzed using descriptive statistics and frequencies. The qualitative information from questionnaires and interviews was coded based on the frequency of common recurring concepts in relation to mental health experiences by the participants. The main themes were centered on mental health issues like anxiety, depression, and trauma among the respondents. The information was transcribed and imported into Excel. In regard to quantitative data, the coding of the transcripts, Stata 8 was used to summarize the frequency distributions and to support thematic patterns that surfaced from the data. Multinomial logistic regression was used to find relationship between Climate Change Effects and Mental Health. The Cross-tabulation with Chi-square was used to find any association between coping strategies, support system and mental health status.

Informed Consent

The researcher gave the participants sufficient information on the study for them to make informed decisions about their participation. It was made clear that any participant would be free to withdraw from the study at any time. No respondent was forced to give information during the study. Codes where used for the participants instead of names to maintain their identity confidential.

Ethical Considerations

The researchers obtained ethical approval from Mulungushi University, under the Directorate of Research and Post graduate studies and Chongwe district health office in order to conduct the study on climate change and mental health among small holder farmers in the community.

RESULTS

Respondents Demographics

The sample consisted of 125 smallholder farmers. The majority were aged between 31–45 years (38.4%) and 46–60 years (32.0%):

Table 1: Respondents Demographics

Variable description	Frequency	Percentage (%)
Age		
18-30	24	19.20
31-45	48	38.40
46-60	40	32.00
Above 60	13	10.40

Gender	68	54.40
Female	57	45.60
Male		
Marital status		
Divorced	9	7.20
Marred	90	72.00
Single	11	8.80
Widowed	15	12.00
Number of years in farming		
Less than 5	11	8.80
5-10	41	32.80
More than 10	73	58.40
Type of farming		
Crop farming	64	51.20
Livestock farming	9	7.20
Mixed farming	52	41.60

The gender distribution showed a higher proportion of female respondents (54.4%) compared to males (45.6%). Most respondents were married (72.0%), while a significant portion (25.6%) had no formal education. The majority (58.4%) had over ten years of farming experience, and crop farming was the predominant activity (51.2%). (Table 1):

Prevalence of Mental Health Disorders

To evaluate the prevalence of mental health disorders among smallholder farmers in the Palabana farming block as a result of climate change, the participants were assessed over metal conditions using a Mini International Neuropsychiatric Interview as a structured questionnaire, surveys where they indicated whether or not they had experienced mental health problems due to climate change. Some examples of items in this category would include:

1. 'In the past year, have you experienced any of the following symptoms due to climate change?' (Check all that apply)

- *Persistent sadness or depression*

- *Loss of interest in farming or daily activities*

- *Trouble concentrating or making decisions*

- *Fatigue or low energy*

- *Unexplained physical pain (e.g., headaches, stomach aches)*

- *No effect*

Findings showed that mental health symptoms were prevalent among smallholder farmers. A total of 105 respondents (84%) reported symptoms indicative of depression, such as persistent sadness, loss of interest in daily activities, and fatigue. Only 16% of participants did not report such symptoms. Symptoms consistent with generalized anxiety disorder were reported by 120 farmers (96%), with just 4% of the sample not experiencing such symptoms.

2. '*How have these climate change effects affected your mental well-being? (Select all that apply)*'

  ○ *Anxiety about future farming seasons*

  ○ *Feelings of hopelessness or depression*

  ○ *Trouble sleeping*

  ○ *Suicidal thoughts*

  ○ *Increased Post Traumatic stress*

  ○ *No effect*

Figure 2: Prevalence of Mental Health Disorders among Farmers
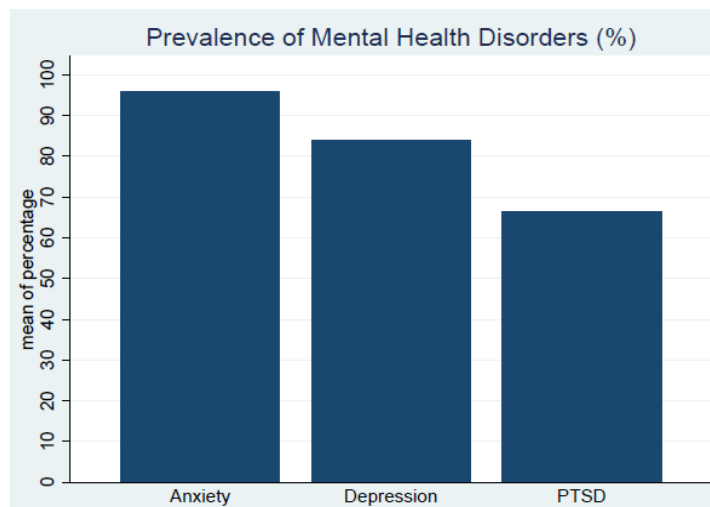
Among the participants, 83 (66.4%) reported post-traumatic stress disorder (PTSD) like symptoms including nightmares, flashbacks, emotional numbness, and hypervigilance. The remaining 33.6% did not report such experiences. (Fig 2)

Relationship between Climate Change and Mental Health

To assess the relationship between Climate Change and mental health, and whether changing weather patterns has an effect on the farmers' mental well-being, a multinomial logistic regression was conducted to examine the relationship between different climate events and mental health outcomes among respondents.

Mental health outcomes included anxiety, depression (used as the base outcome), trouble sleeping, stress, and suicidal thoughts, while climate events included droughts, unpredictable rainfall, and prolonged dry spells, extreme temperatures, and floods. Results showed that the overall model was not statistically significant (LR χ^2 (16) = 16.89, p= 0.3926), with a Pseudo R^2 value of 0.0462, suggesting that climate events explain a small proportion (approximately 4.6%) of the variance in mental health status.

Climate change and Anxiety

The association between prolonged dry spells and anxiety approached statistical significance (coefficient = -1.35, p = 0.053), indicating that experiencing prolonged dry spells was associated with lower odds of anxiety compared to depression. However, other climate events did not significantly predict anxiety.

Trouble Sleeping and Stress: None of the climate events were statistically significant predictors of trouble sleeping or stress. Suicidal Thoughts: The estimates for suicidal thoughts exhibited extremely large standard errors and non-significant p-values, suggesting model instability likely due to the rarity of suicidal thoughts in the sample.

Predicted Probabilities

Predicted probabilities provided additional insight: Respondents who were experiencing unpredictable rainfall patterns had the highest probability of reporting anxiety (0.375) and depression (0.333), both statistically significant (p < 0.001). Floods were associated with the highest predicted probability of reporting trouble sleeping (0.375). Extreme temperatures and prolonged dry spells had relatively higher predicted probabilities for stress (~0.266 and ~0.243, respectively). Predicted probabilities for suicidal thoughts were near zero across all climate events.

Figure 3: Predicted Probabilities
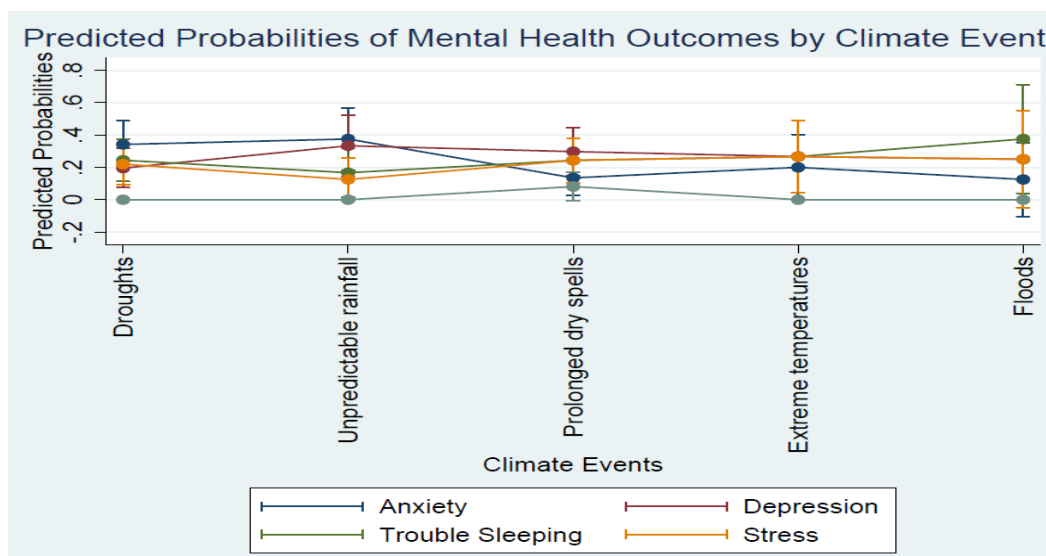
Coping Strategies for Psychological Stress

The study also investigated the coping mechanisms used by smallholder farmers to deal with the mental stress associated with climate variability. A total of 125 respondents reported various coping strategies in response to climate-related stressors. For instance the participants were asked:

4. 'What strategies do you use to cope with climate change-related stress? (Select all that apply)

- *Seeking financial support (loans, grants)*

- *Seeking emotional support from family or community*

- *Engaging in alternative income-generating activities*

- *Practicing religious/spiritual coping methods*

- *Drinking alcohol or using substances*

- *Ignoring the problem*

The most reported strategy was engaging in alternative income-generating activities (30.4%), followed by seeking emotional support from family or friends (24.0%), and seeking financial support such as loans or grants (21.6%). Other strategies included practicing religious or spiritual coping mechanisms (19.2%), drinking alcohol or using substances (4.0%), and using emergency funds or cash-for-work programs (0.8%).

Relationship between Coping Strategies and Mental Health Outcomes

A cross-tabulation of coping strategies by mental health outcomes revealed varying patterns Among the respondents who engaged in alternative income-generating activities, mental health outcomes experienced were depression (34.21%), anxiety (26.32%) followed by stress (18.42%). Religious or spiritual coping was also frequently associated with depression (33.33%) and trouble sleeping (25.00%). Emotional support seekers reported the highest proportion of anxiety (33.33%) and trouble sleeping (30.00%), with relatively lower levels of depression (10.00%). Financial support seekers had similar mental health profiles, with notable rates of trouble sleeping (29.63%), depression (25.93%), and anxiety (22.22%). Substance users showed a higher prevalence of stress (40.00%) and depression (40.00%), though the sample size for this group was very small (n = 5). Emergency fund users (n = 1) reported only trouble sleeping (100%). Despite these patterns, no strong association between coping strategies and specific mental health outcomes was evident.

Figure 4: Strategies used by Small holder Farmers to cope with stress
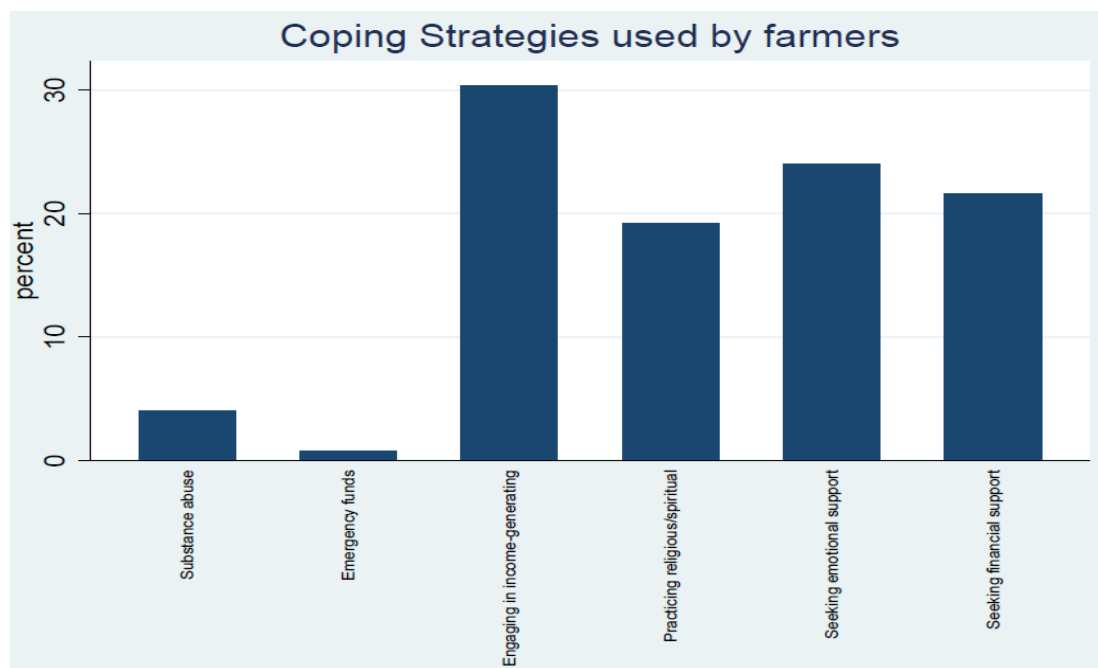
Statistical Association

A Pearson chi-square test of independence was performed to assess the relationship between coping strategy and mental health outcome. The test yielded a chi-square statistic of $\chi^2 (20) = 16.77$, with a p-value of 0.668. This indicates that there was no statistically significant association between the type of coping strategy employed and mental health outcomes among the respondents ($p > 0.05$). Thus, while certain trends were observed descriptively, they were not statistically robust.

Perceived Helpfulness of Community Support Systems

To assess the role of the community support systems in mitigating the mental impacts of climate change among small holder farmers, the farmers were solicited for their opinion regarding the effectiveness of the support systems. The study assessed respondents' perceptions regarding the effectiveness of existing community support

systems (i.e. Farmer cooperatives, Savings and credit groups) in helping them cope with climate-related stressors.

For instance the participants were asked:

5. *'Do you feel that existing community support systems (e.g., farmer cooperatives, religious groups) help reduce stress and anxiety?'*

    Yes No   Somewhat

Results showed that out of 125 respondents: 71.2% (n = 89) reported that they felt existing support systems helped them ("Yes"), 26.4% (n = 33) said they did not feel supported ("No"). Only 2.4% (n = 3) reported feeling "somewhat" helped. This distribution indicates that most respondents perceived community support structures as effective in assisting them during times of climate stress (Fig 5)

Figure 5: Cross tabulation between Support Systems and mental health
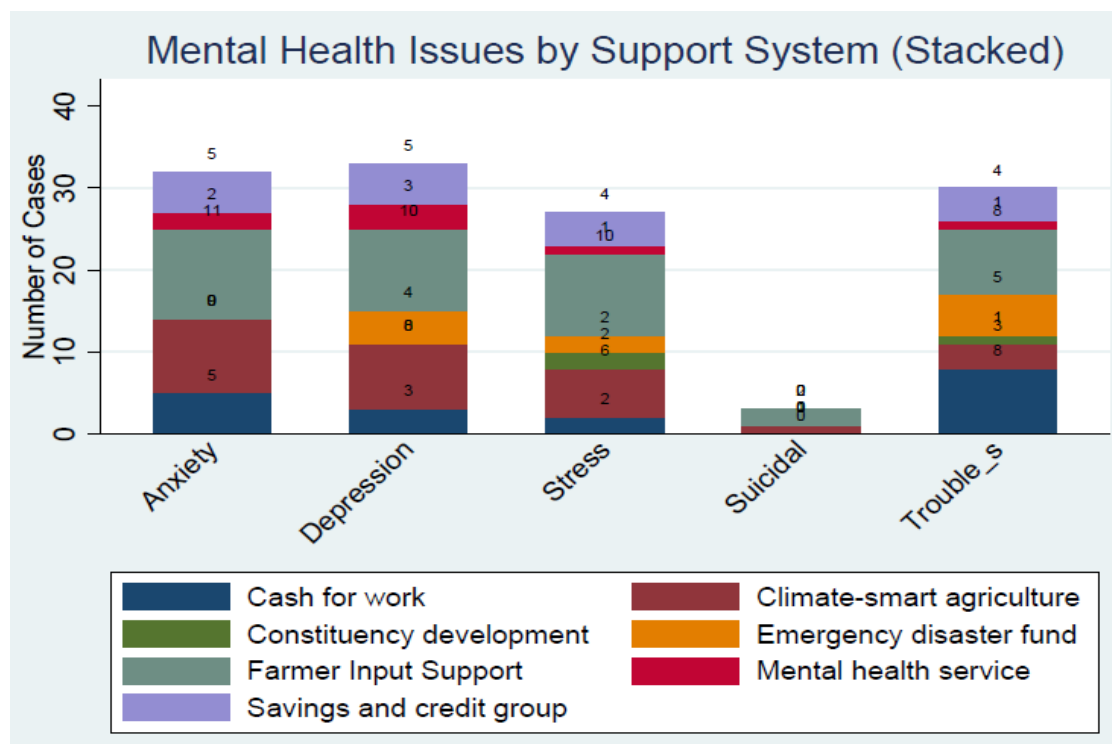
Relationship between Perceived Help and Type of Support Accessed

A cross-tabulation was conducted to explore the relationship between perceived helpfulness and the specific support systems accessed: Among those who felt supported ("Yes"): The most accessed support system was the Farmer Input Support Program (FISP) (33.71%), followed by climate-smart agriculture training (20.22%) and cash-for-work programs (16.85%). Among those who did not feel supported ("No"): Access was mainly through climate-smart agriculture training (27.27%), FISP (27.27%), and savings and credit groups (24.24%). Those who answered "somewhat" mostly accessed FISP (66.67%) and savings groups (33.33%). Thus, although a large number accessed FISP and climate-smart agriculture training, perceptions of supportiveness varied, with some individuals still reporting dissatisfaction.

Statistical Association

The Pearson chi-square test yielded a statistic of $\chi^2 (12) = 10.26$ with a p-value of 0.593. This indicates that there was no statistically significant association between the type of support system accessed and whether respondents felt supported (p > 0.05).

DISCUSSION

Introduction

This study aimed to evaluate the psychological impact of climate change among smallholder farmers, focusing on four specific objectives. This section is a discussion of the findings based on the objectives of the study. The results underscore the growing mental health burden on farming communities, reflecting broader global trends where climate change acts as a multiplier threat for mental health risks.

Prevalence of Mental Health Disorders

The results showed high prevalence of mental health symptoms amount small holder farmers: depression (84%), anxiety (96%) and PTSD (66.4%). These findings are consistent with prior studies that identified agriculture as a high-risk occupation for mental health disorders, especially in the context of environmental stressors (Lawrance *et al.,* 2022). The extraordinarily high anxiety levels suggest chronic stress and worry, potentially fueled by uncertain weather patterns, repeated crop failures, and economic instability. Similarly, the high depression rate may reflect "the psychosocial cost of environmental degradation. The high prevalence of PTSD among small holder farmers (66.4%) is likely to be linked to exposure to traumatic events such as droughts, floods, or land conflicts (Shoko Kori, 2023). This is consistent with findings from Cunsolo and Ellis (2018), who argue that experiences of environmental trauma can produce symptoms that mirror classic PTSD, especially in communities exposed to repeated ecological shocks.

Relationship between Climate Change Effects and Mental Well-Being

The relationship between climate events (droughts, erratic rainfall, floods) and mental health outcomes was analyzed using multinomial logistic regression. The overall results were not statistically significant (p = 0.3926). However, descriptive trends showed that unpredictable rainfall and prolonged dry spells were associated with higher anxiety and depression levels. These finding echoes research by Berry et al., (2011), who concluded that climate variability acts as a chronic stressor for rural populations, leading to cumulative mental health challenges. However, the low explanatory power (Pseudo R^2 = 4.6%) suggests that climate stress tends to interact with other factors like poverty, limited healthcare access, and social isolation, making mental health outcomes multifactorial (Bryant & Garnham, 2015).

Coping Strategies for Psychological Stress

Farmers adopted diverse coping strategies: alternative income-generating activities (30.4%), emotional support (24.0%), financial support (21.6%), and religious coping (19.2%). Despite these strategies, no statistically significant association emerged between coping methods and mental health outcomes (χ^2 (20) = 16.77, p = 0.668). This reflects findings by Bedaso *et. al.,* (2021), who argue that coping strategies among vulnerable groups are often reactive and insufficient without systemic support. Moreover, maladaptive coping like substance abuse (4%) was associated with higher stress levels, echoing concerns that harmful coping behaviors may worsen mental health during climate crises (Doherty & Clayton, 2011, Njeru et al., 2022).

Role of Community Networks and Support Systems

Although the chi-square test did not reveal a significant relationship (p = 0.598), the descriptive trends suggest that certain support systems particularly farmer input support are more frequently associated with mental health issues. This may indicate an over-reliance on agricultural-based aid without accompanying psychological or emotional support mechanisms. Lawrance *et. al.,* (2022) argues that, purely economic or input-based interventions are often insufficient in addressing underlying psychological distress. Without mental health components, such programs may alleviate material needs while leaving psychosocial needs unmet.

There was a low number of participants who reported having access to Mental Health services (5.6% of the participants) across all mental health categories. This aligns with findings by Abunyewah *et. al.,* (2024), who noted a significant global treatment gap in mental health services especially in low-income settings. Barriers

such as stigma, limited-service availability, and lack of awareness could explain the underutilization of mental health services. Lawrance *et. al.*, (2022) highlight that even when economic supports are present, unaddressed psychological needs can persist, especially among vulnerable populations.

High percentages of stress and sleep difficulties were found among those participating in Cash for Work and Farmer Input Support programs. These findings emphasize the need for integrated support systems that combine livelihood assistance with direct psychological services. This highlights the importance of integrated development approaches that embed mental health care into broader social protection programs, in line with the WHO's Mental Health Gap Action Programme (MHGAP) guidelines (WHO, 2008).

Limitations Of The Study

Despite the valuable insights generated, this study had several limitations that should be considered when interpreting the findings:

- The study was conducted in a single rural district, and while it provides important localized data, the findings may not be fully generalizable to all smallholder farmers across other regions or countries.

- The study used a cross-sectional design, capturing data at a single point in time. This limits the ability to establish causal relationships between climate-related stressors and mental health outcomes or to observe changes over time.

- Given the rural setting and potential literacy limitations, there were challenges in fully conveying or understanding clinical mental health terms, even when efforts were made to translate them into local languages.

- The collection of data was done during rainy season which made it a challenge to be able to access the farmers all in one place as most times they were busy with farm work.

- Getting permission from Chongwe District Health office to be allowed to conduct the research was also challenging as it took some time to be approved.

CONCLUSIONS

This study confirms that mental health disorders are prevalent among smallholder farmers exposed to climate variability, with depression and anxiety being the most reported symptoms. While climate change events such as unpredictable rainfall and prolonged dry spells contribute to psychological distress, they are not the sole determinants. Farmers employed various coping strategies and relied heavily on agricultural and financial support programs; however, these measures were not strongly associated with improved mental health outcomes. Furthermore, access to mental health-specific services was limited, highlighting a critical service gap. Community support systems provide vital assistance and emotional encouragement, yet addressing the psychological dimension of climate resilience remains a pressing need. Overall, the findings emphasize that addressing farmers' mental health in the context of climate change requires an integrated, multisectoral approach that includes environmental, social, and psychological interventions.

RECOMMENDATIONS

Based on the findings, the following recommendations are made:

- The high prevalence of mental health symptoms among small holder farmers linked with depression and anxiety suggest the need for expanding Access to Mental Health Services in Rural Areas and Integration of Mental Health Support into Agricultural Programs:

- Support programs like Farmer Input Support Program (FISP) and climate-smart agriculture training should incorporate mental health education and counselling services to offer holistic support to the

farmers in rural areas and strengthen diversify of coping mechanisms. This should include promoting resilience-building activities, such as skills training, microfinance initiatives, and cooperative farming models, to reduce economic vulnerability and enhance psychological well-being.

- Enhance Community-Based Support Networks: There is need for promoting integrated development approaches that embed mental health care into broader social protection programs Expand peer support groups and community-based mental health initiatives that can offer culturally sensitive support, de-stigmatizing mental health issues among small holder farmers.

- Policy Advocacy and Research: Advocate for national climate change and agriculture policies to explicitly recognize mental health as a priority area. Future research should use longitudinal designs to better understand the long-term psychological impacts of climate variability.

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