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Religion as a coping strategy to climate-induced depressive symptoms among farmers in Yapei in Ghana's Savannah region

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Introduction: Climate change is increasingly impacting vulnerable populations, with severe effects on livelihoods and mental health. In many African communities, religion plays a vital role in coping with these challenges. However, little is known about how religious beliefs help farmers in impoverished areas manage climate-induced depressive symptoms.

Methods: A qualitative design was used to examine how farmers in Yapei, Central Gonja District of Ghana, use religion to cope with climate-induced depressive symptoms. Data collection comprised 20 in-depth interviews and four focus group discussions (n = 40), involving participants who had experienced climate-related livelihood disruptions.

Results: Participants reported depressive symptoms, such as inability to sleep (insomnia), think clearly, appetite loss, and suicidal thoughts, due to flooding and drought-related livelihood disruptions. These symptoms were reported by both male (75%) and female (25%) participants. Despite these challenges, participants turned to religious beliefs and practices for relief. Faith and belief in God for divine intervention were central to managing these depressive symptoms.

Discussion: The findings highlight religion as a crucial coping strategy for the mental health impacts of climate change. Faith provided psychological relief and a sense of hope amid adversity.

KEYWORDS

flooding, drought, livelihood, mental health, depressive symptoms, religion

1 Introduction

Climate change impacts, such as flooding and droughts, have gained substantial attention due to their tangible effects on physical environments and livelihoods. However, a less conspicuous yet significant aspect of these impacts pertains to psychological scars that often go unnoticed and untreated (Lee et al., 2024; Heshmati, 2021; Clayton, 2020). Religion emerges as a response mechanism to depressive symptoms; however, there remains a dearth of understanding regarding the interplay between climate change, mental health, and religion within the African context.

“Last year, I cultivated 10 acres of maize and cowpea, but I lost all the maize to the flood. I was very worried and sad because there was nothing left to feed the family with, and I didn’t get some to sell, all were destroyed. That year was a difficult year for us. As the family head, all these people you see around here, including those who are not here, depend on me, but never have I thought of suicide as an option to end this misery. I have never thought about that, and will never think about that. It is even haram (Forbidden) in my religion to consider such thoughts. No, I will not do that because in our language (Gonja) there is a proverb that says “Kibawutanyangarang Kima Kibuluw,” meaning “any wretched living is better than death,” and God can turn bad situations around” (Participant C, a 66-year-old male farmer).

The transcript above deploys religious (i.e., haram) and cultural (i.e., proverb) resources to mitigate the mental health conditions of climate-induced livelihood disruptions. This straightforwardly speaks to the entanglement between religion and culture (Jenkins et al., 2018), in the event of climate-related effects. Jenkins et al. (2018, p. 8) argue that “there is no understanding of the cultural dimensions of climate change without understanding religion.” Indeed, religious belief is an intangible resource for adapting to distress situations of various forms. Over the years, religion has become an inter-generational practice that subconsciously and deliberately influences and shapes people’s mental processes, perceptions, and behavior (Guth et al., 1995). Nevertheless, proceeding from the basic definition of culture as “a way of life of a people” illuminates a reflexive discursive nexus between religion and culture in the context of climate impacts, which is the bedrock of this paper. This reflexive entanglement spans several domains, such as religious identity and climate change (Jenkins et al., 2018); stewardship toward a sustainable future (Golo and Yaro, 2013), and religion as a coping mechanism to climate-induced psychological distress.

The global climate crisis is well-known for its multiplier effect that compounds existing vulnerabilities (Vergunst and Berry, 2021). Northern Ghana is vulnerable to climate variation, emblematic of endemic poverty, limited access to government resources and potential solastalgic illness due to extensive reliance on climate-sensitive agricultural-based livelihoods like crop farming and herding (Tschakert et al., 2013). Consequently, any fluctuation in the climate affects livelihoods, which in turn affects people’s mental health and wellbeing via diverse pathways (Lawrance et al., 2022). Increasing unmet mental healthcare needs of people across the world constitute an urgent global health challenge (Patel et al., 2018). Vulnerabilities of the people in Northern Ghana come to the fore when it comes to mental health because of harsh economic realities, deprived social amenities, and precarious livelihood options. The climate crisis instigates double jeopardy for the suffering of the people.

Globally, 50% of people with mental disorders receive no treatment, with nearly 90% of these cases in low-resource settings, due to constrained mental health systems (Frankish et al., 2018). The World Health Organization (WHO, 2022b) defines mental

health as “a state of wellbeing in which every individual realizes his or her potential, can cope with the stresses of life, can work productively and fruitfully and can contribute to her or his community” (p. 2). Mental health spans a complex continuum, and it is uniquely experienced with different degrees of difficulty and distress, as well as varying social and clinical outcomes. Therefore, we conceptualize mental health as the experience of any symptom, salient enough to be distressful and a risk of self-harm, but below diagnostic criteria for mental disorder or illness. Mental disorders are characterized by clinically significant disturbances in an individual’s cognition, emotional regulation, or behavior. Despite several interventions to improve mental healthcare services at all levels, considerable gaps remain in Ghana. Only about 2% of Ghana’s 2.3 million people living with mental health conditions receive psychiatric treatment and support from health facilities (WHO, 2022a). Recent (Ag-Ngibise et al., 2023; Weobong et al., 2023) and past (Eaton and Ohene, 2016) studies have also reported that the treatment gap in mental healthcare services ranges between 94 and 99%, and 95 and 98%, respectively. This gap impacts not only vulnerable populations but also livelihoods. For instance, severe climate events worsen farmers’ livelihoods, increasing the incidence of mental ill-health such as anxiety and depression (Young et al., 2008; Lee et al., 2024; Clayton, 2020; Trombley et al., 2017).

Climate change undermines mental and physical health and disrupts healthcare services by causing floods that damage health infrastructure, agriculture, and supply chains (Lee et al., 2024; Clayton, 2020; Trombley et al., 2017). Religious involvement and practices may become a protective factor in dealing with depression or anxiety (particularly in resource-poor settings) (Hulme, 2009). Mbiti (1969, p. 1) emphasizes the deep connection between humanity and religion in Africa, stating that “the African is notoriously religious.” However, there is limited research on how vulnerable, impoverished communities use religious faith to address climate impacts and associated mental health risks. Addressing the aforementioned gap is critical for several reasons. First, understanding the role of religiosity in African cultures during climate disasters can inform the design of effective relief strategies. As Gyekye (1996) notes, Africans, particularly those in vulnerable and deprived communities, are “intensely religious,” and belief in God is central to their worldview. Mbiti (1969) further explains that religion is deeply woven into all aspects of their lives, making it inseparable from daily practices and beliefs. This highlights the need to explore how faith serves as a coping mechanism in these communities.

Therefore, the present study provides an opportunity to explore rural communities that are economically disadvantaged and vulnerable to climate change, where people depend heavily on the natural environment. It also reveals an in-depth understanding of the use of religion as a coping strategy to address the deleterious effects of climate change on their mental health. To address the knowledge gap, this paper examines religion as a response mechanism to climate-induced depressive symptoms among the people in Yapei in the Central Gonja District of Ghana.

2 Literature review

2.1 Socioeconomic factors of climate change impacts and mental health conditions

Empirically, a plethora of mental health studies have been linked to both acute and slow-onset climate change events with depression, anxiety, mood disorders, and social vices (Clayton, 2020) and stigma of hopelessness (Corrigan et al., 2016; Livingston and Boyd, 2010). These experiences of climate-related mental conditions vary based on socioeconomic factors, including sex, age, income, occupation and education. These factors influence the level of mental health conditions that people suffer when climate change impairs livelihoods. During climate disasters, studies such as Jones-Bitton et al. (2020) and Daghigh Yazd et al. (2019) have shown that farmers experience higher rates of depression than non-farmers. Also, Milner et al. (2013) and Klingelschmidt et al. (2018) reported that farmers face a greater risk of suicide compared to other occupations.

For instance, Carleton (2017) suggests that fluctuations in temperature during India's primary growing season significantly impact suicide rates. This is because most farmers rely on a favorable climate for agricultural production. As such, any temperature variation disrupts outputs, which subsequently influence their mental health. This mirrors the situation in Africa, where many farmers heavily depend on the natural rains for sustainable livelihoods, such that even minor disruption in the climate conditions significantly impacts their livelihoods (Omotoso et al., 2023), resulting in mental health issues. Older adults are more vulnerable than younger adults. The aged tend to suffer more emotional stress than the younger adults (Bei et al., 2013) due to their relatively less physical and economic capacity to deploy strategies to deal with disasters.

Mental health issues across the gender divide due to climate disasters are mixed (Clayton et al., 2023). On one hand, Clayton et al. (2023) found that women reported experiencing more adverse emotions (i.e., anxiety and depression) of climate impacts than men. Additionally, women had a higher tendency to experience mental health problems following disaster (Clayton et al., 2023; Doherty, 2015; Trumbo et al., 2011). Therefore, any external stressors, such as climate change impact trigger depression and anxiety symptoms in women more than men. On the other hand, suicide rates following climate disasters are higher among men than women (Hanigan and Chaston, 2022). Also, Hanigan and Chaston (2022) found that from 1971 to 2007, severe drought was significantly linked to higher suicide rates among working-age rural males in New South Wales. In contrast, drought conditions were associated with lower suicide rates among women of the same age group (Hanigan and Chaston, 2022). The high incidence of suicide among rural men may stem from societal expectations of their role as family providers. Extreme weather events can disrupt their livelihoods, threatening this identity. These contrasting findings in male-female suggest that men and women experience mental health conditions (i.e., depression and anxiety) differently. Incomparable experiences of depression by both sexes could also lead to incorrect measurements.

Income level and place of residence are important factors influencing how climate change affects mental health. Low-income earners are more susceptible to the effects of climate-induced mental health disorders due to limited resources for adapting to climate challenges. In contrast, high-income earners can better manage such mental health impacts by employing effective adaptation strategies. Place of residence also determines the risk of depression: for instance, people living in flood-affected areas experienced increased symptoms of depression (North et al., 2004). Generally, people living in flooded areas were more depressed than those living in areas free from flooding (Azuma et al., 2014). The reflection of flood disasters and the fear of further flood recurrence heighten concerns and increase the risk of depression symptoms. Even though studies on climate-induced mental conditions have been widespread over varying demographics and rural communities, there are no such studies among farmers in the central Gonja district of Ghana.

2.2 Climate-induced mental health conditions and religion: related studies

An individual mental construct of home and sense of belonging may be altered by the knowledge that something can change permanently (Mason et al., 2010). This feeling of loss, despair, and perceived threats to one's identity when valued environments become dramatically transformed, predominates cases of white farmers, fisher folk, and rural residents deeply committed to their land and community, particularly in Australia and Canada (Albrecht et al., 2007). The concept of solastalgia (Albrecht, 2005; Albrecht et al., 2007) embodies a "profundity of human distress resulting from displacement and loss due to ecological crises by which places are traumatized to the point that they can no longer provide solace and sustenance" (Kelly, 2009, p. 2). Thus, watching a place with deep historical and affective attachment degrade uncontrollably engenders psychological distress (Cáceres et al., 2022). Solastalgia is likely to become a global condition, fueled by similar environmental transformation, albeit felt and articulated differently by different people in localized geospatial and socio-cultural settings. Albrecht refers to this universal looming threat as "climate change queued up," from which nobody can get away (Smith, 2010, p. 2). In this context, religion can help individuals emotionally affected by climate challenges by offering mental health support and a sense of meaning and hope, often through belief in divine intervention. In Africa, particularly Ghana, where people are often described as deeply religious (Pobee, 1992), their strong religiosity becomes a vital resource for managing climate-related mental distress.

2.2.1 Impact of climate change and religion

According to McCown (1927), the link between religion and climate change is more pronounced than generally realized. Other authors (Clingerman and O'Brien, 2017; Haluza-DeLay, 2014; Hulme, 2017; Jenkins et al., 2018; Murphy et al., 2016; Leiserowitz

et al., 2013; Veldman et al., 2013) assert that religion may become a critical agent in the fight against the effects of climate change. According to Veldman et al. (2013), although world religions have varied ways of exerting influence, they can “decisively impact how societies all over the world respond” to climate change (p. 3). Culture, values, and worldviews of climate change research appear to have encouraged attention to religion (Ives et al., 2020).

To understand the cultural dynamics of climate change, scholars have argued that religion must be properly understood and underscore the potential of religion in addressing human-induced environmental degradation (Hitzhusen and Tucker, 2013). Religions shape the worldviews and moral attitudes of their adherents and how individuals approach nature (Ives et al., 2024). In other words, religious leaders and organizations have an important voice in public debates on the environment and political decision-making through their different networks (Schaefer, 2016). Therefore, studying religious perspectives, particularly faith and belief, is key to understanding how farmers adapted to climate change-induced mental health in the current study.

Illustrating the role of religion in climate change discourse, some authors (Bagir and Martiam, 2016; Hancock, 2018) concur that Khalifa is the single most important theme regarding Islam and ecology. Khalifa refers to the role of humans as vicegerents of God on earth. It is man’s responsibility to take care of nature. Therefore, caring for nature means serving God. Being stewards of God’s creation, humans must carefully manage natural resources as different verses in the Qur’an warn against their overexploitation and wastage (AbdelZaher et al., 2016). From this viewpoint, climate change appears to be man’s failure of the assigned trusteeship. Humans are close to breaking environmental stewardship, resulting in climate change and its impact (IPCC, 2014).

2.3 Religion as a coping strategy

The coping strategy in this study refers to short-term climate change adaptation, specifically, adjusting to climate change in the short term, enabled by religious beliefs and practices. Religious beliefs have been shown to help emotionally distressed individuals by fostering the perception that God is supportive and can alleviate distress (Levine, 2008). This provides relief and comfort in challenging situations, such as coping with climate impacts. Although studies have shown that the nature and scale of climate impact and mental health are gaining prominence, studies on religion as a coping mechanism to deal with climate-induced mental health in Ghana are rare. This study focused on climate-induced depressive symptoms and the use of religion as a coping strategy in Yapei in the Central Gonja district in Ghana. The study explored the effects of flooding and droughts and associated depressive symptoms. Also, the study examined the use of religion as a coping strategy to respond to climate change and depressive symptoms in the Yapei community. Next, we explore the theoretical and conceptual framework for the study.

2.4 Theoretical framework

The study relies on the social-ecological theory of Bronfenbrenner (1979), which is part of systems theory (Lawrance et al., 2022), as a theoretical framework to understand the connections between climate change impacts and mental health. The social-ecological theory asserts that human development and behaviors are impacted by different levels of environments in a complex ecosystem of interrelationships (Bronfenbrenner, 1979). The different levels of environment could be described using concentric circles named micro-system, mesosystem, exosystem, macrosystem, and chronosystem of climate disaster impacts. The microsystem refers to the innermost ecosystem where people affected by climate change reside and interact, for instance, with their relatives and organizations like family, churches, and other social groups (Crawford, 2020). Such interactions could influence the state of their mental wellness. The mesosystem level refers to the second-order ecosystem, which defines how different microsystems intersect and influence each other (Balakrishnan et al., 2024). In other words, the mesosystem explains how the causal connections of climate change impact other factors at the microsystem level (Adu and Oudshoorn, 2020) that may inform the psychological health of people. For instance, a lack of support from family members and church groups has adverse effects on the mental health of people affected by climate change. Also, positive relationships among the various groups at the mesosystem level could enhance the state of psychological wellness. The exosystem refers to external environmental factors that are remote from the individual but have a huge impact on their development. The external factors of the exosystem include climate events such as flooding and drought, government policies, social services, agroecological zones, etc., which can influence the microsystems and mesosystems, with or without direct effects on individuals. For instance, favorable climate conditions could result in a good harvest that can cause experiences of positive feelings. The macrosystem is the broadest level of environmental influence, encompassing economic and socio-cultural factors shaping human development, while the chronosystem defines the temporal dimension of the theory, examining how the different components of the systems evolve.

Depressive symptoms occur at the micro-level of individual thought processes that globally evaluate everything as negative, resulting in helplessness and hopelessness (Abramson et al., 1989; Beck et al., 1979). This notwithstanding, Pearlin used his stress process model to clarify that stressors do not act in isolation but act in concert with other factors (i.e., divorce and natural disasters) based on people’s locations in status hierarchies (Aneshensel and Avison, 2015; Pearlin et al., 1981). The stress process model validates the idea that depressive symptoms are triggered by disruptive job events, causing income loss and producing income strain (Moyna et al., 2024). Extant research also highlights gendered vulnerability perspectives that assert that women’s preexisting conditions predispose them to more climate impacts, due to their limited access to resources, gendered decision-making power, and social acceptance (Choudhury and Haque, 2016; Cutter et al., 2003). Several socio-economic variables

(i.e., age, education, health) interact with geographic factors to worsen women's vulnerability in the wake of climate change disasters (Goodrich et al., 2019; Lazarus and Steigerwalt, 2018). According to the Gender-based Livelihood Vulnerability Index and the GLVI-IPCC framework, women in coastal Bangladesh were more susceptible to health problems and sanitation than men (Jerin et al., 2023). In addition, Ribot (2014) found that physical environmental factors intersect with social processes to engender varied vulnerabilities among women and children in poor and deprived communities.

2.5 Conceptual framework

Figure 1 describes the conceptual framework of the study. The framework illustrates the social risk pathways of how climate change impacts (i.e., floods and droughts) result in depressive symptoms like suicidal thoughts, sleepless nights, and inability to eat and think clearly. When climate disasters disrupt livelihoods in poor communities without social support from the state or private relief agencies, it generates stress, leading to mental health risks such as anxiety and depressive symptoms. The people's ability to deal with the losses and associated mental health risks depends on their socio-demographic background, with religious beliefs and faith as one such coping strategy.

Two broad ways of addressing climate change impacts involve mitigation and adaptation. Viewed from the social-ecological system perspective, these two pathways strand all the subsystems of Bronfenbrenner's social-ecological systems. While mitigation involves reducing the severity of climate change impact, adaptation encompasses adjustments in human and natural systems in response to real or probable climate change. Our study focuses on short-term adaptation to climate change impacts, specifically coping strategies in terms of human adjustment to climate-induced depressive symptoms caused by flooding and or droughts. We focus on adjustment using religious beliefs and faith in this conceptual framework (Figure 1). Bronfenbrenner moved beyond the effect of just a microsystem to focus on the holistic developmental challenges that may confront the individual in multiple life situations like schools, churches, homes and environments (Crawford, 2020). The framework explains how individuals' social environments influence each other. For instance, interactions among families, and other people or organizations within the community the individual resides, contribute to the individual's development (Adu and Oudshoorn, 2020). In this context, the current study expects that individual farmers who lose their farm yields to floods and or droughts will have their livelihoods disrupted. The subjective evaluation of livelihood losses distorts individuals' feelings and affects their mental health. When this evaluation leaves farmers feeling overwhelmed, helpless and hopeless (Young et al., 2008) about overcoming this environmental catastrophe and building back their lives, then they show all the depressive symptoms and suicidal ideation being reported in this study. To respond to this situation, farmers' faith and belief are deployed to reduce the effects of climate-induced depressive symptoms.

3 Methodology

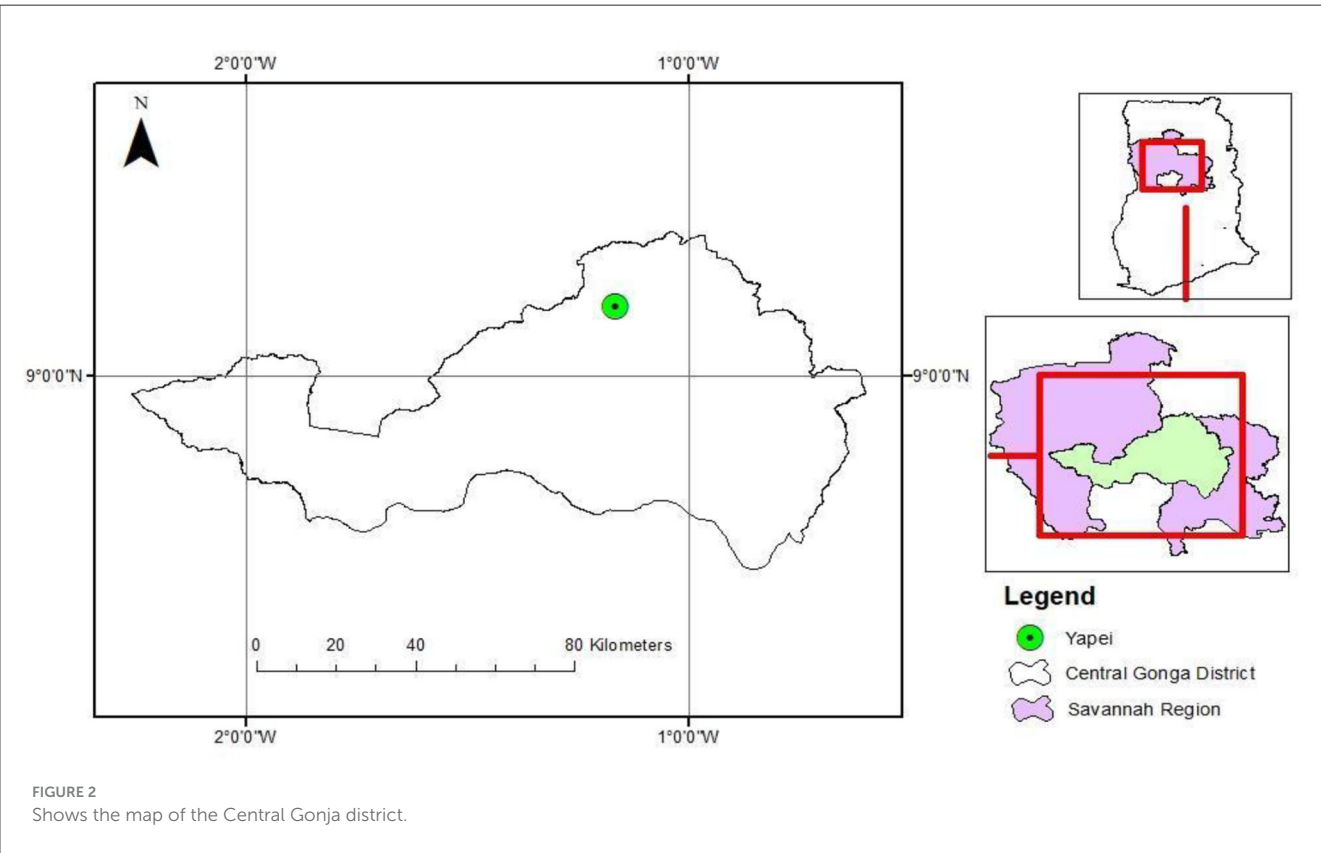
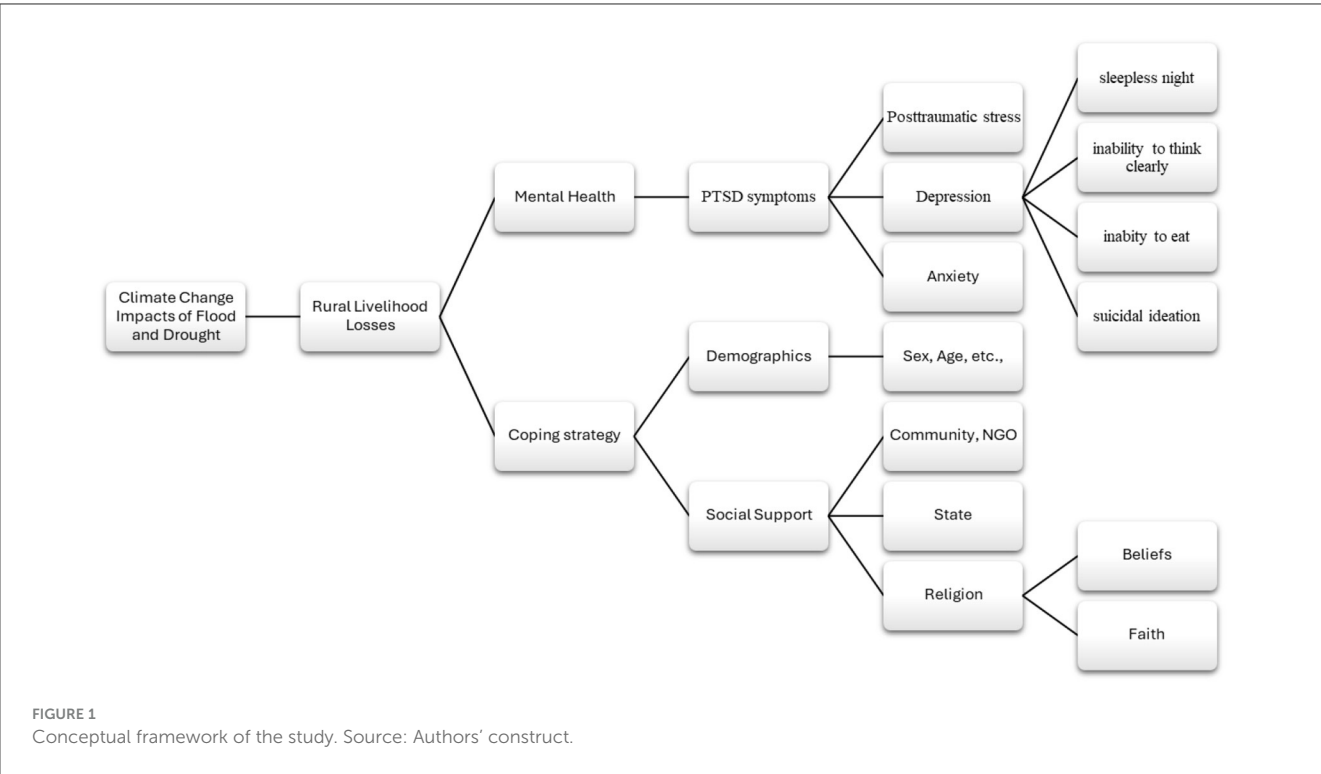
3.1 Study area

The study was conducted in the Yapei community in the Central Gonja district. The district is one of seven districts in the Savannah region, carved out of the West Gonja district, and is situated in the southwestern part of the Northern Region of Ghana. Yapei lies within latitude 9.1613° N and longitude 1.1671° W. The main occupation of the community is agriculture, mainly crop farming, animal herding, and fishing. The district's population is 142,762, making up 21.9% of the region's population as of 2021 (Ghana Statistical Service, 2021). The Ghana Statistical Service (2021) suggests that the male population is 71,635 (50.2%) and the female population is 71,127 (49.8%). The rural areas of the district are more populated than the urban parts. The dominant religion in the district is Islam (84.3%), followed by Christianity (12.1%), traditionalist (1.8%), and non-religious (1.6%) (Figure 2).

Yapei was selected because it reflected the socio-economic and climate characteristics of the Central Gonja district. Most people in Yapei are farmers and engage in small-scale farming to feed their families. However, changes in rainfall patterns and fluctuations in the climate conditions (Ghana Statistical Service, 2014) in the community usually lead to crop failure. According to Tschakert et al. (2013), Northern Ghana districts are emblematic of endemic poverty and sensitive to climate change and variability.

3.2 Study design, sampling strategy and data collection

This study employed an interpretivist qualitative method to explore the subjective meanings (Creswell, 2013) of climate disasters with complex nuances of the lived experiences of people in the Yapei community. An interpretivist's research paradigm seeks a deeper understanding of complex social phenomena, which cannot be deciphered using quantitative methods. Unlike quantitative methods, qualitative methods allow for flexibility in exploring the subjective meanings of the lived experiences of the participants (Creswell, 2013) based on their individual and cultural values, religious beliefs, and behaviors and practices (Patton, 2015). It also permits a convenient sample size of forty (FGDs) and twenty (IDIs), which was attained at the point of saturation, where additional interviews yielded no new insights. The qualitative data collection, involving twenty (20) in-depth interviews (IDIs) and (4) focus group discussions (FGDs) consisting of 40 participants, 10 in each group, was conducted to explore climate-induced depressive symptoms and religion as a strategy to deal with symptoms (including suicidal ideation and poor eating habit) in the rural community. Using a purposive selection of participants who have lived experiences of climate impact, own or have access to farmlands, were born or have stayed in the community over a long period and are engaged in farming and related economic activities, was included in the selection process. The inclusion criteria for participants (IDIs and FGDs) are people affected by at least one climate disaster in the Yapei community. Participants who had experienced the



disaster outside Yapei were excluded. Participants were informed about the study's purpose and assured that their responses would remain confidential.

Each of the four focus group discussions was selected using a snowball approach. The size of the participants in the FGDs was to enhance time for effective discussion and contribution of individual

viewpoints. Two of the FGDs comprised young women and elderly women, while the other two FGDs were young men and elderly men (including sub-chiefs). The separation of women from men enhanced the ability of the women and the young participants to freely and comfortably express their views (Dako-Gyeke et al., 2019).

The interviews were conducted in the natural settings of the participants using a semi-structured interview guide. Most (80%) of the interviews were conducted in their native language and translated into English. The rest (20%) were conducted in Twi and translated into English. The interviews were first recorded using a digital recorder and transcribed for analysis. The transcribed data was analyzed by identifying common themes and sub-themes such as climate change (extreme weather events such as flooding and droughts), livelihood losses, depressive symptoms, religion, faith, and belief. To ensure anonymity, alphabets were used to protect the participants' identities. Most participants were heads of families, wives and sons of family heads, whose primary occupations were crop farming and herding. Most participants had no education, a few had attained Junior High Secondary (JHS). The participants were mostly Muslims, while a few of them were Christians.

3.3 Data analysis

We analyzed the data using thematic analysis by Braun and Clarke (2006, 2016). This involved identifying themes from transcribed interviews (Braun and Clarke, 2016) through repeated reading (Dawadi, 2020; King, 2004; Rice and Ezzy, 1999). The analysis followed Braun and Clarke's six stages to ensure quality. The first stage involved familiarizing ourselves with the data by immersing ourselves in the transcripts and helping identify emerging themes. After repeated readings, we manually coded the transcripts, selecting relevant phrases or sentences, such as "too much rain," "inability to sleep," and "poor eating habits." In the second and third stages, codes were organized into themes, reflecting connections between them. Within the main themes and codes were the sub-themes and subcodes which captured relationships between climate events, depression symptoms, and religion as a coping strategy. The fourth stage checked for consistency and differences in themes, termed internal homogeneity and external heterogeneity by Braun and Clarke. In the fifth stage, themes were refined by reviewing major themes, sub-themes, codes, and participant quotes. Finally, the findings were written and discussed (see Section 4).

4 Findings and discussions: climate-induced depressive symptoms

At the micro-system level of the socio-ecological theory, the present study found that participants with vulnerable socio-economic and demographic backgrounds experienced heightened depressive symptoms following climate-related disasters. Several findings in the quotations have confirmed that the external impact of climate disaster (macrosystem) affects individuals at the microsystem of Bronfenbrenner's socio-ecological theory. These symptoms included difficulties in

thinking clearly, eating, or sleeping, as well as suicidal thoughts. To cope with these challenges, many participants relied on their religious faith or beliefs. The subsequent sections discuss these findings.

4.1 Linking socio-economic and demographic attributes to depressive symptoms

Table 1 presents the socio-economic prevalence of risk factors of the participants in the in-depth interviews, which represents the micro-ecosystem of the socio-ecological theory. The participants were aged between 30 (minimum) and 72 (maximum) years, averaging 52 ± 12 years. They were largely (75%) Males and a few Females (25%), who were dominantly Muslims (90%) and a few Christians (10%). The Male Muslims (70%) were more than the Female Muslims (20%). In addition, a majority of the participants were married (80%), as against a few single parents (10%) and widows (10%) who were also household heads (75%), wives of household heads (10%) or have other (15%) household roles such as grandmother or grandfather. While a minority (45%) had attained tertiary (15%), Senior Secondary (15%) or Junior Secondary (15%) school education, most (55%) had no formal education. Consequently, farming and trading in farm produce dominate their occupational statuses. There were about 70% farmers, 10% traders/food vendors, 10% farmers/teachers, and 10% representing multiple occupations such as farming, tailoring, and fishing. This high (70%) proportion of farmers expressing signs of depression in the current study corroborates Jones-Bitton et al. (2020) and Daghigh Yazd et al. (2019) assertion that farmers experience higher rates of depression relative to others. In general, the dominance of agriculture and lack of education demonstrate that the participants' socioeconomic prevalence risks of climate change/variability vulnerability and related effects on livelihoods can pose mental health risks.

The present findings corroborate Young et al. (2008), Lawrance et al. (2022), Tschakert et al. (2013) and Jenkins et al. (2018). Young et al. (2008) and Lawrance et al. (2022), concur that the dominance of agriculture, which has been disrupted by the floods coupled with their low level of education, undermines confidence in the way people think about their future livelihood prospects, which can lead to fear and hopelessness causing depressive symptoms. For instance, farmers and fishermen heavily rely on agriculture and trading for their incomes. Adverse climate impacts, such as erratic rainfall patterns, extreme precipitation, and temperatures, significantly affect food crop yields, animal feed, fish stocks, and trading activities (Altieri and Nicholls, 2017). Hence, the heavy dependence on these climate-sensitive occupations magnifies participants' vulnerability to income fluctuations and unstable socioeconomic outcomes of adverse climate, as reported by Tschakert et al. (2013) and Jenkins et al. (2018).

Furthermore, the educational distribution implies that a sizable portion of participants (55%) had no formal education. Having no formal education limits their ability to adopt or adapt to new

TABLE 1 Socio-demographic and economic characteristics of the participants in Yapei.

Socio-demographic and economic attributes of participants		Christian (N = 2)	Muslim (N = 18)	Overall (N = 20)
Age (years)	Minimum	41	30	30
	Maximum	72	70	72
	Average	57	52	52
	Standard deviation	22	11	12
Sex	Female	5%	20%	25%
	Male	5%	70%	75%
Marital status	Married	0%	80%	80%
	Single parent	5%	5%	10%
	Widow	5%	5%	10%
Household status	Head	5%	70%	75%
	Wife	0%	10%	10%
	Other e.g., stepmother	5%	10%	15%
Education (formal)	None	5%	50%	55%
	Junior Secondary	0%	15%	15%
	Senior Secondary	5%	10%	15%
	Tertiary	0%	15%	15%
Occupation	Farmer (e.g., crop and animal farming)	0%	70%	70%
	Trader/Food vendor	5%	5%	10%
	Farmer/Teacher	0%	10%	10%
	Farmer/Fishing/Tailor	0%	5%	10%

technologies and alternative livelihoods to address the adverse climate impacts (Young et al., 2008). Even those with some formal education still face livelihood sustainability challenges when their skill sets mismatch the emerging coping strategies, opportunities, and alternative livelihood measures (Lawrance et al., 2022).

In addition, the observed gender distribution implies that 75% of male participants who engaged in farming might bear a higher burden from climate-related risks in male-headed households than female-headed households. However, female household heads, especially those in agriculture, face the additional challenge of limited access to resources, information, and decision-making power. The gender dynamics of the findings corroborate previous authors like Lawrance et al. (2022) and Berry et al. (2011). Lawrance et al. (2022) and Berry et al. (2011) reported that vulnerable groups of people, experiencing less privileged socioeconomic status and climate-related livelihood losses, face psychological distress and its associated mental health effects.

The observed socioeconomic prevalence risks suggest religious and cultural dimensions. According to Jenkins et al. (2018) and Ives et al. (2020), religious and cultural practices are crucial in communicating climate-related coping strategies and opportunities. In line with Jenkins et al. (2018) and Ives et al. (2020), the religious and cultural practices of the

Muslim-dominated (90%) participants among the few Christians (10%) in the present study underline their coping strategies and opportunities. Furthermore, the prevalence of married participants (80%) highlights that not only are individual livelihoods predisposed, but also the entire family unit. This assertion corroborates Lawrance et al. (2022), who suggest that orphans, widows, and single parents may experience relatively more vulnerabilities due to the prevailing poor social and economic support of the meso and macro-systems associated with the external or climate-related risks in the study area.

In a nutshell, the socioeconomic and demographic attributes of the participants in the current study confirm that exposure to climate-related stressors, such as crop failures, loss of livelihoods, or extreme weather events, can contribute to mental health challenges that can dislodge the overall wellbeing of the participants. These potential impacts on the physiological and mental health of the participants align with (Lawrance et al., 2022). Furthermore, the diversity of primary occupations among the participants underscores the importance of devising diverse coping strategies across occupations. Unequal impacts on occupations require coping strategies to account for the diverse occupational impacts of adverse climate effects (Altieri and Nicholls, 2017). Addressing the observed socioeconomic risks would require a holistic approach, encompassing the intersectionality of education, gender, religion, and family dynamics of the socio-ecological theory, potential

coping strategies, and climate-change resilience interventions in the study area.

4.2 Inability to think clearly

It was found that climate-induced livelihood losses caused dire socio-economic consequences and further resulted in depressive symptoms among participants, particularly men, due to their primary roles as breadwinners. Corrigan et al. (2016) and Livingston and Boyd (2010) previously suggested that stigma results in loss of hope, self-esteem, shame, and disempowerment. The difficulty in providing for families during such distressful situations, i.e., flooding, could result in stigma in a patriarchal society, implicating hopelessness, shame and disempowerment resulting in depressive symptoms. This finding is highlighted in a statement by a man in an in-depth interview.

"I don't think clearly, I always think of how am going to take care of my family...any time I have a poor harvest caused by flood or drought as the family head, the burden on me goes up because I have to provide for the family no matter the situation...life becomes difficult sometimes, even food to eat becomes a problem...this makes me think and think of how to get something to feed my family" (IDI with Participant D, a 50-year-old male farmer, and a family head-A Muslim).

"I remember losing my okro farm to drought last two years, the thought of the losses affected me so much that I never wanted to return to the farm anymore. this farm was an acre. Hmm, the money I had spent on the farm had all gone to waste. This affected my thought, all the pressures in the house affected me such that I could not think properly and straight" (Participant M, a 45-year-old male farmer- Muslim).

The above quotations underscore the significance of fulfilling the traditional role of men as providers for their families. If this role is threatened by climate effects on their farm yields, as alluded to earlier, it might result in a stigma, hopelessness and helplessness that manifest in depression symptoms. The performance of men's roles in their families is a social norm and a practice that must be performed. This defines who a man is within a patriarchal socio-cultural context. Failure to perform this role due to climate-induced livelihood losses undermines self-definition and mental health. This aligns with social-ecological theory, which suggests that an individual's social environments influence one another. In this context, the macrosystem, represented by flood or drought-related crop losses, impacts an individual's functioning abilities. This, in turn, affects their role as the head of the family at the microsystem level, leading to multiple challenges (Young et al., 2008) and subsequently resulting in psychological distress.

It was found that during flood-related yield loss, the cost of farming and the time invested in farming affect women's ability to think clearly. This is revealed by a female farmer in an in-depth interview. She said:

"How can you think properly, when all that you planted is gone, the flood swept everything, all that we put into the farm, the cost of laborers, the land preparation, the seedlings, fertilizer,

hmmm, my sister, it wasn't easy... At the time, someone could be talking to me, but my mind would be far from what the person was saying and was rather thinking about my farm (destroyed)" (Participant N, a 33-year-old female farmer- Muslim).

"In 2018, the floods destroyed our house, foodstuff, and my kitchen. I have three children, and where to sleep was a problem. During that time, I became very disturbed and helpless because even here that we are seated now was flooded and where to cook and feed my family was a challenge, hmm a lot was going on such that we could have a discussion but when you ask me the following day, I wouldn't be able to remember. I was so disturbed in my mind that I could not think properly" (Participant K, a 41-year-old farmer-A Christian).

The quotes from both females (Participant K and Participant N) expressed their inability to think clearly following flood-related disasters on their farms and property, which is common to the experiences of the men in the study area. However, in the case of Participant K, her inability to think straight was heightened due to her inability to perform her duty as a mother and a wife. In this current study, the gendered experiences of depressive symptoms relate to the perceived climate impacts and traditional gender norms and roles, which confirms Clayton et al. (2023). This explains the unique emotional experiences of men and women and why they experience depressive symptoms differently. Similarly, Trumbo et al. (2011) and Lawrance et al. (2022) assert that following disasters, women had a higher tendency to experience mental ill health such as stress, anxiety and depression. Additionally, our study found that both Muslims and Christians experience depressive symptoms following climate disasters equally. This indicates that climate-related depressive symptoms affect individuals regardless of their religious background.

4.3 Poor eating habits/loss of appetite

The thought of yield loss affected participants' appetite. This was confirmed by both male and female farmers during the FGDs. A male farmer said:

"Seasonal floods and droughts are destroying our farm crops, causing us to think so much that when there is food in front of you, you are unable to eat" (Participant F, a male farmer in FGD 1- Muslim).

Another participant said:

"Last year, floods washed away my crops, and the heavy rains also stripped off our roof. Things (life) were not easy for us at all. I lost self-consciousness; even when you asked me about something, my mind was somewhere far from what you were saying. Things became so tough that even when I was eating, I would just put my hands in and out, in and out of the food plate and would not feel like eating, hmm....my sister, it wasn't easy" (Participant E, 38-year-old female farmer, FGD 3-A Muslim).

The quote above suggests that livelihood disruption and associated food crop and income losses affected participants' mental

processes, including loss of appetite. The massive crop losses in the wake of climate disasters (i.e., flooding) present a double jeopardy to women. Choudhury and Haque (2016) and Cutter et al. (2003) assert that gendered vulnerability results from women's pre-existing situatedness of limited access to resources, lack of decision-making power and overall marginalization. The postulates of Choudhury and Haque (2016) and Cutter et al. (2003) implied that not only would participant E and other women suffer the mental health consequences of the loss of their crops, but they would also have to bear the burden of providing food on the table for the family. Women, therefore, are unequally yoked to the effects of climate disasters (Jerin et al., 2022). This is especially so when physical limitations intersect with social processes to cause multifaceted vulnerabilities among women and children in poor communities (Ribot, 2014).

4.4 Sleepless nights

The thought of yield loss and the burden of providing for family dependents leads to sleepless nights, especially during the early weeks of the event. Two men in an in-depth interview (IDI) stated,

"Last two years, for instance, all the things I planted were destroyed by flooding. The first 3 days to one week were challenging times for me. I hardly slept, and I had sleepless nights because of the lost crops, which we depended on for the sale of farm produce to take care of our family and our children, who are in school. Life becomes very tough" (IDI with Participant A, a 65-year-old male farmer- A Christian).

"I was not able to sleep well when I lost my crops to drought the last time. I planted maize and it looked promising. Suddenly, the rain stopped...hmmm, the maize farm did not do well. I had borrowed money to work on the farm. Hmm, at the beginning it was difficult for me to even sleep because I always thought about the losses and how I was going to feed my family" (Participant Y, a 52-year-old male farmer- A Muslim).

The foregoing finding implies that crop yield loss and its associated effects on livelihoods threatened the food and economic security of participants and their role as breadwinners, which subsequently disturbed their sleep. This evidence confirms Doherty (2015) that climate-related effects on lives and livelihoods are often accompanied by mental health conditions, including depression and sleep disruption. Also, Participant A's report of losing his crops 2 years prior highlights the chronicity of floods and the vulnerabilities it engenders as a preexisting condition, as opined by Choudhury and Haque (2016).

4.5 Religious response to depressive symptoms and suicidal ideation

The current study found that suicidal ideation was not pronounced, since to most of the participants, such thought

is forbidden by their religion. This finding contradicts Milner et al. (2013) and Klingelschmidt et al. (2018) report that farmers face a greater risk of suicide compared to other occupations. Rather, religion and faith provided the comfort of hope in such distressing situations. This finding also contradicts some previous studies that have found high levels of suicide attempts because of drought (O'Brien et al., 2014). In this study, it was noted that most men and women expressed no suicidal thoughts during their climate-induced livelihood losses. The evidence of the current finding was emphasized in in-depth interviews as follows:

"Ooh, we don't think of committing suicide, we always give everything to God, when that happens, you believe that it is God who has made it so, so we don't take our lives" (IDI with Participant B, a 55-year-old woman Muslim).

"... Last year I planted maize and the flood destroyed everything. I was worried, but I never thought of killing myself because I harvested nothing. ... I just give it to God and expect that things will be better in the next farming season" (IDI with Participant V, a 62-year-old man and a Muslim).

"I lost my farm to the floods in 2018/2019. I only harvested a few bags. I have a large family size, I have school-going children at the secondary and tertiary levels. Things were hard for me and my family, and I sometimes forget myself, I became absent-minded... I could not think straight because there were so many thoughts going through my mind, but in all, I believed God was going to change the situation. If yesterday was bad, tomorrow will be good" (Participant G, a 68-year-old male Farmer and a retired teacher- Christian).

"At the beginning, it was difficult for me to sleep because I always thought about the losses and how I was going to feed my family and bounce back... umm I believe that things will change and get better" (Participant Y, a 52-year-old male farmer-Muslim).

These statements (quotes) suggest that experiences of climate-induced impact on crop yield losses largely do not lead to suicidal ideation. On the contrary, Carleton (2017) shows that higher temperatures during the agricultural farming season considerably increase yearly suicide rates among Indian farmers. However, in this research, participants who were affected by yield loss leaned on their faith for strength to endure such situations rather than contemplate suicide. Our participants conceptualized God as a source of support that can change difficult situations and relieve distress (Levine, 2008). This suggests that religiosity and faith during distress situations are important resources that help both Muslims and Christians to build resilience and hope, even though they all belong to different faiths. Similarly, Pabee (1992) states that religion is important to the people of Ghana even though the country is secular.

The findings of the current study imply that religiosity and faith were important concepts that participants relied upon to deal with suicidal ideation and other depressive symptoms. Some participants shared experiences of passive suicidal thoughts from the repercussions of flooding and droughts that left them helpless. Some male farmers complained of developing suicidal thoughts after being left incapable of paying back loans invested in farms

destroyed by flooding or droughts, emanating from climate change events in Ghana. The study findings corroborate [Hanigan and Chaston \(2022\)](#), who reported that the likelihood of livelihood loss-related suicide is higher for men than women. The development of suicidal thoughts by the male respondents in the present study is therefore consistent with international literature, with a new dimension from the people of Yapei in the Gonja district of Ghana.

In general, the findings of this paper suggest that climate change impacts the livelihood sustenance of farm households in Yapei. Climate events negatively impact the livelihoods and mental health of the people. Farmers' experiences of climate events such as irregular rainfall, droughts, and flooding affected their crops, food, and income sources. The livelihoods of farmers and those in the off-farm agricultural value chain are affected by climate change impacts. These findings confirm [Altieri and Nicholls \(2017\)](#), which indicate that the livelihoods of rural folks are getting more vulnerable because rain-fed agriculture is facing a compelling threat of climate change impact, which is bound to reduce crop production. Contrary to [O'Brien et al. \(2014\)](#), who found droughts to be the leading cause of suicide among farmers, the current study suggests otherwise. Religious faith and belief can alleviate distressing situations ([Levine, 2008](#)). The farmers in the current study who experienced depressive symptoms, such as impaired thought, appetite, and sleep patterns, believed in God that the situation could improve. Suicidal thoughts were rare due to their strong religious faith and belief, which serve as an important resource for dispelling suicidal thoughts and overcoming challenging situations. The strong religious beliefs of farmers in this study underscore the importance of interaction between farmers and religious institutions in coping with climate-related depression. These interactions reflect the interconnected systems described in Bronfenbrenner's social ecological theory. By engaging with places of worship like mosques and churches, farmers strengthen their faith and belief and develop a sense of hope that difficult situations are temporary. This faith becomes a crucial coping mechanism, helping them manage the emotional and psychological distress caused by climate impacts ([Adu and Oudshoorn, 2020](#)).

The low level of suicidal ideation does not negate the huge mental health treatment gap. As was earlier reported, the mental healthcare gap in Ghana indicates the percentage (95% and 98%) of individuals with mental health conditions who did not receive any treatment in a previous 12-month period ([Eaton and Ohene, 2016](#)). More recent findings from a health facility case detection survey and situational analysis of mental health services in three districts in Ghana reported a care gap between 94 and 99% ([Ag-Ngibise et al., 2023](#); [Weobong et al., 2023](#)). In other words, the current study provides evidence that religiosity has become a mechanism that helps affected people cope with climate-induced suicidal ideation without the need for treatment.

5 Limitations

The study acknowledges the limitations of the subjective and localized qualitative research methods, limiting the generalizability

and applicability of the study findings to people having different experiences and natural settings ([Creswell, 2013](#)). Hence, the depressive symptoms were only interpreted from the perceived experiences of participants. Although we talk about faith-based, the predominant faith in our study area is Islam. Additionally, the voices of women were not reflected much because of the patriarchal nature of our study area. Future studies must therefore endeavor to incorporate diverse faiths and women's voices.

6 Conclusion

This paper highlighted climate change-induced depressive symptoms among farmers in Yapei. It was found that both male and female farmers experience depressive symptoms from the effects of climate change (floods and droughts). The observed depressive symptoms were more prevalent among male farmers than female farmers because of men's role as household heads in their families. Yield losses and related socio-economic consequences of climate change affected clear thought, appetite, and disturbed sleep patterns of farmers. Extreme cases could trigger suicidal thoughts. The strong religious beliefs shielded the farmers from pondering suicide as well as dealing with other depressive symptoms. Faith and hope in God (both Muslims and Christians) provide resilience to climate-induced depressive symptoms.

As already clarified, the entanglement between religion and climate change effects straddles many domains. Nevertheless, of particular significance to this study is the nexus between religion and climate-induced psychological/mental distress. Here, we have shown how religious beliefs serve as a coping mechanism. The policy implication of our findings is two-fold: (1) mainstreaming religious beliefs in climate change and climate adaptation public education; and (2) developing context-specific faith-based interventions to help communities, especially those in poor-resource settings, to ameliorate the mental health sequelae of climate change.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Ethics Committee for Humanities, University of Ghana. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

SO-Y: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Validation, Writing – original draft, Writing – review & editing. AA: Investigation, Validation, Writing – review & editing. ED: Formal analysis, Project administration, Validation, Writing – review & editing.

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Appendix A: Interview guide

This study is conducted to investigate “Religion as a coping strategy to climate-induced depressive symptoms among farmers in Yapei in Ghana’s Savannah region.” Your identities and responses will be confidential and anonymous and only for academic purposes.

Name of community

Region

Socio-economic and demographic characteristics of participants

1. Name/Identifier
2. Age:
3. Religion:
4. Gender:
5. Educational Level:
6. Occupation:
7. Marital Status:

Knowledge/perception of climate change

8. What have been the changes in temperature and or rainfall in this community (probe: pattern of change in temperature/rainfall)?

Impact of climate change

10. What have been your experiences of flooding and or droughts in this community? (Probe: frequency, severity and changing patterns over time).
11. How have you been affected by flooding and or droughts? (Probe: livelihood, property etc).

Symptoms of depression in participants

14. Have your feelings/emotions been positively/negatively affected by having experienced the effect of droughts and or flooding?
15. How have your feelings/emotions been affected having experienced the effect of droughts and or droughts (Probe for thinking ability, eating habits, sleeping pattern and suicidal thoughts)
(Probe for ways of responding to the feelings/emotions indicated).