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Research Paper

Impact of Climate-Driven Hydrometeorological Disasters and Distress on Mental Health and Emotional Wellbeing of Farmers

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ABSTRACT

Climate change is intensifying hydrometeorological disasters, with droughts and floods emerging as dominant yet contrasting extremes that shape mental health outcomes. Droughts, as slow and creeping crises, progressively undermine livelihoods, food and water security, and social stability, particularly in agrarian regions. These prolonged stressors are linked to increased anxiety, depression, eco anxiety, and suicide risk. In contrast, floods act as rapid shocks that cause sudden displacement, loss of property and livelihood, and prolonged recovery, often leading to post traumatic stress disorder (PTSD), depression, grief, and emotional distress. These burdens disproportionately affect vulnerable populations, especially farmers. Psychological distress frequently persists beyond physical recovery, highlighting the urgent need to integrate mental health into climate adaptation, disaster risk reduction, and public health responses.

Keywords: *Drought, Farmers' Mental Health, PTSD, Flood*

Climate change has intensified the frequency, duration, and severity of hydrometeorological disasters, particularly droughts and floods, posing escalating risks to climate sensitive sectors such as agriculture (IPCC, 2022; FAO, 2021). For farmers, livelihood is closely tied to seasonal rhythms, rainfall patterns, and soil health. Changes in climate therefore do not remain distant environmental processes but become part of everyday experience, shaping farming decisions, household stability, and community survival. A delayed monsoon, an unexpected dry spell, or a river overflowing beyond its banks can unravel months of labour and years of investment within days. In this context, climate extremes represent more than environmental disturbances. They threaten economic security, occupational identity, intergenerational continuity, and the cohesion of rural communities. Beyond the visible physical and financial losses, these disasters increase the likelihood of adverse mental health outcomes, including severe post traumatic psychopathologies (Keya *et al*., 2023). The resulting strain on physical and economic resources can also contribute to stress, anxiety, depression, and other psychological challenges (Garrett Wright *et al*., 2023; Sanne *et al.*, 2004).

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Drought as a slow developing psychological stressor

Drought is widely recognised as a slow developing disaster that can produce significant health effects through environmental, economic, and social pathways (King *et al*., 2009; Vins *et al*., 2015). Unlike sudden disasters, drought gradually enters daily life. Wells run dry, crops slowly wither, debts accumulate quietly, and hope about the future begins to erode. The prolonged uncertainty surrounding rainfall and harvest outcomes undermines farmers' sense of control and their ability to plan ahead. Over time, this sustained strain generates chronic stress, emotional exhaustion, and feelings of helplessness. Empirical evidence has consistently linked repeated drought exposure with elevated levels of psychological distress, depression, and suicide risk among farming populations (Hanigan *et al*., 2012; Vins *et al*., 2015). The psychological toll of drought is often intensified by the fact that its impacts are less visible than those of sudden disasters. Distress frequently remains hidden within rural cultures that value endurance and resilience. Scholars also recognise that drought can take multiple forms depending on the processes and impacts involved. These are commonly classified as hydrological, meteorological, agricultural, and ecological drought (Douville, 2021). Such distinctions highlight the complex ways in which water scarcity affects agricultural systems and the wellbeing of the communities that depend on them.

Floods as sudden and traumatic environmental shocks

In contrast to drought, floods represent rapid onset disasters that disrupt landscapes and livelihoods with little warning. Floods are the most common type of disaster globally and have been responsible for nearly 53,000 deaths in the past decade, with a disproportionate impact on low-income countries (Alderman *et al*., 2012). Climate change is expected to increase both the frequency and intensity of flooding events due to rising sea levels and more extreme precipitation patterns (Ramin and McMichael, 2009). The health consequences of floods are diverse. They include deaths, injuries, infectious diseases, toxic contamination, and various mental health problems (Ahern *et al*., 2005). Within hours, homes may be submerged, livestock lost, farmland destroyed, and families displaced from their communities. Although the immediate devastation of floods is widely documented, the long-term psychological consequences often receive less attention. Lamond et al., (2015) noted that the enduring emotional effects of flood related trauma and memories of damage and loss remain insufficiently studied. This gap is particularly important for communities that experience repeated flooding, where persistent mental health problems may weaken resilience and reduce the capacity to cope with future disasters. Research has shown that the most common mental health conditions following floods include PTSD, depression, and anxiety (Liu *et al*., 2006; Mason *et al.*, 2010; Norris *et al*., 2005). Exposure to flooding events has also been associated with heightened risks of PTSD, anxiety, depression, and sustained emotional disturbance (Alderman et al., 2012).

Overlapping and compounding climate risks

Although droughts and floods differ in their speed and manifestation, both disasters produce complex and overlapping mental health burdens within agricultural communities. Drought gradually erodes resilience through prolonged uncertainty and economic pressure, while floods introduce sudden trauma, loss, and displacement. Drought can also coincide with additional hazards such as heat waves and wildfires, creating layered environmental stressors (Gillingham, 2023). Similarly, floods often produce cascading impacts that extend beyond the immediate disaster. Farmers may experience depression and anxiety following crop losses or

damage to property (Fraser *et al*., 2005). Other mental health consequences associated with drought and flooding include PTSD, suicide, social isolation, and persistent stress related to financial loss or failure to meet contractual obligations (Rural mental health: government response to the committee's fourth report, 2023; Austin *et al*., 2018; Review of the research and scientific understanding of drought: summary report, 2025). Increasing climate variability means that some regions now experience cycles of prolonged drought followed by intense rainfall. Such sequences reduce recovery time between disasters and intensify the psychological burden on farming households. These creeping drought conditions and acute flood disasters therefore create distinct yet interconnected patterns of psychological stress within agrarian communities (Tannehill, 1947; Wilhite and Glantz, 1985; Cavalcante, 2023; Blake *et al*., 2025).

Socioeconomic vulnerabilities of farming communities

Farmers face a set of structural vulnerabilities that amplify the mental health impacts of climate extremes. Agricultural livelihoods are directly dependent on climate sensitive production systems, meaning environmental shocks often translate immediately into financial instability, crop failure, and rising debt. In rural India, extremes in water availability, whether severe drought or excessive rainfall, have been identified as important environmental drivers of suicide among farming populations. Rural isolation and limited access to mental health services further restrict opportunities for early intervention and support. Cultural norms that emphasise self-reliance and endurance may also discourage individuals from seeking help, reinforcing stigma around mental health challenges. In many farming communities, existing pressures such as fluctuating market prices, limited access to crop insurance, and insufficient institutional support already create fragile economic conditions. When climatic disasters occur, these underlying vulnerabilities intensify farmers' experiences of uncertainty, stress, and psychological strain.

Environmental loss, identity, and emotional distress

The distress associated with climate change often extends beyond financial hardship. For many farmers, land represents more than a productive resource. It forms part of their identity, heritage, and sense of belonging within a particular landscape. When droughts, floods, or other climate extremes alter or degrade that landscape, farmers may experience a form of emotional distress known as solastalgia. This term describes the grief and psychological discomfort felt when one's home environment undergoes unwanted transformation. For individuals whose sense of self is closely connected to farming traditions and ancestral land, environmental degradation can feel like a personal loss. Such experiences may generate grief, anger, and identity disruption. Emerging research suggests that these climate related psychological impacts are persistent and cumulative, yet they remain insufficiently integrated into disaster risk reduction and climate resilience planning (Berry *et al*., 2010; Cunsolo and Ellis, 2018).

Research gap and purpose of the study

Despite growing research on climate change and mental health, relatively few syntheses focus specifically on farmers. Farming communities occupy a unique socio-economic position where livelihood dependence, cultural identity, and environmental exposure intersect, making them particularly vulnerable to both ecological and psychological harm.

Addressing this gap is essential for developing equitable climate adaptation strategies and effective support systems for rural populations. This article therefore systematically reviews current evidence on the mental health impacts of droughts and floods among farming communities. By examining these two distinct but interconnected hazards, the study highlights the importance of integrating context sensitive mental health support into broader climate adaptation, agricultural policy, and resilience planning frameworks.

Significance of the study

The study explores a pressing issue related to farmer mental health issues from 2004 to 2025 as one of the most important public health crises with social and economic consequences. To be able to develop effective prevention strategies, we need to understand the root cause of these behaviours**.**

MATERIALS AND METHODS

Search strategy

A systematic literature search was conducted during January and February using multiple electronic databases, including Scopus, PubMed, PsycINFO, Web of Science, IWA Publishing, Cureus, EcoHealth, MDPI, JMIR Publications, ResearchGate, and Google Scholar. The objective was to identify peer-reviewed studies examining the mental health impacts of climate change–related hydrometeorological disasters, particularly droughts and floods, on farmers and rural populations. Each database was systematically searched using combinations of keywords and Boolean operators. The primary search string used was:

("climate change" AND ("drought" OR "flood") AND "farmers") AND ("mental health" OR "depression" OR "suicide" OR "anxiety" OR "PTSD" OR "emotional distress" OR "psychological distress" OR "eco-anxiety" OR "emotional wellbeing").

Reference lists of selected articles were also examined to identify additional relevant studies.

Inclusion criteria

Studies were included if they met the following criteria:

1. Published in peer-reviewed journals;
2. Published between 2004 and 2025;
3. Contained the specified keywords in the title and throughout the text;
4. Examined droughts or floods as exposure variables;
5. Reported at least one mental health outcome as a primary outcome measure (e.g., posttraumatic stress disorder [PTSD], depression, anxiety, suicide, emotional distress, psychological distress, or eco-anxiety).

The selection process followed predefined screening criteria adapted from established review methodologies (Khan et al., 2003). Particular emphasis was placed on studies involving agricultural and rural communities whose livelihoods are directly influenced by climatic variability.

Exclusion criteria

Review articles were excluded unless they offered substantial new empirical insights. Publications not written in English were also excluded from the review.

Data characteristics

Floods and droughts were treated as the primary exposure factors. Mental health conditions including PTSD, depression, anxiety, suicide, emotional distress, psychological distress, and eco-anxiety were considered outcome variables. The final set of included studies represented diverse geographic contexts across Asia, Africa, Europe and the Americas.

RESULTS

Drought, psychological distress, and suicide risk

Across geographic contexts, drought emerged as a chronic and deeply personal stressor that gradually erodes farmers' psychological wellbeing. In rural New South Wales, suicide risk increased by 15 percent among rural males aged 30 to 49 during severe droughts, while risk declined among rural females over 30 (Hanigan *et al*., 2012). In Victoria, farming suicides accounted for over 3 percent of all suicides between 2001 and 2007, with drought identified as a primary stressor (Guiney, 2012). Psychological autopsy research identified two pathways to suicide among male farmers: an acute situational pathway triggered by financial crises often linked to drought related losses, and a protracted pathway involving longstanding psychiatric illness, where climate induced economic shocks frequently acted as immediate triggers (Kunde *et al*., 2017).

In India, similar patterns were evident. State level analyses showed that frequent drought significantly increased farmer suicides, particularly in economically poorer states. A one unit rise in rural poverty was associated with a 2.89 percent increase in suicides during frequent drought conditions (Parida *et al*., 2018). The agrarian crisis of 2014 reflects this pattern, as small and marginal farmers accounted for 72.4 percent of total farmer suicides, with a high concentration in Maharashtra (Patnayak, 2023). Drought not only has an adverse impact on rice yields in India, but also results in farmer suicides due to the resultant income loss from crop failures over the years (Mishra, 2006; Sridhar, 2006; Vaidyanathan 2006; Dongre and Deshmukh, 2012; Birthal *et al*., 2015).

Large scale survey research in rural Australia further confirmed that greater drought severity and agricultural loss were associated with higher psychological distress among farmers and farm workers, while non-agricultural workers experienced comparatively limited impact (Edwards *et al*., 2015). Younger farmers, those living and working on farms, financially insecure individuals, and residents of remote regions were particularly vulnerable (Austin *et al*., 2018). Qualitative findings described environmentally produced distress, avoidance behaviours, and intense drought related worry, especially among farmers with strong attachment to land and farming identity (Sartore *et al*., 2008; Stain *et al*., 2011).

Identity disruption and sense of place

Beyond financial strain, drought disrupted farmers' sense of identity and belonging. In the Western Australian Wheatbelt, changing weather patterns intensified anxiety and generated cumulative place-based distress, increasing perceived risks of depression and suicide (Ellis

and Albrecht, 2017). Similarly, survey data from 837 farmers in Ohio demonstrated that exposure to extreme weather threatened the good farmer identity, reinforcing chronic stress through uncertainty and perceived loss of control (Linder *et al*., 2025).

Attachment to land functioned as a double-edged influence. While a strong sense of place provided meaning and continuity, it was also associated with elevated drought related worry (Stain *et al*., 2011). These findings suggest that climate stressors do not only undermine livelihoods but also challenge deeply rooted occupational pride, cultural identity, and emotional bonds with the land.

Floods, trauma, and post-traumatic stress (PTS)

In contrast to the gradual strain of drought, floods and cyclones were more strongly associated with sudden psychological shock and trauma. Following the floods in Kerala during 2018 and 2019, 74 percent of surveyed farmers showed symptoms of PTSD, with higher prevalence in interior districts than in coastal areas. Resilience was strongly and negatively correlated with PTSD severity, indicating its protective role (Jose and Fenn, 2021). Six months after the 2014 floods in Kashmir, high rates of PTSD and severe depression were reported among affected adults (Fatima and Maqbool, 2017).

In coastal Bangladesh, communities exposed to cyclones such as Sidr and Aila reported elevated psychological distress, traumatic stress, anxiety, sleep disturbances, and suicidal ideation months after the events (Kabir *et al*., 2016; Hasan *et al*., 2020). Prolonged waterlogging also imposed a heavy emotional burden. Almost all surveyed farmers reported persistent worry, and anxiety was especially pronounced among those facing extended annual flooding (Kabir and Islam, 2024).

Urban agrarian populations showed comparable vulnerability. After the 2023 floods of the Yamuna in Delhi, affected farmers described trauma responses, anxiety, depressive symptoms, and ongoing financial insecurity, with notable gender differences in perceived risk and coping strategies (Verma *et al*., 2025). In Ghana, nearly half of surveyed urban crop farmers reported psychological distress following flood induced farm destruction (Owusu *et al*., 2025).

Socioeconomic vulnerability and poverty pathways

Both drought and flood impacts were consistently shaped by poverty and livelihood insecurity. In India, rural poverty amplified suicide risk during both frequent drought, which showed a 2.89 percent increase, and moderate floods, which showed a 3.52 percent increase (Parida et al., 2018). In Benin, farmers affected by the 2012 floods were among the poorest in the region, and 99 percent reported reduced happiness after the disaster. Poverty was strongly influenced by farmland loss, household size, and limited access to secondary income sources (Bonou *et al*., 2024).

Importantly, the severity of flood damage did not always predict PTSD levels (Manu Jose and Fenn, 2021), suggesting that economic insecurity, prolonged exposure, and limited adaptive capacity may matter more than hazard magnitude alone. Across contexts, climatic shocks reinforced a vicious cycle of debt and long-term financial trauma (Shree and Gowda, 2024).

Structural barriers and help seeking

Mental health outcomes were further influenced by access to services and social attitudes toward help seeking. In rural South Australia, growers described how uncontrollable stressors, including drought, financial hardship, and market pressures, undermined psychological wellbeing and discouraged engagement with professional support (Staniford *et al*., 2009). Similar patterns of limited rural mental health services and persistent stigma were observed in farming communities in the United States (Linder *et al.*, 2025).

DISCUSSION

This synthesis highlights distinct yet interconnected mental health pathways associated with drought and flood exposure. Drought functions as a slow moving and cumulative stressor that gradually wears down psychological wellbeing through repeated production loss, debt accumulation, and disruption of identity. Suicide risk appears particularly elevated among working age male farmers, especially in settings marked by rural poverty and limited livelihood diversification. Floods and cyclones, by contrast, produce immediate trauma responses characterized by high rates of PTSD, depression, and anxiety. However, when flooding becomes recurrent or prolonged, such as in cases of chronic waterlogging, it may shift from a sudden shock to a sustained stressor with long term economic and psychological consequences similar to drought. Across both hazard types, socioeconomic vulnerability consistently shapes outcomes. Poverty, financial insecurity, small landholdings, and limited secondary income sources intensify mental health risks. At the same time, threats to occupational identity and sense of place deepen emotional distress, indicating that climate impacts are not only economic but also existential.

Resilience and community connectedness emerge as important protective factors, while stigma and limited rural mental health infrastructure constrain adaptive responses. Together, these findings underscore the need for integrated disaster risk reduction strategies that combine livelihood protection, poverty alleviation, and culturally responsive mental health services tailored specifically to the lived realities of farming communities.

CONCLUSION

1. Climate driven droughts, floods, and cyclones do not only damage crops and infrastructure; they leave deep emotional scars on the farmers who depend on the land for their identity, livelihood, and family survival.
2. Drought slowly wears people down. Season after season of uncertainty, crop loss, and mounting debt can lead to anxiety, depression, hopelessness, and, in some cases, suicide.
3. Floods and cyclones often strike suddenly, bringing shock and trauma. Many farmers experience intense fear, sleep disturbances, anxiety, and PTS. When floods become recurrent or waterlogging persists, this distress can linger and turn into long term exhaustion and insecurity.
4. These psychological burdens are not evenly distributed. Small and marginal farmers, younger cultivators, financially struggling households, and those living in remote areas often carry the heaviest weight.
5. Financial instability, debt cycles, and unstable markets magnify emotional strain. At the same time, farmers' deep attachment to their land and their identity as capable stewards intensify the pain when environmental change disrupts their way of life.

6. Stigma around mental health and limited access to rural services prevent many farmers from seeking support, even when they are overwhelmed.
7. Protecting farmers' mental health is not optional or secondary. It is essential for sustaining agriculture, strengthening resilience, and ensuring long term food security.

RECOMMENDATIONS

1. Mental health should be treated as a core part of climate adaptation and disaster risk reduction efforts, not as an afterthought once physical damage has been repaired.
2. Agricultural extension services should become trusted entry points for emotional support by integrating mental health screening, referral systems, and trained professionals into routine farmer engagement.
3. Insurance and compensation programs should extend beyond crop loss to include access to counselling, stress management support, and wellbeing recovery services.
4. Governments should strengthen social protection measures such as debt relief, income stabilization, and livelihood diversification so that financial shocks do not spiral into psychological crises.
5. Early outreach systems should be activated when drought conditions or flood warnings emerge, offering information, community check ins, and preventive support before distress escalates.
6. Public awareness initiatives should normalize conversations about stress, validate farmers' lived experiences, and reduce stigma so that seeking help feels acceptable and safe.
7. Community based programs should nurture peer networks, farmer support groups, and local solidarity, recognizing that social connectedness is a powerful buffer against despair.
8. Support strategies should recognize that men and women may express distress differently and engage with help in different ways. Tailoring interventions to these differences can make support more accessible and meaningful.
9. Urban farmers and resource poor cultivators in flood prone areas need targeted programs that combine livelihood recovery with trauma informed care.
10. Ultimately, strengthening climate resilience requires investing not only in seeds, irrigation, and infrastructure, but also in the emotional wellbeing of the people who cultivate the land. When farmers feel supported, valued, and mentally strong, they are better able to adapt, endure, and sustain the agricultural systems on which societies depend.

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Conflict of Interest
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