

A systematic review of the impact of flooding on mental health outcomes among diverse populations in Nigeria

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Abstract

Flooding represents the most recurrent and devastating natural hazard in Nigeria, affecting millions of individuals annually with consequences that extend beyond physical destruction to profound psychological impairment. Despite the escalating frequency and severity of flood events, the mental health dimensions of flooding remain systematically under-researched and under-prioritized within Nigerian disaster response frameworks. This systematic review aimed to synthesise existing evidence on the mental health outcomes associated with flooding among diverse populations in Nigeria. A comprehensive search of Scopus, PubMed, ScienceDirect, Springer, AJOL, and BMC databases was conducted for peer-reviewed studies published between 2015 and 2026. Risk of bias was assessed using the Mixed Methods Appraisal Tool. Data were synthesised using thematic analysis. Twelve studies met the inclusion criteria, spanning populations including internally displaced persons, children, farmers, elderly individuals, and community residents across multiple Nigerian states. The evidence consistently demonstrated elevated prevalence of post-traumatic stress disorder, depression, anxiety, and general psychological distress among flood-affected populations. Key determinants included displacement status, property loss, gender, age, educational attainment, and social support availability. Flooding in Nigeria is associated with a significant and multifaceted mental health burden across diverse population subgroups. The evidence underscores the urgent necessity for integrating mental health and psychosocial support into national disaster preparedness and response frameworks. Targeted interventions for vulnerable groups, including children, women, and the elderly, are essential components of comprehensive flood response strategies.

Key words: flooding, mental health, outcomes, diverse, populations, Nigeria.

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Introduction

Global burden of flooding and mental health

Flooding constitutes the most frequent and widespread natural hazard globally, accounting for approximately 47% of all weather-related disasters over the past two decades.¹ The World Health Organization estimates that floods affected over 2 billion people worldwide between 1998 and 2017, with disproportionate impacts concentrated in low- and middle-income countries where adaptive capacity remains constrained.² The global literature consistently demonstrates that flooding extends far beyond immediate mortality and physical injury, generating enduring psychological sequelae that may persist for years following the initial event.³ Research conducted across multiple continents has established that flood-affected populations experience elevated rates of post-traumatic stress disorder (PTSD), major depressive disorder, generalized anxiety disorder, and non-specific psychological distress.⁴ A meta-analysis of disaster-related mental health outcomes reported pooled PTSD prevalence of 15.9% and depression prevalence of 17.3% among flood survivors globally.⁵ Children exposed to flooding exhibit heightened vul-

nerability, with studies documenting increased rates of emotional and behavioral difficulties, sleep disturbances, and academic impairment following flood events.⁶ Elderly populations similarly demonstrate elevated risk profiles, with pre-existing physical comorbidities and social isolation compounding psychological vulnerability.⁷

The pathways linking flood exposure to adverse mental health outcomes operate through multiple interconnected mechanisms. Direct trauma exposure during the flood event, including life-threatening experiences and witnessing destruction, constitutes a primary pathway to PTSD development.⁸ Secondary stressors, including displacement, loss of livelihood, property damage, and disruption of social networks, generate chronic psychological strain that precipitates depression and anxiety disorders.⁹ The loss of place attachment and community cohesion further erodes psychological resilience, particularly among populations with strong cultural and ancestral ties to affected lands.¹⁰ Despite the substantial global evidence base, significant geographical disparities characterize the flood-mental health literature. The majority of studies originate from high-income countries in North America, Europe, and Australasia, with comparatively limited evidence from sub-Saharan Africa, where flood vulnerability intersects with poverty,

inadequate infrastructure, and overstretched health systems.¹¹ This evidence gap constrains the development of contextually appropriate mental health interventions for the populations bearing the greatest flood burden.¹² Importantly, the underrepresentation of African settings may also reflect structural research inequities, including limited funding for disaster mental health research, publication bias favoring high-income settings, and weak surveillance systems for post-disaster psychological outcomes in low-resource environments.

The Nigerian flood context

Nigeria confronts an escalating flood crisis that has intensified markedly over the past decade. The country's geographical location within the Niger and Benue River basins, combined with inadequate drainage infrastructure, unregulated urban expansion, and climate change-induced precipitation variability, has rendered large portions of the population perennially vulnerable to flooding.¹³ The 2012 floods affected approximately 7.7 million people across 34 of Nigeria's 36 states, causing 363 deaths and displacing 2.3 million individuals.¹⁴ In 2022, Nigeria experienced its most severe flooding in a decade, with the National Emergency Management Agency reporting 603 fatalities, over 1.4 million persons displaced, and extensive damage to homes, farmlands, and critical infrastructure.¹⁵ The 2024 floods further compounded this trajectory, affecting over 5.2 million individuals and displacing 1.2 million people across 35 states.¹⁶

The Nigerian flood burden is not merely a function of meteorological factors but reflects deeper structural vulnerabilities. Rapid urbanization without corresponding infrastructure development has produced extensive informal settlements in flood-prone areas, particularly in coastal cities such as Lagos, Port Harcourt, and Warri.¹⁷ Deforestation and land-use changes have altered hydrological patterns, increasing runoff and reducing natural flood attenuation capacity.¹⁸ The release of water from dams, notably the Lagdo Dam in Cameroon, has triggered recurrent downstream flooding in states along the Benue River, including Adamawa, Taraba, Benue, and Kogi.¹⁹ Climate projections indicate that precipitation intensity and flood frequency in the Niger Basin will increase through the twenty-first century, suggesting that the mental health burden associated with flooding will escalate without substantial adaptation investments.²⁰

Mental health infrastructure in Nigeria

Nigeria's mental health infrastructure remains critically inadequate to address existing population needs, let alone the additional burden imposed by recurrent flooding. The country has fewer than 300 psychiatrists serving a population exceeding 220 million, representing a ratio of approximately 0.15 psychiatrists per 100,000 population, compared to the global median of 2.0 per 100,000.²¹ Mental health services are concentrated in tertiary facilities in urban centers, leaving the predominantly rural populations most vulnerable to flooding with severely limited access to psychological care.²² The National Mental Health Act (2023) represents a landmark legislative advancement, yet implementation remains nascent and integration of mental health into disaster preparedness and response systems is not yet operationalized.²³ Post-disaster response in Nigeria continues to prioritize food security, shelter, water, and sanitation, with limited incorporation of structured psychosocial interventions.²⁴ This reflects a broader global pattern of the marginalization of mental health in disaster response frame-

works.²⁵ However, evidence indicates that untreated post-disaster mental health conditions contribute to long-term functional impairment, reduced productivity, and increased health system burden.²⁶

Rationale for the review

The confluence of escalating flood frequency, extensive population exposure, and inadequate mental health infrastructure creates a compelling imperative for systematic synthesis of the available evidence on flooding-related mental health outcomes in Nigeria. While individual studies have examined specific populations and outcomes, no systematic review to date has comprehensively mapped the evidence landscape across Nigeria's diverse flood-affected populations. Existing reviews have either adopted a pan-African scope or focused on narrow subpopulations such as children or internally displaced persons (IDPs), limiting Nigeria-specific synthesis and policy relevance.^{27,28} Furthermore, there is limited consolidation of intervention evidence and implementation feasibility within Nigerian health and disaster systems. Understanding patterns of mental health outcomes across population subgroups is essential for identifying inequities in vulnerability and guiding resource allocation. Equally important is the translation of evidence into scalable, culturally appropriate, and health system-integrated interventions.

Objectives of the study

The primary objective of this systematic review was to synthesize the available peer-reviewed evidence on mental health outcomes associated with flooding among diverse populations in Nigeria. The secondary objectives were i) to identify the range and prevalence of mental health conditions documented among flood-affected populations in Nigeria, including PTSD, depression, anxiety, and general psychological distress; ii) to examine the demographic, socioeconomic, and contextual factors associated with differential vulnerability to adverse mental health outcomes following flood exposure; iii) to identify thematic patterns in the lived experience of psychological distress among flood-affected Nigerians as documented in qualitative and mixed-methods studies; iv) to evaluate the methodological quality and risk of bias in the existing evidence base; v) to delineate critical research gaps and provide recommendations for future investigation and policy development.

Methods

Study design

A systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement.²⁹ Given the anticipated heterogeneity in study designs, populations, and outcome measures, a narrative thematic synthesis approach was adopted rather than meta-analysis.

Information sources

A comprehensive search was conducted across Scopus, PubMed (MEDLINE), ScienceDirect, SpringerLink, BMC, and AJOL for articles published between January 2015 and January 2026. Reference lists of included studies were also screened. Grey literature (including government reports, non-governmental organization (NGO) reports, dissertations, and policy briefs) was

excluded to ensure methodological consistency and peer-review verification, although this may limit comprehensiveness and introduce publication bias.

Search strategy

The search strategy combined terms related to three conceptual domains: (i) flooding and flood-related disasters, (ii) mental health outcomes, and (iii) Nigeria. Boolean operators were employed as follows: (“flood” OR “flooding” OR “flood disaster” OR “climate-induced flooding”) AND (“mental health” OR “psychological distress” OR “PTSD” OR “post-traumatic stress” OR “depression” OR “anxiety” OR “psychological well-being” OR “psychosocial”) AND (“Nigeria” OR “Nigerian”). Database-specific filters were applied where available to restrict results to articles published between January 2015 and January 2026. No language restrictions were applied.

Eligibility criteria

Inclusion criteria

Inclusion criteria included peer-reviewed quantitative, qualitative, mixed-methods, quasi-experimental, and randomized controlled trial (RCT) designs involving flood-affected populations in Nigeria with reported mental health outcomes (PTSD, depression, anxiety, psychological distress, coping, or well-being) published between January 2015 and January 2026.

Exclusion criteria

Exclusion criteria included reviews, commentaries, non-Nigeria studies, non-flood exposures, non-mental health outcomes, grey literature, conference abstracts, and non-English publications without translation.

Risk of bias assessment

Mixed methods appraisal tool (MMAT) (2018) was used to assess methodological quality across quantitative, qualitative, and mixed-methods studies.³⁰ Studies were categorized as high, moderate, or low quality based on fulfillment of MMAT criteria. *Supplementary Table 1* presents the risk of bias assessment score of the included studies.

Study selection

Title and abstract screening were conducted independently by two reviewers against the eligibility criteria. Full-text articles of potentially eligible studies were retrieved and independently assessed. Discrepancies were resolved through consensus discussion. The study selection process is documented in the PRISMA flow diagram (Figure 1).

Data extraction and synthesis approach

A standardized data extraction form was developed and piloted on three included studies. Extracted information included authors

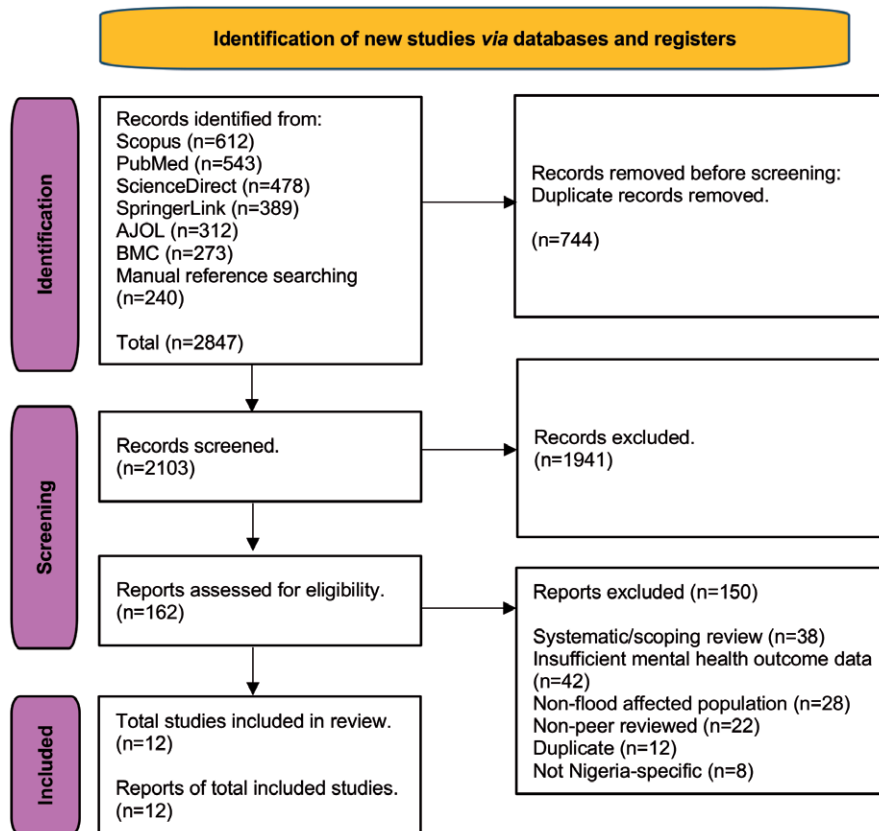


Figure 1. Diagram of the PRISMA 2020 Process for Systematic Reviews and Meta-Analyses.

and year, study objectives, study design, study setting and sample characteristics, flood events examined, mental health measures employed, key findings, and conclusions. Due to substantial methodological heterogeneity across studies, a thematic synthesis approach was adopted. Findings were organized into descriptive themes that captured recurring patterns across studies, followed by development of analytical themes addressing the review objectives.

Screening procedure

Records identified through database searching (n=2847): Scopus (n=612), PubMed (n=543), ScienceDirect (n=478), SpringerLink (n=389), AJOL (n=312), BMC (n=273), manual reference searching (n=240); records after duplicates removed (n=744); records screened (title/abstract) (n=2103); records excluded (n=1941); full-text articles assessed for eligibility (n=162); full-text articles excluded (n=150): systematic/scoping reviews: 38, insufficient mental health outcome data: 42, population not flood-affected: 28, non-peer-reviewed: 22, duplicate reporting: 12, not Nigeria-specific: 8; studies included in qualitative synthesis (n=12). Figure 1 presents the selection and screening procedure of the included studies.

Quality appraisal

Quality appraisal of the included studies was performed using the MMAT.³⁰ Each study was evaluated against the five core quality criteria relevant to its methodological design. Studies meeting all five criteria were rated as high quality; those meeting three to four criteria were rated as moderate quality; and those meeting fewer than three criteria were rated as low quality. Table 1 presents the quality assessment score of the included studies.

Results

Characteristics of eligible included studies

Twelve studies met inclusion criteria.^{10-13,18,28,31-36} Studies were published between 2019 and 2026, with increased publication after 2023. Geographic coverage included all six geopolitical zones, though no eligible study originated from the South-West region, indicating a clear geographical evidence gap. Populations included IDPs, children and adolescents, farmers, elderly individuals, and mixed community samples. Outcomes included PTSD, depression, anxiety, psychological distress, and coping outcomes. The absence of South-West Nigeria studies may reflect differential research funding priorities, lower inclusion of urban flooding research in indexed journals, and underrepresentation of southern flood impacts in academic disaster literature relative to northern humanitarian crises.

Quality appraisal of included studies

Six studies were high quality and six moderate quality, with no low-quality studies identified. Across studies, a consistent strength was the use of validated instruments such as Patient Health Questionnaire 9-item (PHQ-9), Generalized Anxiety Disorder 7-item scale (GAD-7), PTSD Checklist for DSM-5 (PCL-5), Harvard Trauma Questionnaire, Strengths and Difficulties Questionnaire (SDQ), and Hamilton Depression Rating Scale. However, methodological limitations included reliance on cross-sectional designs, convenience sampling, and limited cultural validation of psychometric tools in Nigerian flood-affected popula-

tions. The exclusive reliance on cross-sectional designs limits causal inference and prevents assessment of temporal trajectories of psychological distress, including recovery patterns, chronicity, or delayed-onset disorders following flood exposure. This constrains the interpretation of prevalence estimates as static rather than dynamic outcomes. *Supplementary Table 1* presents the quality assessment score of the included studies.

Thematic review/key synthesis

The prevalence and spectrum of flood-related psychopathology

The evidence synthesized from Nigerian populations demonstrates that flooding is associated with a substantial and clinically significant mental health burden.^{10-13,18,28,31-36} The spectrum of documented psychopathology encompasses PTSD, depression, generalized anxiety, and non-specific psychological distress, with consistently elevated prevalence estimates across studies. Among IDPs in camp settings in north-eastern Nigeria, high levels of depression, anxiety, and probable PTSD have been reported.¹⁰ Comparable findings emerge from assessments conducted in Maiduguri, where IDPs residing in camps consistently exhibited elevated psychiatric symptom burden.¹⁸ Similar patterns are observed in Adamawa State, where displaced populations exposed to multiple adversities, including flooding, demonstrated elevated PTSD and depression scores.³⁶

Children constitute a particularly vulnerable subgroup. Among flood-affected children aged 7-17 years in Maiduguri, significant psychological distress was reported across emotional, conduct, hyperactivity, and peer relationship domains.¹¹ This pattern reflects not only direct disaster exposure but also cumulative adversity arising from poverty, conflict exposure, and disrupted schooling. Agricultural populations experience a dual burden of psychological trauma and livelihood disruption. Farmers affected by flooding report elevated anxiety symptoms closely linked to crop loss and financial insecurity.¹³ In such contexts, mental health outcomes are inseparable from economic precarity, with distress frequently reflecting anticipatory anxiety regarding survival and household provision. Qualitative evidence further expands the clinical framing of flood-related psychopathology by highlighting persistent affective states that may not meet diagnostic thresholds. Survivors describe fear, grief, helplessness, and perceived governmental neglect, often persisting long after acute flood events.³² These findings underscore that clinically defined disorders represent only part of a broader continuum of psychological suffering.

Displacement as a central pathway to psychological deterioration

Displacement emerges as a primary mechanism linking flooding to adverse mental health outcomes. Forced relocation disrupts place attachment, social identity, and daily routines (key determinants of psychological stability). Evidence indicates that longer duration of displacement is associated with progressively worsening mental health outcomes, including depression, anxiety, and PTSD.¹⁰ This suggests a dose-response relationship in which prolonged uncertainty exacerbates psychological distress rather than allowing natural recovery. Qualitative findings from IDP camps highlight multiple interacting stressors: inadequate shelter, poor sanitation, restricted mobility, and loss of autonomy.¹² These conditions create a chronic stress environment that sustains psychological morbidity beyond the acute disaster phase. Importantly,

displacement also fragments social networks that typically serve as protective psychosocial buffers. Extended family systems, religious networks, and community structures are disrupted, leaving individuals socially isolated and psychologically vulnerable.¹²

Gender, age, and socioeconomic determinants of vulnerability

Evidence consistently demonstrates patterned inequalities in post-flood mental health outcomes, reflecting pre-existing social and structural determinants of health. Gender disparities are prominent, with female flood survivors exhibiting significantly higher PTSD and psychological distress levels compared to males.^{10,35} These differences are likely mediated by gendered roles in household maintenance, increased caregiving burden, loss of domestic assets, and heightened exposure to gender-based violence in displacement settings. Age-related patterns are more complex. Contrary to assumptions of uniform vulnerability among the elderly or children, evidence suggests that younger adults (20–40 years) may experience the highest psychological burden.³³ This likely reflects their central role in household economic provision, making livelihood disruption particularly distressing. Nevertheless, elderly populations also experience substantial psychological distress compounded by physical frailty and social isolation.²⁸ Socioeconomic status and education function as protective factors. Higher educational attainment is associated with reduced PTSD severity, potentially due to improved access to coping resources and services.^{10,18,35,36} Conversely, poverty and low literacy intensify vulnerability, reflecting cumulative disadvantage that amplifies both exposure and reduced adaptive capacity.

Coping mechanisms and resilience

Coping strategies among flood-affected populations reflect a complex interplay between adaptive and maladaptive responses. Maladaptive coping strategies such as avoidance, denial, and emotional suppression are consistently associated with higher psychological distress.¹¹ However, evidence suggests that the relationship between coping and distress is not linear; the use of adaptive coping strategies may sometimes reflect greater underlying symptom severity rather than effective psychological adjustment. Religious and spiritual coping plays a central role in psychological adaptation. Faith-based interpretations of suffering, prayer, and engagement with religious communities provide meaning-making frameworks and emotional regulation mechanisms.¹⁰ These culturally embedded coping systems are particularly salient in Nigerian contexts and represent important considerations for intervention design. Resilience is associated with lower PTSD severity, independent of demographic factors.¹⁰ However, resilience should not be conceptualized solely as an individual trait; rather, it is shaped by structural determinants including social support, economic stability, and community cohesion. This reinforces the need for multi-level interventions rather than purely individual-focused approaches.

Intervention evidence and service delivery gaps

Although limited in number, intervention studies provide promising evidence for the effectiveness of psychological treatments in flood-affected Nigerian populations. Cognitive-behavioral interventions, including rational emotive behaviour therapy (REBT), have demonstrated significant reductions in post-traumatic depression among flood victims, with sustained effects over time.³⁴ Similarly, rational emotive family health therapy (REFHT)

has shown effectiveness in reducing anxiety among flood-affected farmers, suggesting adaptability to occupational and family contexts.¹³ Among children, creative arts-based interventions, including drama and music therapy, have demonstrated significant reductions in PTSD and anxiety symptoms.^{10,34–36} These interventions are particularly relevant in low-resource settings due to their low cost and group-based delivery potential.

However, despite these promising findings, a critical gap exists between evidence of efficacy and real-world implementation. Mental health services remain largely absent from post-flood response frameworks in Nigeria, which continue to prioritize food aid, shelter, and physical health interventions.^{10,12,18,35,36} From an implementation science perspective, key barriers include limited mental health workforce capacity, lack of integration into primary healthcare systems, and absence of structured psychosocial response protocols within emergency management agencies. Consequently, most interventions remain pilot or research-based rather than embedded in routine disaster response systems, severely limiting population-level impact. Scalability therefore requires task-shifting approaches, integration into primary healthcare delivery, and training of community health workers in basic psychological interventions and psychological first aid.

Ethical, cultural, and contextual considerations

Flood-related mental health interventions must be culturally responsive to local explanatory models of distress. Religious and spiritual frameworks are central to meaning-making and should be integrated rather than excluded from intervention design. However, there is a need to critically balance cultural integration with risk mitigation, particularly where fatalistic beliefs may delay help-seeking or reinforce stigma associated with formal mental health care. Effective interventions must therefore engage religious leaders and community gatekeepers while promoting evidence-based psychological care. Overall, the evidence indicates that flooding in Nigeria produces a multidimensional mental health burden shaped by exposure severity, displacement dynamics, and pre-existing structural inequalities. However, interpretation of this evidence is constrained by methodological heterogeneity, cross-sectional design dominance, and limited cultural validation of assessment tools.

Methodological heterogeneity and interpretive constraints

A key limitation across the evidence base is substantial methodological heterogeneity, which constrains comparability and limits inferential strength. Included studies vary widely in design (cross-sectional, qualitative, and a small number of RCTs), sampling approaches, and outcome measurement tools. Most quantitative studies rely on cross-sectional designs, which preclude causal inference and obscure temporal trajectories of psychological distress, including delayed onset, recovery patterns, or chronicity. As a result, reported prevalence estimates should be interpreted as static snapshots rather than representations of dynamic post-disaster mental health courses. In addition, variation in psychometric instruments (PHQ-9, PCL-5, GAD-7, SDQ, HTQ) introduces potential measurement non-equivalence, particularly given limited evidence of cultural validation in flood-affected Nigerian populations. These limitations reduce the feasibility of meta-analytic synthesis and necessitate cautious interpretation of cross-study comparisons.

Discussion

Flood-related mental health burden in Nigeria: comparison with global evidence

The findings of this systematic review demonstrate that flooding in Nigeria is associated with a substantial and clinically significant mental health burden, broadly consistent with international evidence but frequently higher in magnitude. Global meta-analyses report pooled prevalence estimates of PTSD and depression among flood-affected populations ranging between 15 and 20%.⁵ In contrast, Nigerian studies, particularly those involving IDPs, report substantially higher estimates, with some studies documenting depression rates exceeding 60% and PTSD prevalence approaching 45%.^{10,37,38} While part of this variation may reflect methodological differences (including sampling frames and measurement approaches), the consistency of elevated estimates across multiple Nigerian settings suggests a genuine intensification of risk driven by context-specific vulnerabilities. These include the co-occurrence of flooding with armed conflict, chronic poverty, food insecurity, and severely constrained health systems. In such settings, flooding operates not as an isolated shock event but as a compounding stressor within an already fragile socioecological environment.

Displacement emerges as a central explanatory pathway, aligning with global evidence from disasters such as Hurricane Katrina and large-scale monsoon flooding in South Asia.^{6,39} However, the Nigerian evidence extends this literature by demonstrating that prolonged displacement in resource-constrained IDP camps is associated with cumulative psychological deterioration rather than recovery, reinforcing that duration of exposure functions as a risk amplifier in contexts of unresolved humanitarian crisis.¹⁰ The limited but promising intervention evidence aligns with global clinical guidelines recommending trauma-focused cognitive behavioral therapies for disaster-related PTSD.^{40–42} Nigerian studies on REBT and REFHT demonstrate that culturally adapted cognitive-behavioural interventions can be effectively delivered in low-resource contexts, including among populations with limited formal education.^{13,34,35} However, these remain largely efficacy studies rather than implementation trials, limiting understanding of scalability within routine disaster response systems.

Population-specific vulnerability patterns

This review confirms patterned inequalities in post-flood mental health outcomes that reflect broader structural determinants of health. Gender disparities are consistently observed, with women exhibiting higher levels of PTSD and psychological distress.^{10,35} These disparities are likely driven by intersecting factors, including caregiving burdens, loss of household assets, and heightened exposure to gender-based violence in displacement contexts. Age-related patterns are more nuanced. Contrary to assumptions of uniform vulnerability among children or older adults, evidence suggests that younger adults (20–40 years) may experience the highest psychological burden due to their central role in economic provision and heightened exposure to livelihood disruption.³³ Elderly populations also experience substantial distress, compounded by physical frailty and social isolation.²⁸ Socioeconomic status and education operate as protective factors, with higher education associated with reduced PTSD severity.^{10,18,35,36} This likely reflects improved access to information, coping resources, and service navigation capacity, whereas

poverty compounds vulnerability through cumulative exposure and constrained recovery capacity.

Displacement as a central mechanism of psychological harm

Displacement is not merely a consequence of flooding but a core mechanism driving mental health deterioration. Prolonged displacement is consistently associated with worsening depression, anxiety, and PTSD symptoms.¹⁰ This dose-response relationship highlights displacement as a chronic stress exposure rather than a time-limited event. Qualitative evidence from IDP camps demonstrates that psychological distress is sustained by structurally adverse living conditions, including overcrowding, inadequate sanitation, restricted autonomy, and disrupted social networks.¹² These conditions generate what may be conceptualized as structural psychological harm, extending beyond individual trauma exposure to encompass environmental deprivation and loss of agency. Importantly, humanitarian mental health responses remain largely oriented toward short-term emergency intervention models. The evidence from Nigeria indicates that such approaches are insufficient in protracted displacement contexts, where psychological distress persists long beyond the acute disaster phase. This underscores the need for sustained system-integrated mental health and psychosocial support (MHPSS) programming.

Cultural and contextual determinants of mental health expression

Religious and spiritual coping represents a central framework for meaning-making and emotional regulation among flood-affected populations.¹⁰ These culturally embedded systems provide psychological containment, social support, and interpretive frameworks for catastrophic loss. However, culturally responsive intervention design must balance integration with clinical effectiveness. While spiritual coping can enhance resilience, uncritical reliance on fatalistic interpretations of suffering may delay help-seeking or reinforce stigma surrounding mental illness. Family systems also play a critical role in both vulnerability and recovery. Evidence from family-based interventions indicates that targeting relational structures is particularly appropriate in collectivist contexts, where psychological well-being is deeply embedded within family functioning.¹³

Health system constraints and implementation gaps

Nigeria's mental health system is severely constrained, with fewer than 300 psychiatrists serving a population exceeding 220 million.^{43,44} Services remain highly centralized in urban tertiary facilities, rendering them inaccessible to rural and flood-prone populations.^{45–48} Although the National Mental Health Act (2023) represents a major policy advancement, implementation gaps remain substantial. Legislative progress has not yet translated into scaled service delivery, workforce expansion, or integration of mental health into disaster preparedness systems.⁴⁹ Critically, mental health remains marginal within disaster response architecture, which continues to prioritize food, shelter, and physical health needs. This reflects both systemic capacity constraints and longstanding global patterns in humanitarian response.^{24,50} Operationalization of WHO and Inter-Agency Standing Committee MHPSS frameworks in Nigeria will require task-shifting approaches, integration into primary healthcare, and structured training of non-specialist providers.^{51,52} From an implementation science perspective, the main barrier is not only evidence of effi-

cacy but the absence of delivery systems capable of scaling interventions sustainably within disaster response structures.

Methodological considerations and evidence limitations

While the use of validated instruments strengthens confidence in individual study findings, the overall evidence base is constrained by design limitations. The predominance of cross-sectional studies limits temporal inference, while heterogeneity in measurement tools reduces comparability across studies. Although half of the included studies were of high methodological quality, the absence of longitudinal designs represents a critical gap. Without prospective data, the natural course of flood-related mental health conditions, including recovery trajectories and delayed-onset disorders remains unknown. Geographical coverage is also incomplete, with a notable absence of studies from the South-West despite substantial flood exposure in urban centers such as Lagos. Additionally, several high-risk groups remain under-researched, including pregnant women, individuals with severe mental illness, persons with disabilities, and out-of-school adolescents.

Strengths and limitations of the study

Strengths

This review benefits from a comprehensive multi-database search strategy, explicit eligibility criteria, dual-reviewer screening, and systematic quality appraisal using MMAT. The inclusion of qualitative and quantitative studies enabled a holistic synthesis capturing both prevalence estimates and lived experience. Focusing exclusively on Nigeria allowed context-specific insights into structural and cultural determinants of mental health outcomes.

Limitations

Potential publication bias cannot be excluded, as studies with significant findings are more likely to be published. Exclusion of grey literature may have omitted relevant NGO and governmental reports. The narrative synthesis approach limits statistical comparability with global meta-analyses. Language restrictions may have excluded relevant non-English studies.

Prioritized research gaps

The evidence base reveals four priority research gaps, which include (i) longitudinal cohort studies to map trajectories of psychological recovery, chronicity, and delayed onset following flood exposure; (ii) implementation research evaluating scalability of psychological interventions within primary healthcare and disaster response systems; (iii) geographical expansion of evidence, particularly in the Southwest and underrepresented geopolitical zones; (iv) economic evaluation studies, including cost-effectiveness and cost-of-illness analyses of flood-related mental health conditions and interventions. Additional priority populations include pregnant women, individuals with pre-existing severe mental illness, persons with disabilities, and adolescents outside formal education systems.

Conclusions

This systematic review synthesised peer-reviewed evidence on mental health outcomes associated with flooding among diverse populations in Nigeria. The evidence demonstrates that flooding is associated with a substantial and consistent mental health burden,

characterized by elevated rates of PTSD, depression, anxiety, and psychological distress across multiple population groups. In several studies, prevalence estimates substantially exceeded those reported in general Nigerian populations and, in some instances, global averages for disaster-affected settings. A key finding is that flood-related mental health outcomes are shaped by intersecting structural and contextual factors rather than exposure alone. Displacement emerged as the dominant pathway to psychological deterioration, with camp conditions, duration of displacement, and breakdown of social networks producing cumulative distress. Vulnerability was socially patterned, with women, younger adults in economically productive age groups, and socioeconomically disadvantaged populations experiencing disproportionate burden.

Although limited, the intervention evidence indicates that culturally adapted psychological therapies, including cognitive-behavioral approaches and creative arts-based interventions, can reduce flood-related psychological symptoms in Nigerian contexts. However, this evidence is not matched by service availability, as MHPSS remains largely absent from routine disaster response systems. Overall, the review highlights a critical mismatch between mental health need and service provision within Nigeria's flood response architecture. Without integration of mental health into disaster preparedness and climate adaptation strategies, flooding will continue to generate avoidable and long-term psychological morbidity.

Recommendations

Based on the findings, three implementation priorities emerge:

1. Integration of mental health into disaster response systems: MHPSS should be formally embedded within National Emergency Management Agency and State Emergency Management Agency protocols, aligned with Inter-Agency Standing Committee guidelines, rather than delivered as *ad hoc* post-disaster services.
2. Expansion of task-shared mental health service delivery: given severe workforce shortages, scalable delivery models should prioritize task-sharing approaches within primary healthcare and community systems, including training of non-specialist providers in psychological first aid and brief evidence-based interventions.
3. Protection-focused disaster mental health programming: flood response strategies should incorporate targeted psychosocial protection for high-risk groups (women, children, displaced populations, and economically vulnerable adults), alongside improvements in IDP camp conditions, including dignity, safety, and social cohesion.

Implications of the study

For policymakers, the findings demonstrate that flood-related mental health outcomes constitute a predictable and substantial public health burden requiring formal integration into disaster risk reduction and climate adaptation planning. The current separation of mental health from emergency response systems represents a structural gap in national preparedness.

For humanitarian actors and NGOs, the evidence underscores that material relief alone is insufficient. Effective flood response must include structured psychosocial interventions to address both acute distress and longer-term psychological sequelae.

For healthcare providers, the high burden of PTSD, depression, and anxiety suggests the need for routine mental health screening in

flood-affected communities, particularly among individuals presenting with somatic complaints following flood exposure.

For researchers, the findings define a clear evidence-to-action gap, particularly in relation to intervention scalability, longitudinal outcomes, and geographically representative data.

Future directions

Future research should be organized around four priority domains:

1. Longitudinal mental health trajectories: prospective cohort studies are needed to characterize recovery patterns, chronicity, and delayed-onset disorders following flood exposure, enabling evidence-based timing of interventions.
2. Implementation and scalability research: there is an urgent need for implementation science studies evaluating how evidence-based interventions can be integrated into primary care and disaster response systems at scale, particularly using task-sharing models.
3. Geographical and population evidence expansion: future studies should address the marked geographical imbalance in existing research, particularly the absence of South-West Nigeria data, and include under-researched populations such as pregnant women, persons with disabilities, individuals with severe mental illness, and out-of-school adolescents.
4. Economic and systems-level evaluation: cost-of-illness studies and cost-effectiveness analyses are required to quantify the economic burden of flood-related mental health conditions and strengthen the investment case for integrating mental health into climate adaptation and disaster risk financing.

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