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*Article*

# Psychological Distress and Coping Mechanisms Among Flood-Affected Children In Maiduguri, Nigeria

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**Abstract**

**Background**: Flood disasters, alongside prolonged conflict and socio-economic hardship in Maiduguri, Borno State, Nigeria, have heightened the psychological vulnerability of children. This study examined the prevalence of psychological distress and explored the coping mechanisms employed by children affected by flooding in the region. **Method**: Children aged 7–17 years from flood-affected areas in Maiduguri were included in the study. Psychological distress was measured using the parent version of the Strengths and Difficulties Questionnaire (SDQ-13), and coping mechanisms were assessed using the Kidcope Parent Version. Multivariate and ordinal logistic regression examined factors associated with psychological distress and coping mechanisms. **Results:** A total of 374 children participated in the study. 63.6% experienced abnormal psychological distress. Moderate and high levels of maladaptive coping were significantly associated with greater odds of psychological distress (Odds Ratio [OR] = 1.72, 95% CI: 1.25 - 2.36; OR = 2.43, 95% CI: 1.46 - 4.04). Similarly, moderate adaptive coping was associated with higher odds of distress compared to poor coping (OR = 1.90, 95% CI: 1.38 - 2.61). In unadjusted models, age, female gender, higher education, Christian religion, and higher household income were associated with increased psychological distress. However, these were not significant in the adjusted model. Ordinal logistic regression showed no significant predictors of either maladaptive or adaptive coping levels. **Conclusion**: A high proportion of flood-affected children in Maiduguri experience psychological distress, with maladaptive coping playing a key role. The findings indicate the need for targeted psychosocial interventions to improve adaptive coping skills in flood-affected children.

**Keywords:** psychological distress; coping mechanisms; flood disaster; children

## 1. Introduction

Floods rank among the most devastating natural disasters worldwide, causing widespread destruction, displacement, and significant psychological trauma, especially among vulnerable populations like children. Children are particularly susceptible due to their developmental stage and dependence on caregivers for emotional stability and protection [1,2]. The psychological distress experienced by children affected by floods often manifests as anxiety, depression, post-traumatic stress disorder (PTSD), and emotional withdrawal [3]. These outcomes are often exacerbated by the loss of loved ones, damage to homes, and disruption of schooling and social support systems, all of which can hinder children's emotional, cognitive, and social development [4].

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In Nigeria, flooding has become increasingly frequent due to climate change, poor urban planning, and inadequate drainage infrastructure [5]. Maiduguri, the capital of Borno State, is particularly vulnerable not only to seasonal flooding but also to the prolonged effects of insurgency. This dual burden of climate-related disaster and armed conflict has placed enormous stress on already fragile communities, especially children, who are exposed to both environmental and socio-political traumas [6]. Such compounded stressors elevate the risk of psychological distress and can contribute to long-term developmental and mental health challenges [7].

Although the mental health impacts of flooding are globally acknowledged, there remains limited research specifically focused on the psychological well-being of children in Maiduguri. Most interventions in the aftermath of floods have emphasised physical relief efforts, such as food distribution, shelter, and sanitation, while psychosocial support services remain limited or absent [2,8]. Existing literature identifies symptoms such as fear, depression, social withdrawal, and concentration difficulties in children post-disaster, which can persist for extended periods and negatively affect academic performance, peer interactions, and overall well-being [9].

Coping strategies play a crucial role in determining how children adapt to traumatic events. Adaptive coping mechanisms, such as seeking social support, engaging in play therapy, or reframing traumatic experiences, can foster resilience and recovery. In contrast, maladaptive coping mechanisms, including avoidance, aggression, and emotional detachment, can exacerbate psychological distress [7,9]. The specific coping methods children employ are influenced by various factors, including their developmental stage, family environment, access to mental health resources, and community support systems.

Despite established research on coping in other disaster-prone settings, there is a notable gap in the literature on coping mechanisms among flood-affected children in Maiduguri. This knowledge gap stresses the urgent need for context-specific, culturally relevant mental health interventions. Therefore, this study aims to assess the level of psychological distress experienced by flood-affected children in Maiduguri, Nigeria, and to explore the coping mechanisms they adopt. The knowledge or the insight into both psychological distress and coping strategies will contribute to the development of evidence-based, child-centred mental health responses for disaster-affected populations in conflict-impacted regions.

## 2. Methodology

A descriptive cross-sectional research design was adapted for this study. This is because the design gives a snapshot of a situation at a particular moment in time by collecting data from a group of people at one point in time to describe the characteristics or prevalence of a particular condition or phenomenon within that population [10]. Therefore, a descriptive cross-sectional research design was used to assess psychological distress and coping strategies among flood-affected children in Maiduguri, Nigeria, thereby capturing the prevalence of distress and related coping responses [11,12]. The study was conducted in Maiduguri, the capital of Borno State, Nigeria. This region, particularly Maiduguri, has been repeatedly affected by seasonal flooding, which has compounded the vulnerabilities already caused by over a decade of armed conflict and internal displacement.

A multi-stage sampling technique was employed for this study to ensure the representativeness of the flood-affected children in Maiduguri. This was necessary to ensure the affected population's diverse demographic and geographic characteristics are captured. To achieve this, the sampling process involved three main stages. First, purposive sampling was used to select specific communities affected by the flood in Maiduguri, Borno State, Nigeria. These communities were identified with the support of local health authorities, community leaders, and humanitarian actors. This intentional selection focused on areas where children had experienced direct flood-related trauma and displacement

Subsequently, the selected flood-affected areas were stratified based on age groups, specifically children aged 7–11 years and those aged 12–17 years. This stratified random sampling approach was used because psychological distress and coping mechanisms may vary significantly between younger

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children and adolescents due to differences in cognitive development, social support systems, and exposure to stressors as supported by as supported by findings from Masten and Narayan [13]. Age has been shown to significantly influence children's emotional responses to disasters and the coping mechanisms they adopt [14]. Finally, within each age stratum, a simple random sampling technique was used to select participants, represented by their parents or primary caregivers. This method ensured that every eligible child in the affected communities had an equal chance of inclusion, thereby reducing selection bias and enhancing the external validity of the study [15].

The sample size for this study was determined using Cochran's formula for cross-sectional studies. Therefore, the formula $n = Z^2P\ (1-P)/d^2$ [16] was used. The estimated prevalence of psychological distress among flood-affected children was 0.5 (50%) due to the absence of prior studies in the study area. Therefore, the sample size was 384 Parents/Caregivers of the affected Children in the flood-affected areas using the aforementioned formula.

Regarding the inclusion and exclusion criteria for this study, only children aged 7–17 years who had experienced flooding in Maiduguri, lived in affected areas for at least six months, and whose parents/guardians provided consent to be part of the study. Children with severe cognitive or developmental disabilities or a lack of consent were excluded.

Strengths and Difficulties Questionnaire (SDQ-13) parent version was adopted to assess Psychological distress. The SDQ-13 Parent Version is a brief behavioral screening tool designed to assess emotional and behavioural difficulties in children and adolescents based on parental reporting. For the coping strategies, a 15-item Parent Version of the Kidcope was adopted to determine the coping strategies. The 15-item Parent Version of the Kidcope is an adapted form of the original child self-report questionnaire designed to assess parental perceptions of the coping strategies their children use in response to stress or trauma.

Data was collected through face-to-face, interviewer-administered questionnaires conducted by trained research assistants using English, Hausa, or Kanuri based on participant preference. This was due to low literacy levels in the study area. To maintain participant confidentiality and encourage candid disclosure, interviews were held in quiet, polite settings within communities or camps for displaced people. The Federal Ministry of Health Research Ethics Committee, through the Borno State Ministry of Health Research Ethics Committee, granted ethical approval for the study (NHREC/082/12/2024). All participating children's parents or legal guardians provided written informed consent. The confidentiality of their answers was guaranteed, and participants were made aware of their freedom to leave the study at any time without facing any consequences. According to the Declaration of Helsinki [17], the values of beneficence, justice, and respect for persons were rigorously upheld during the entire research process.

All statistical analyses were conducted using IBM SPSS Statistics for Windows, version 30.0.0 (IBM Corp., Armonk, N.Y., USA). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were computed to summarize sociodemographic characteristics and levels of psychological distress and coping mechanisms among participants. To examine the relationships between psychological distress and levels of coping mechanisms (maladaptive and adaptive), binary logistic regression analysis was performed. Odds Ratios (ORs) with 95% Confidence Intervals (CIs) were calculated, and statistical significance was determined at $p < 0.05$. Both univariate (crude) and multivariate (adjusted) logistic regression models were estimated to identify sociodemographic factors associated with psychological distress. Further, to explore predictors of coping strategies (adaptive and maladaptive), ordinal logistic regression analysis was conducted. Coping levels were treated as ordinal dependent variables (poor, moderate, strong for adaptive; low, moderate, high for maladaptive). Estimates and 95% confidence intervals were reported. Statistical significance was considered at $p < 0.05$. Appropriate model assumptions, including scales of measurements and multicollinearity, were adhered to, and missing data were excluded listwise.

## 3. Results

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This study assessed psychological distress and coping mechanisms employed by flood-affected children in Maiduguri, Nigeria. A total of 384 questionnaires were distributed, but only 374 met the criteria for inclusion in the analysis. Therefore, the return rate is 97.4%.

Table 1 presents the sociodemographic characteristics of the respondents, along with the distribution of key study variables including psychological distress, maladaptive coping, and adaptive coping. The sample consisted of 374 participants, with a slightly higher proportion of males (56.1%) compared to females. Most children were not enrolled in formal education (41.2%), and over half of the fathers (54.3%) had no formal education, with only 6.1% having attained tertiary education. In terms of religion, a majority of respondents identified as Muslim (63.1%), and most households earned between 21,000–30,000 (Naira) local currency per month (41.4%). The mean age of the children was 11.2 years.

**Table 1.** Sociodemographic Characteristics of Respondents and Study Variables.

| **Variables** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Age | 11.2 ±3.1 (Mean ± SD) | 100 |
| **Gender** | | |
| Male | 210 | 56.1 |
| Female | 164 | 43.9 |
| **Level of Education of the child** | | |
| Not in any Formal Education | 154 | 41.2 |
| Primary Education | 130 | 34.8 |
| Secondary Education | 90 | 24.1 |
| **Level of Education of the Father** | | |
| No Formal Education | 203 | 54.3 |
| Primary | 113 | 30.2 |
| Secondary | 35 | 9.4 |
| Tertiary | 23 | 6.1 |
| **Religious Status** | | |
| Islam | 236 | 63.1 |
| Christianity | 138 | 36.9 |
| **Household income Per Month** | | |
| 5000-20000 | 116 | 31.0 |

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| | | |
|---|---|---|
| 21000-3000 | 155 | 41.4 |
| 31000-50000 | 51 | 13.6 |
| >50000 | 52 | 13.9 |
| **Psychological Distress** | | |
| Normal | 136 | 36.4 |
| Abnormal | 238 | 63.6 |
| **Maladaptive Coping** | | |
| Low | 139 | 37.2 |
| Moderate | 163 | 43.6 |
| High | 72 | 19.3 |
| **Adaptive Coping** | | |
| Poor | 201 | 53.8 |
| Moderate | 165 | 44.1 |
| Strong | 8 | 2.1 |

SD: Standard Deviation.

Regarding the outcome variables, 63.6% of children exhibited abnormal psychological distress, while 36.4% were classified as normal. For coping styles, maladaptive coping was prevalent, with 43.6% reporting moderate levels and 19.3% high levels. In contrast, adaptive coping was generally poor, with over half (53.8%) of the children showing poor adaptive coping, and only 2.0% exhibiting strong adaptive coping.

In Table 2, the regression analysis showed that higher levels of maladaptive coping were strongly associated with increased odds of psychological distress. Compared to those with low maladaptive coping, children with moderate and high maladaptive coping had significantly greater odds of experiencing psychological distress. Similarly, those with moderate adaptive coping had higher odds of distress compared to those with poor adaptive coping. However, strong adaptive coping did not show a significant association, likely due to the small sample size in that category.

**Table 2.** Relationship between psychological distress with levels of coping mechanisms (maladaptive and adaptive).

| **Coping Level Variable** | **OR (95% CI) of Psychological Distress** |
|---|---|
| Maladaptive Coping | |
| Low (ref) | 1 |
| Moderate | 1.72*** (1.25–2.36) |
| High | 2.43*** (1.46–4.04) |

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| | |
|---|---|
| Adaptive Coping | |
| Poor (ref) | 1 |
| Moderate | 1.90*** (1.38–2.61) |
| Strong | 1.00 (0.25–4.00) |

OR: Odds Ratio; CI: Confidence Intervals; ***p<0.001.

The Binary logistic regression (estimated as Crude Odds Ratio) analysis identified several socio-economic factors significantly associated with abnormal psychological distress. Older age, female gender, higher child and paternal education, Christian religion, and higher household income were all significantly associated with increased odds of psychological distress in the unadjusted models. However, in the multivariate model (estimated as adjusted Odds Ratio), no predictors remained statistically significant, suggesting potential confounding effects. The direction of associations remained generally consistent (Table 3).

**Table 3.** Logistic regression predicting socio-demographic factors associated with psychological distress.

| Variables | Crude OR (95% CI) | Adjusted OR (95% CI) |
|---|---|---|
| Age | 1.05*** (1.03–1.06) | 1.00 (0.96–1.04) |
| Gender | | |
| Male (ref) | 1 | 1 |
| Female | 1.65** (1.20–2.26) | 0.92 (0.60–1.40) |
| Child Education | | |
| No formal (ref) | 1 | 1 |
| Primary | 1.89*** (1.32–2.71) | 1.26 (0.77–2.06) |
| Secondary | 1.81** (1.18–2.79) | 1.43 (0.82–2.48) |
| Father's Education | | |
| No formal (ref) | 1 | 1 |
| Primary | 2.42*** (1.62–3.64) | 1.53 (0.92–2.55) |
| Secondary | 1.33 (0.68–2.60) | 0.93 (0.44–1.95) |
| Tertiary | 2.29 (0.94–5.56) | 1.89 (0.72–4.95) |
| Religion | | |
| Islam (ref) | 1 | 1 |
| Christianity | 2.14*** (1.49–3.06) | 1.52 (0.97–2.38) |

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| | | |
|---|---|---|
| Household Income | | |
| N5000–N20,000 (ref) | 1 | 1 |
| N21,000–N30,000 | 1.98*** (1.42–2.77) | 1.36 (0.83–2.22) |
| N31,000–N50,000 | 1.04 (0.60–1.80) | 0.76 (0.40–1.45) |
| >N50,000 | 2.25** (1.25–4.05) | 1.53 (0.77–3.07) |

OR: Odds Ratio; CI: Confidence Intervals; **p<0.01, ***p<0.001.

Table 4 indicates ordinal logistic regression analysis results, which did not reveal any statistically significant predictors of adaptive coping. While age, male gender, and higher education levels showed some positive associations with higher adaptive coping, none reached statistical significance. Confidence intervals for all predictors included zero, suggesting a lack of strong association.

**Table 4.** Ordinal logistic regression predicting socio-demographic factors associated with adaptive and maladaptive coping.

| **Variables** | **Adaptive Estimate (95% CI)** | **Maladaptive Estimate (95% CI)** |
|---|---|---|
| Age | 0.030 (–0.04, 0.10) | 0.02 (–0.05, 0.08) |
| Gender (Female = ref) | | |
| Male | –0.09 (–0.50, 0.32) | –0.04 (–0.43, 0.35) |
| Child Education (Tertiary = ref) | | |
| Primary | 0.14 (–0.40, 0.68) | –0.07 (–0.58, 0.44) |
| Secondary | 0.27 (–0.29, 0.82) | –0.14 (–0.66, 0.39) |
| Father's Education (Tertiary = ref) | | |
| No Formal | 0.49 (–0.42, 1.41) | 0.38 (–0.47, 1.23) |
| Primary | 0.31 (–0.66, 1.27) | 0.27 (–0.62, 1.16) |
| Secondary | 0.27 (–0.84, 1.38) | –0.22 (–1.25, 0.82) |
| Religion (Christianity = ref) | | |
| Islam | –0.02 (–0.46, 0.43) | 0.08 (–0.34, 0.50) |
| Economic Status (>N50,000 = ref) | | |
| N5000–N20,000 (ref) | 0.06 (–0.62, 0.73) | 0.45 (–0.18, 1.08) |
| N21,000–N30,000 | 0.03 (–0.62, 0.68) | 0.03 (–0.57, 0.64) |

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| | | |
|---|---|---|
| N31,000–N50,000 | 0.36 (–0.43, 1.14) | –0.40 (–1.15, 0.34) |

CI: Confidence Intervals.

Similarly, no sociodemographic variables were found to be statistically significant predictors of maladaptive coping. Estimates for age, gender, education, religion, and economic status showed no significant associations with coping levels, and all confidence intervals crossed zero.

## 4. Discussion

This study assessed flood-affected children's psychological distress and coping mechanisms in Maiduguri, Nigeria. The findings of the study revealed that 63.6% of children exhibited abnormal psychological distress, while 36.4% were classified as normal. For coping strategies, maladaptive coping was prevalent, with 43.6% reporting moderate levels and 19.3% high levels. In contrast, adaptive coping was generally poor, with over half (53.8%) of the children showing poor adaptive coping, and only 2.0% exhibiting strong adaptive coping. These findings align with [18], who reported that **48.0% of the children** in their study were found to have **Emotional and Behavioural Problems (EBP).** This indicates that nearly half of the children displayed signs of psychological or behavioural difficulties, such as emotional distress, conduct issues, or problems with social interaction.

The findings of the study revealed that 63.6% of the flood-affected children showed abnormal psychological distress, which suggests high emotional and behavioural vulnerability. This finding may not be unconnected to the multifaceted trauma experienced by children in the study area, not just from natural disasters like flooding, but also from unending conflict, displacement, and poverty. In agreement with this finding is a study by David et al. [19] and Cénat et al. [20], who reported significant symptoms of **psychological distress** among displaced adolescents in Northeast Nigeria

The findings of this study revealed that 53.8% of respondents had poor adaptive coping. This implies that a significant number of the children in the study area lack effective psychological strategies to cope with the post-flood effects. Adaptive coping mechanisms are known to serve as critical shields against psychological distress, especially in the context of trauma. Given that 41.2% of children in this study do not have or are not enrolled in any formal education, it is possible that these children had fewer opportunities to learn and practice adaptive coping. This highlights the interconnectedness of education, psychosocial well-being, and disaster. This finding aligns with Ghasemi et al. [21], who reported that under conditions of extreme stress, children with access to protective interpersonal relationships and internal coping strategies are more resilient and less likely to experience long-term emotional problems. These findings also align with Masiran et al. [18], who reported that **48.0% of the children** in their study were found to have **Emotional and Behavioural Problems (EBP).** This indicates that nearly half of the children displayed signs of psychological or behavioural difficulties, such as emotional distress, conduct issues, or problems with social interaction.

However, in regions like Maiduguri, the development of such protective mechanisms is hindered by repeated exposure to conflict, displacement, poverty, and natural disasters. It is important to state that children who have been uprooted from familiar environments, exposed to repeated losses, or denied safe spaces and education are at a higher risk of developing maladaptive coping patterns due to chronic stress and emotional insecurity [22]. In a study conducted among displaced adolescents in Northeast Nigeria, David et al. [19] found that many exhibited signs of psychological distress, including sadness, isolation, and hopelessness, largely due to a lack of supportive environments and mental health services. On the contrary, the present study shows that 43.6% of children reported moderate maladaptive coping, while 19.3% demonstrated high levels of such behaviour. Maladaptive coping, such as avoidance, emotional withdrawal, aggression, or denial, may serve as short-term relief mechanisms but are typically associated with poor

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psychological outcomes when persistent. David et al. [19] and Kar [14] noted that children who lacked coping resources often developed social withdrawal and engaged in risky behaviours as a means of dealing with overwhelming stress. Additionally, Sheikh et al. [23] observed that trauma-exposed internally displaced children in Kaduna, Nigeria, exhibited patterns of emotional numbing and behavioural disturbances, especially when psychosocial interventions were not provided.

The regression analysis showed that higher levels of maladaptive coping were strongly associated with increased odds of psychological distress. Compared to those with low maladaptive coping, children with moderate and high maladaptive coping had significantly greater odds of experiencing psychological distress. Similarly, those with moderate adaptive coping had higher odds of distress compared to those with poor adaptive coping. However, strong adaptive coping did not show a significant association, likely due to the small sample size in that category The findings align with a meta-analysis by Raccanello et al. [24] found that maladaptive coping strategies like escape and social isolation significantly correlate with higher levels of post-traumatic stress disorder (PTSD), depression, and anxiety among children and adolescents following natural disasters. Also, a study by David et al. [19] focusing on internally displaced adolescents in Northeast Nigeria reported that reliance on maladaptive coping mechanisms, including social withdrawal and risky behaviours, exacerbated psychological symptoms and hindered recovery.

The findings from this study reveal a complex relationship between sociodemographic factors and psychological distress among children affected by flooding. Initially, age was significantly associated with psychological distress in the unadjusted model (OR = 1.05; 95% CI: 1.03–1.06; $p < .001$), suggesting that older children experience greater emotional difficulties. However, this association diminished in the adjusted model (OR = 1.00; 95% CI: 0.96–1.04), indicating that the relationship may be confounded by other variables such as socioeconomic status or education. This pattern aligns with evidence from sub-Saharan Africa, where older children exhibit heightened emotional vulnerability due to greater cognitive awareness of traumatic events [25]. Furthermore, older children may assume caregiving roles or be more directly exposed to the consequences of displacement, which can exacerbate psychological burden.

Gender differences in distress were also observed. Female children were more likely to experience psychological distress in the crude analysis (OR = 1.65; 95% CI: 1.20–2.26; $p < .01$), though the association was not statistically significant in the adjusted model. This finding mirrors other studies indicating that girls often report higher levels of psychological distress, particularly in humanitarian settings. Such disparities are frequently attributed to cultural expectations, gender-based violence, and psychosocial vulnerabilities [25]. Girls are often socialised to internalise stress, making them more prone to anxiety and depression in the aftermath of crises. Educational status was initially related to increased psychological distress, especially among children in primary and secondary school. This may arise from educational interruptions, ambiguity regarding future education, and increased performance expectations. This finding is in agreement with Tol et al. [26], who assessed mental health and psychosocial support in humanitarian settings. Paternal education initially showed a strong association with child distress (OR = 2.42; 95% CI: 1.62–3.64; $p < .001$), but this effect also diminished in the adjusted model. This might reflect the psychological pressure placed on children by parents with educational backgrounds who expect better outcomes despite the challenges posed by displacement. While parental education is generally linked to favourable results, in emergency contexts it may serve as a source of stress when objectives become unachievable [27].

Religious affiliation appeared to be a significant factor in the unadjusted analysis, with Christian children reporting higher distress levels than their Muslim peers. However, this association became non-significant after adjusting for confounders. Religious minority status may contribute to heightened psychological vulnerability, particularly when it involves reduced access to communal support or heightened social isolation in regions dominated by a different faith group [28]. Interestingly, children from middle- and high-income households initially reported higher psychological distress. This counterintuitive trend may result from a steep decline in living

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standards, leading to greater psychological disruption in families unaccustomed to hardship. Economic shocks can affect identity, stability, and coping resources [29].

Overall, the findings of the current study suggested several socio-demographic factors were linked to psychological distress, these associations weakened after adjusting for confounders. This highlights the complexity of children's psychological responses and the influence of cumulative stressors on individual characteristics. Importantly, ordinal regression analysis revealed that no socio-demographic variable significantly predicted adaptive or maladaptive coping. These results are consistent with Batte et al. [30], who found that in disaster contexts, the severity of shared stressors can minimise typical sociodemographic differences in coping strategies.

## 5. Conclusions

This study found that a majority of flood-affected children in Maiduguri, Nigeria, experience significant psychological distress, with many resorting to maladaptive coping strategies and lacking robust adaptive coping mechanisms. The distress was influenced by several factors, including disrupted education, poverty, and ongoing trauma; however, no socio-demographic variable independently predicted coping styles after adjustment.

Based on the aforementioned findings, the current study recommends the urgent need to establish community-based mental health and psychosocial support services for children affected by floods. This entails implementing coping skills training, improving educational access for displaced or out-of-school children, and assisting parents and caregivers who are crucial to children's mental health. Additional research is also required to comprehend the enduring effects on mental health, and mental health support must be incorporated into disaster response strategies. Intersectoral collaboration is vital to guarantee a comprehensive and sustainable methodology.

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