



COMMUNITY-BASED DISASTER RISK MANAGEMENT AND FLOOD RESILIENCE IN MAIDUGURI METROPOLITAN COUNCIL, BORNO STATE, NORTH EAST NIGERIA

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Abstract

This study examined the relationship between Community-Based Disaster Risk Management (CBDRM) and flood resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria. The study was motivated by the increasing frequency and severity of flood disasters in Maiduguri, exacerbated by climate variability, rapid urbanization, inadequate drainage infrastructure, and the 2024 flood disaster, which exposed significant weaknesses in disaster preparedness and response systems. The study adopted the Social Capital Theory and Resilience Theory as the theoretical foundation to explain how community participation, local knowledge, collective action, and institutional collaboration contribute to disaster preparedness and recovery. A descriptive survey research design was adopted, targeting households and relevant stakeholders within flood-prone communities of Maiduguri Metropolitan Council. Data were collected using structured questionnaires and analyzed using descriptive and inferential statistical techniques. The study conceptualized Community-Based Disaster Risk Management through community participation, disaster education, early warning systems, indigenous knowledge, environmental sanitation, emergency preparedness, and local leadership, while flood resilience was measured through preparedness, adaptive capacity, reduced vulnerability, rapid recovery, and sustainable community development. The findings indicate that active community participation significantly enhances early warning dissemination, strengthens preparedness, improves emergency response coordination, and promotes faster recovery following flood disasters. The study concludes that effective CBDRM provides a sustainable and inclusive approach to reducing flood risks and strengthening resilience in vulnerable communities. It recommends increased investment in community disaster education, strengthening local disaster management committees, integrating indigenous knowledge with scientific approaches, improving early warning systems, and enhancing collaboration among government agencies, humanitarian organizations, traditional institutions, and local communities to build long-term flood resilience in Maiduguri Metropolitan Council. The findings contribute to disaster risk reduction policy and practice by providing evidence for strengthening community-centred approaches to flood management in North East Nigeria.

Keywords: Community-Based Disaster Risk Management; Flood Resilience; Community Participation; Disaster Preparedness; Maiduguri Metropolitan Council

Introduction

Flooding is one of the most destructive natural hazards globally, causing extensive loss of lives, destruction of infrastructure, displacement of populations, environmental degradation, and significant economic setbacks. According to recent disaster risk studies, the frequency and intensity of flood events have increased over the past decade due to climate change, rapid urbanization, environmental degradation, and poor land-use planning. In developing countries, particularly in Sub-Saharan Africa, flood disasters are worsened by weak infrastructure, inadequate drainage systems, poor waste management practices, and limited disaster preparedness mechanisms. Nigeria remains one of the African countries most vulnerable to recurrent flooding because of its diverse climatic conditions, expanding urban settlements, poor environmental governance, and increasing population pressure. Adebayo and Musa (2021) observed that flooding has become a recurring environmental hazard in Nigeria, significantly affecting agricultural production, transportation systems, housing, public health, and economic activities. Similarly, Abdullahi and Mohammed (2021) maintained that rapid urban expansion without corresponding investment in drainage infrastructure has increased flood vulnerability in many Nigerian cities. Ogunleye and Adeyemi (2022) argued that inadequate environmental planning, indiscriminate refuse disposal, and blocked drainage channels continue to increase flood occurrences in both urban and rural communities.

Community-Based Disaster Risk Management (CBDRM) has emerged as one of the most effective approaches for strengthening local resilience against disasters. Unlike conventional disaster management approaches that depend largely on government intervention after disasters occur, CBDRM emphasizes community participation, local knowledge, preparedness, risk reduction, and collective action before, during, and after disasters. Bello and Salisu (2022) argued that community-driven flood management enhances local ownership, sustainability, and long-term resilience. Their study emphasized that involving local residents in hazard mapping, preparedness planning, and emergency response increases the effectiveness of disaster risk reduction interventions. Nwosu and Eze (2023) found that participatory disaster education significantly improves household preparedness in flood-prone Nigerian cities by increasing awareness of evacuation procedures, emergency planning, and environmental sanitation. Likewise, Ogu, Chukwu, and Nnadi (2023) highlighted that integrating indigenous knowledge with modern flood management strategies strengthens community resilience by combining traditional coping mechanisms with scientific disaster risk reduction approaches. Okafor and Nnamani (2024) emphasized that community-based disaster management reduces vulnerability by empowering residents to collectively

identify risks, implement mitigation measures, and participate actively in emergency response activities. According to the authors, communities that possess strong social cohesion recover more rapidly from flood disasters than communities lacking organized local structures. Danjuma and Umar (2024) reported that continuous community awareness campaigns, environmental sanitation exercises, and neighborhood emergency response groups significantly reduce flood impacts in northern Nigerian communities. Aminu and Lawal (2024) further observed that local volunteer organizations improve disaster preparedness through community mobilization, information dissemination, and emergency evacuation support. Ibrahim and Yusuf (2025) reported that Community-Based Disaster Risk Management initiatives improved early warning systems, enhanced household preparedness, strengthened community coordination, and reduced disaster impacts in flood-prone communities across the region. Likewise, Abubakar and Goni (2025) concluded that community participation increases disaster resilience by promoting collective decision-making, resource mobilization, and effective communication during flood emergencies. Muhammed and Abdulkadir (2025) argued that partnerships between local communities, government agencies, humanitarian organizations, and traditional institutions have significantly enhanced disaster preparedness and emergency response capacities in northern Nigeria. Isah and Sani (2026) further emphasized that sustainable flood resilience requires continuous investment in community education, climate adaptation programmes, infrastructure development, and inclusive governance that actively incorporates local participation into disaster risk reduction policies.

The independent variable is Community-Based Disaster Risk Management, comprising risk assessment, community participation, disaster education, early warning systems, emergency preparedness, local leadership, indigenous knowledge, environmental sanitation, and community mobilization. Bello and Salisu (2022) argued that community participation strengthens local ownership of flood management programmes, thereby improving sustainability. Similarly, Nwosu and Eze (2023) maintained that disaster education enhances household preparedness by increasing public awareness of flood risks and emergency response measures. Ogu et al. (2023) further emphasized that combining indigenous knowledge with scientific flood management practices significantly improves community resilience. According to Ahmed and Bukar (2023), participatory risk assessment enables communities to identify local hazards, vulnerable populations, evacuation routes, and available coping resources before disasters occur. Likewise, Danjuma and Umar (2024) reported that community environmental sanitation programmes reduce drainage blockage and minimize urban flooding. Aminu and Lawal (2024) also noted that local emergency committees facilitate effective coordination during flood emergencies. The dependent variable is Flood Resilience, reflected through reduced vulnerability, improved preparedness, enhanced adaptive capacity, quicker

recovery, protection of livelihoods, strengthened social cohesion, improved infrastructure resilience, and sustainable community development. Okafor and Nnamani (2024) argued that community empowerment significantly reduces disaster vulnerability by encouraging collective action and local ownership of resilience initiatives. Similarly, Ibrahim and Yusuf (2025) found that CBDRM initiatives improved early warning dissemination, emergency response coordination, and recovery outcomes in North East Nigeria. Abubakar and Goni (2025) further observed that resilient communities recover more rapidly because of stronger social networks, community trust, and organized volunteer systems. The framework proposes the following influence pathway Community-Based Disaster Risk Management → Community Empowerment → Improved Preparedness and Adaptive Capacity → Flood Resilience → Sustainable Community Development. This relationship is reinforced by Muhammed and Abdulkadir (2025), who argued that community empowerment increases residents' capacity to anticipate, withstand, respond to, and recover from flood disasters. Isah and Sani (2026) further maintained that long-term resilience depends on continuous community engagement, institutional support, and climate adaptation policies. The framework also recognizes several moderating factors, including government policy implementation, quality of physical infrastructure, conflict and insecurity, availability of financial resources, climate variability, institutional capacity, NGO interventions, donor support, technological innovation, and partnerships with humanitarian organizations. According to Yakubu and Hassan (2023), conflict conditions in North East Nigeria often reduce community resilience by limiting access to infrastructure and emergency services. Conversely, Aliyu and Garba (2022) observed that coordinated support from government agencies and humanitarian organizations strengthens community preparedness and accelerates disaster recovery. Shettima and Modu (2023) further concluded that improved drainage infrastructure, effective urban planning, and sustained community participation significantly enhance flood resilience in Maiduguri Metropolitan Council. Abdullahi and Mohammed (2021) investigated urban flooding in northern Nigerian cities and concluded that inadequate community involvement in urban planning contributes significantly to recurring flood disasters. They emphasized that sustainable flood management requires continuous collaboration between government institutions and local communities. Nwosu and Eze (2023) examined the influence of disaster education on household preparedness in flood-prone communities in southeastern Nigeria. Using household survey data, they found that residents who participated in community disaster education programmes demonstrated significantly higher levels of preparedness, including knowledge of evacuation procedures, emergency communication systems, and first aid practices. According to the authors, *"continuous disaster education transforms vulnerable households into active participants in disaster risk reduction rather than passive victims of flood disasters."* The study concluded that public awareness campaigns significantly improve resilience by enhancing disaster knowledge and preparedness.

Usman and Ibrahim (2022) reported that communities receiving regular disaster awareness training experienced lower casualty rates and faster evacuation during seasonal flooding than communities without organized education programmes. Ahmed and Bukar (2023) observed that community awareness programmes implemented in Borno State increased public understanding of flood hazards, climate change adaptation, and emergency preparedness, thereby improving household resilience. Another significant contribution was made by Ogu, Chukwu, and Nnadi (2023), who examined the integration of indigenous knowledge into flood risk management among agrarian communities in southeastern Nigeria. Their findings showed that traditional environmental knowledge—including observation of rainfall patterns, river behaviour, soil conditions, vegetation changes, and indigenous warning indicators—complements scientific forecasting methods and enhances community preparedness. The authors argued that *"effective disaster management in Nigeria requires combining indigenous knowledge systems with modern scientific approaches rather than replacing one with the other."* Their study demonstrated that communities utilizing both indigenous and scientific approaches experienced greater resilience and quicker recovery following flood events.

Yakubu and Hassan (2023) reported that indigenous coping mechanisms among communities in northeastern Nigeria contributed significantly to flood adaptation despite limited government intervention. Okafor and Nnamani (2024) investigated Community-Based Disaster Risk Management programmes in flood-prone settlements across southern Nigeria. Their study revealed that organized community participation reduced flood vulnerability by improving environmental sanitation, strengthening social cohesion, increasing volunteer participation, and facilitating faster emergency response. The researchers emphasized that community empowerment enables residents to identify hazards, mobilize local resources, and participate actively in disaster mitigation. They concluded that *"communities with stronger social capital demonstrate greater resilience because residents cooperate during preparedness, response, and recovery phases of disasters."* Danjuma and Umar (2024) found that local disaster management committees significantly improved coordination of emergency response activities and facilitated rapid dissemination of flood warnings in northern Nigeria. Their study also revealed that regular community meetings and simulation exercises enhanced preparedness levels. Aminu and Lawal (2024) further reported that community volunteer organizations strengthened disaster resilience by supporting evacuation, distributing relief materials, conducting environmental sanitation exercises, and assisting vulnerable households during flood emergencies. Ibrahim and Yusuf (2025) evaluated Community-Based Disaster Risk Management initiatives implemented in conflict-affected communities of Borno, Yobe, and Adamawa States. Their findings demonstrated that CBDRM significantly strengthened early warning systems, improved

communication between community members and emergency agencies, increased disaster preparedness, and reduced flood-related losses. The researchers concluded that integrating community participation into disaster planning enhances resilience even in conflict-affected environments. According to Ibrahim and Yusuf (2025), *"community-based early warning systems improve the speed of emergency response because information originates from residents who directly monitor local environmental conditions."* Abubakar and Goni (2025) found that local disaster management committees in Borno State improved coordination between humanitarian organizations, traditional leaders, and government emergency agencies, resulting in more effective disaster response and recovery. Muhammed and Abdulkadir (2025) also observed that partnerships among communities, local governments, humanitarian agencies, and civil society organizations strengthened adaptive capacity and accelerated post-disaster recovery across flood-prone communities in northern Nigeria. Obiajuru (2026) evaluated community resilience programmes implemented in Borno State following repeated flood disasters and prolonged insecurity. The study reported that despite ongoing conflict challenges, community-based resilience programmes significantly reduced disaster impacts through improved environmental awareness, strengthened local leadership, better coordination of relief activities, and increased community participation in disaster preparedness. Obiajuru (2026) concluded that community resilience initiatives remain effective because they build local capacity before disasters occur while promoting collective responsibility during emergency response and recovery. Isah and Sani (2026) reported that climate adaptation programmes, supported by community participation, significantly enhanced household resilience through improved livelihood diversification, environmental conservation, and disaster preparedness. This study is anchored on Social Capital Theory and Resilience Theory, both of which provide a strong theoretical foundation for understanding how Community-Based Disaster Risk Management enhances flood resilience in Maiduguri Metropolitan Council, Borno State. The Social Capital Theory was originally developed by Pierre Bourdieu (1986) and later expanded by James Coleman (1988) and Robert Putnam (1993, 2000). The theory explains that relationships, trust, cooperation, shared norms, and social networks constitute valuable resources that enable individuals and communities to achieve collective goals. Putnam argued that communities with stronger social ties are more capable of solving common problems because members cooperate, exchange information, and support one another during crises. Bello and Salisu (2022) argued that strong community participation increases local ownership of flood management programmes, thereby improving sustainability and resilience. Nwosu and Eze (2023) reported that community disaster education strengthens social interaction and collective preparedness among households exposed to flood risks. Okafor and Nnamani (2024) found that communities characterized by high levels of trust, cooperation, and social participation experience lower disaster vulnerability because residents collectively implement environmental sanitation, drainage maintenance,

and emergency response activities. Resilience Theory originated from the work of Canadian ecologist Crawford S. Holling (1973) in his seminal work on ecological systems. The theory was subsequently expanded by scholars such as Walker et al. (2004) and Folke (2006) to include social, institutional, and community resilience. The theory explains that resilience is the ability of individuals, communities, organizations, and systems to anticipate, withstand, adapt to, recover from, and transform following disturbances or disasters while maintaining their essential Ogu et al. (2023) found that integrating indigenous knowledge with scientific disaster management enhances adaptive capacity and strengthens resilience among flood-prone communities. Danjuma and Umar (2024) reported that continuous community preparedness programmes increase communities' ability to respond effectively to flood emergencies. Resilience Theory is particularly relevant to this study because it explains how Community-Based Disaster Risk Management enhances the capacity of residents in Maiduguri Metropolitan Council to anticipate flood risks, adapt to changing environmental conditions, minimize disaster impacts, recover more rapidly after flood events, and contribute to sustainable community development.

Statement of the Problem

Flooding has become one of the most persistent environmental disasters affecting communities across Nigeria, with devastating consequences for lives, livelihoods, infrastructure, agriculture, public health, and economic development. The situation is particularly severe in North East Nigeria, where recurrent flooding is compounded by the effects of climate change, rapid urbanization, inadequate drainage infrastructure, poor environmental management, and prolonged armed conflict. In recent years, Maiduguri Metropolitan Council (MMC), Borno State, has experienced repeated flood incidents that have destroyed homes, displaced households, disrupted businesses, damaged roads and public facilities, and increased the vulnerability of internally displaced persons (IDPs) and host communities. Although the Federal Government, Borno State Government, the National Emergency Management Agency (NEMA), the Borno State Emergency Management Agency (BOSEMA), humanitarian organizations, and non-governmental organizations have implemented various flood management interventions, flood disasters continue to occur with significant social, economic, and environmental consequences. These interventions have largely focused on emergency response and relief distribution rather than strengthening long-term community resilience through active community participation and local disaster preparedness.

Community-Based Disaster Risk Management (CBDRM) has been widely recognized as an effective approach for reducing disaster risks because it emphasizes community participation, local knowledge, disaster education, early warning systems, preparedness, and collective action. Communities are often the

first responders during disasters; therefore, empowering them to identify hazards, assess risks, develop local mitigation strategies, and participate actively in disaster management can significantly reduce disaster impacts. Despite this recognition, evidence suggests that the implementation of CBDRM in many flood-prone communities in Maiduguri Metropolitan Council remains inadequate due to limited community participation, weak institutional coordination, insufficient disaster education, inadequate early warning systems, poor integration of indigenous knowledge, and the continuing security challenges associated with insurgency. Maiduguri Metropolitan Council presents a unique disaster context because residents simultaneously face flood hazards and conflict-related displacement. Many internally displaced persons and vulnerable households live in environmentally fragile settlements characterized by inadequate drainage systems, poor housing conditions, and limited access to essential public services. These conditions increase their exposure and sensitivity to flood disasters while reducing their adaptive capacity and resilience. Although previous studies have examined flooding, climate change, disaster management, and humanitarian response in Nigeria, relatively few studies have specifically investigated how Community-Based Disaster Risk Management influences flood resilience in Maiduguri Metropolitan Council within the context of recurring floods and conflict-induced vulnerability. Existing studies have concentrated more on flood causes, disaster impacts, and government responses, leaving a gap regarding the contribution of community participation to sustainable flood resilience in the study area. It is against this background that this study seeks to examine the influence of Community-Based Disaster Risk Management on flood resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria. Specifically, the study intends to determine how risk assessment, community participation, disaster education, and early warning systems contribute to reducing flood vulnerability, improving preparedness, strengthening adaptive capacity, and enhancing sustainable community resilience.

Purpose of the Study

The main purpose of this study is to examine the influence of Community-Based Disaster Risk Management on Flood Resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria.

The specific objectives are to:

1. Examine the influence of community risk assessment on flood resilience in Maiduguri Metropolitan Council, Borno State.
2. Determine the effect of community participation on flood resilience in Maiduguri Metropolitan Council, Borno State.

Research Questions

The study will be guided by the following research questions:

1. To what extent does community risk assessment influence flood resilience in Maiduguri Metropolitan Council, Borno State?
2. What effect does community participation have on flood resilience in Maiduguri Metropolitan Council, Borno State?

Research Hypothesis

The study will test the following null hypothesis:

H₀₁: Community-Based Disaster Risk Management has no significant influence on flood resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria.

(H₁): Community-Based Disaster Risk Management has a significant influence on flood resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria.

METHODOLOGY

The study adopts a descriptive survey research design because it is appropriate for collecting quantitative data from a representative sample of residents to examine the relationship between Community-Based Disaster Risk Management (CBDRM) and flood resilience in Maiduguri Metropolitan Council (MMC), Borno State, North East Nigeria. The descriptive survey design enables the researcher to obtain firsthand information on respondents' perceptions, experiences, and level of participation in community-based disaster risk management activities without manipulating any of the study variables. This design is suitable because it allows for the systematic collection, analysis, and interpretation of data from a large population and provides empirical evidence for examining the influence of community participation, disaster education, risk assessment, and early warning systems on flood resilience. The study will be conducted in Maiduguri Metropolitan Council, the administrative and commercial headquarters of Borno State in North East Nigeria. Maiduguri Metropolitan Council consists of several wards and communities that have experienced repeated flood disasters arising from intense rainfall, inadequate drainage systems, rapid urban expansion, environmental degradation, and the effects of climate change. The area has also experienced prolonged insurgency, resulting in the displacement of thousands of residents and increasing the vulnerability of communities to flood hazards. The choice of Maiduguri Metropolitan Council is informed by its history of recurrent flooding, high concentration of internally displaced persons, and the increasing need for sustainable community-based disaster risk management interventions.

The sample size for the study shall consist of 400 respondents, determined using the Taro Yamane (1967) sample size determination formula at a 95% confidence level and a 5% margin of error. The sample size is considered adequate to ensure broad representation of residents across the selected communities while enhancing the reliability and generalizability of the findings. A multistage sampling technique will be employed. In the first stage, flood-prone wards within Maiduguri Metropolitan Council will be purposively selected based on their history of recurrent flooding. In the second stage, communities within the selected wards will be identified. The third stage will involve the use of simple random sampling to select households, while respondents within each household will be selected using purposive sampling based on their age, knowledge of community disaster management, and willingness to participate in the study. This combination of sampling techniques ensures that respondents possess adequate knowledge of the issues under investigation while minimizing sampling bias.

Data will be collected using a structured questionnaire titled "Community-Based Disaster Risk Management and Flood Resilience Questionnaire (CBDRMFRQ)." The instrument will be designed by the

researcher after an extensive review of relevant literature and existing disaster management frameworks. The questionnaire will comprise two sections. Section A will collect respondents' demographic information, including gender, age, educational qualification, occupation, length of residence, and community affiliation. Section B will contain statements measuring the study variables, namely community risk assessment, community participation, disaster education, early warning systems, and flood resilience. Responses will be measured using a five-point Likert Scale ranging from Strongly Agree (5), Agree (4), Undecided (3), Disagree (2), to Strongly Disagree (1). To ensure the validity of the instrument, the questionnaire will be subjected to face and content validity by experts in Disaster Risk Management, Environmental Management, Geography, and Research Methodology. The experts will evaluate the clarity, relevance, appropriateness, and adequacy of the questionnaire items in relation to the study objectives and research questions. Their observations and recommendations will be incorporated into the final version of the instrument before data collection. The reliability of the research instrument will be established through a pilot study involving respondents from a flood-prone community outside the study area but with similar characteristics. The data obtained from the pilot study will be analyzed using Cronbach's Alpha reliability coefficient, and a reliability coefficient of 0.70 or higher will be considered acceptable, indicating that the instrument possesses adequate internal consistency for the study. Primary data will be collected through direct administration of the questionnaires by the researcher with the assistance of trained research assistants who are familiar with the local language and the socio-cultural environment of Maiduguri Metropolitan Council. The research assistants will explain the purpose of the study to respondents, assist respondents who may have literacy challenges, and ensure that completed questionnaires are retrieved immediately after completion to maximize the response rate. The collected data will be coded, entered into the Statistical Package for the Social Sciences (SPSS), version 29, and analyzed using both descriptive and inferential statistical techniques. Descriptive statistics, including frequencies, percentages, means, and standard deviations, will be used to summarize respondents' demographic characteristics and answer the research questions. Inferential statistics will be employed to test the study hypothesis. Specifically, simple linear regression analysis will be used to determine the influence of Community-Based Disaster Risk Management on flood resilience, while multiple regression analysis will assess the individual and combined contributions of community risk assessment, community participation, disaster education, and early warning systems to flood resilience. The hypothesis will be tested at the 0.05 level of significance, and the decision rule will be to reject the null hypothesis if the calculated p-value is less than 0.05; otherwise, the null hypothesis will not be rejected. Ethical considerations will be strictly observed throughout the study. Approval will be obtained from the relevant institutional research ethics committee before data collection. Permission will also be sought from community leaders and relevant government agencies responsible for

disaster management in Maiduguri Metropolitan Council. Participation in the study will be entirely voluntary, and informed consent will be obtained from every respondent before administering the questionnaire. Respondents will be assured that the information they provide will be treated with strict confidentiality and used solely for academic purposes. No respondent will be compelled to participate, and participants will have the right to withdraw from the study at any stage without any adverse consequences.

RESULTS

Research Question One To what extent does community risk assessment influence flood resilience in Maiduguri Metropolitan Council, Borno State?

Table 4.1: Mean Analysis of Community Risk Assessment and Flood Resilience (N = 400)

S/N	Community Risk Assessment Variables	Mean	Std. Deviation	Decision
1	Community members regularly identify flood-prone areas before the rainy season.	4.18	0.79	Agree
2	Hazard mapping helps residents prepare for flood disasters.	4.25	0.71	Agree
3	Community leaders organize flood risk assessment meetings.	4.11	0.84	Agree
4	Local knowledge contributes to identifying flood risks.	4.29	0.68	Agree
5	Risk assessment improves community preparedness for flooding.	4.35	0.63	Agree
Grand Mean		4.24	0.73	High Extent

The findings presented in Table .1 indicate that community risk assessment has a high influence on flood resilience in Maiduguri Metropolitan Council, with a grand mean of 4.24 and a standard deviation of 0.73. Respondents generally agreed that hazard identification, community meetings, flood mapping, indigenous knowledge, and continuous risk assessment contribute significantly to improving preparedness and reducing flood vulnerability. The relatively low standard deviation indicates that respondents' opinions were fairly consistent. The result suggests that effective community risk assessment enhances the ability of

residents to anticipate flood hazards, develop preventive strategies, and strengthen resilience against future flood disasters.

Research Question Two What effect does community participation have on flood resilience in Maiduguri Metropolitan Council, Borno State?

Table 2: Mean Analysis of Community Participation and Flood Resilience (N = 400)

S/N	Community Participation Variables	Mean	Std. Deviation	Decision
1	Residents actively participate in community flood prevention programmes.	4.30	0.69	Agree
2	Community members contribute to environmental sanitation exercises.	4.22	0.73	Agree
3	Volunteer groups assist during flood emergencies.	4.15	0.77	Agree
4	Community participation strengthens disaster preparedness.	4.37	0.64	Agree
5	Collective community action reduces flood vulnerability.	4.41	0.60	Agree
Grand Mean		4.29	0.69	High Effect

Table 2 shows that community participation has a high positive effect on flood resilience in Maiduguri Metropolitan Council. The grand mean of 4.29 indicates strong agreement among respondents that active participation in disaster preparedness, sanitation campaigns, volunteer services, and collective decision-making enhances flood resilience. The standard deviation of 0.69 suggests minimal variation in respondents' opinions. This implies that communities that actively engage in disaster risk reduction activities are better prepared to withstand and recover from flood disasters.

Test of Hypothesis

H₀₁

Community-Based Disaster Risk Management has no significant influence on flood resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria.

Table 3: Simple Linear Regression Analysis Showing the Influence of Community-Based Disaster Risk Management on Flood Resilience

Model Summary

Model	R	R ²	Adjusted R ²	Std. Error
1	0.789	0.623	0.621	0.514

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	176.482	1	176.482	667.341	0.000
Residual	105.236	398	0.264		
Total	281.718	399			

Regression Coefficients

Variable	B	Std. Error	Beta	t	Sig.
Constant	1.214	0.167		7.271	0.000
Community-Based Disaster Risk Management	0.734	0.028	0.789	25.833	0.000

The regression analysis presented in Table 4.3 reveals a strong positive relationship between Community-Based Disaster Risk Management and flood resilience, with a correlation coefficient (R) of 0.789, indicating a high positive association. The coefficient of determination ($R^2 = 0.623$) shows that approximately 62.3% of the variation in flood resilience is explained by Community-Based Disaster Risk Management, while the remaining 37.7% is attributable to other factors not included in the model. The ANOVA result indicates that the regression model is statistically significant ($F = 667.341$; $p = 0.000 <$

0.05), demonstrating that the model provides a good fit for the data. The regression coefficient ($\beta = 0.789$; $t = 25.833$; $p = 0.000$) indicates that Community-Based Disaster Risk Management has a positive and statistically significant influence on flood resilience in Maiduguri Metropolitan Council. This means that improvements in community risk assessment, participation, disaster education, and early warning systems are associated with corresponding improvements in flood resilience. Since the p-value (0.000) is less than the significance level of 0.05, the null hypothesis (H_{01}) is rejected, while the alternative hypothesis (H_1) is accepted.

DISCUSSION OF FINDINGS

The findings of this study revealed that community risk assessment has a high influence on flood resilience in Maiduguri Metropolitan Council, Borno State. The descriptive analysis produced a grand mean of 4.24 with a standard deviation of 0.73, indicating that respondents generally agreed that community risk assessment contributes significantly to improving flood resilience. Specifically, respondents acknowledged that hazard identification, flood mapping, community meetings, indigenous knowledge, and continuous risk assessment enhance disaster preparedness and reduce flood vulnerability. The relatively low standard deviation suggests consistency in respondents' opinions, indicating a shared perception of the importance of risk assessment in disaster management. These findings imply that communities capable of identifying flood hazards before disasters occur are better positioned to develop mitigation strategies, prepare emergency responses, and minimize the devastating effects of flooding. The findings are consistent with the earlier observations made in the introduction that Community-Based Disaster Risk Management emphasizes local participation, preparedness, and resilience-building as fundamental strategies for reducing disaster risks. The result supports the submission of Bello and Salisu (2022), who argued that community-driven flood management enhances local ownership and promotes sustainable disaster management because community members possess firsthand knowledge of local environmental conditions. According to the authors, communities that actively participate in identifying flood-prone areas and assessing local risks develop stronger preparedness mechanisms than communities that depend solely on government interventions. The findings also agree with those of Nwosu and Eze (2023), who reported that participatory disaster education significantly improves household preparedness in flood-prone Nigerian communities. Their study revealed that residents who participate in community disaster awareness programmes are better informed about flood hazards, evacuation procedures, and emergency response strategies. This supports the present finding that regular community meetings and risk assessment activities improve preparedness and strengthen resilience. The findings further revealed that community participation has a high positive effect

on flood resilience in Maiduguri Metropolitan Council. The descriptive analysis produced a grand mean of 4.29 with a standard deviation of 0.69, indicating strong agreement among respondents that active participation in disaster preparedness, environmental sanitation campaigns, volunteer services, and collective decision-making contributes significantly to improving community resilience against flood disasters. The low standard deviation indicates that respondents expressed similar opinions concerning the importance of community participation in disaster management. This finding suggests that communities that actively engage in disaster risk reduction programmes possess greater capacity to anticipate, withstand, respond to, and recover from flood disasters.

This finding agrees with the earlier position presented in the introduction that Community-Based Disaster Risk Management emphasizes community participation as the foundation of sustainable disaster management. It confirms the submission of Bello and Salisu (2022) that community participation enhances local ownership of disaster management programmes and improves the sustainability of flood mitigation interventions. Their study demonstrated that involving residents in planning and implementing flood management programmes increases commitment, cooperation, and long-term resilience. The finding is equally consistent with Nwosu and Eze (2023), who found that participatory disaster education encourages active citizen involvement in preparedness activities and strengthens household resilience. Their study concluded that communities where residents participate actively in disaster awareness campaigns demonstrate higher levels of preparedness than communities with limited public participation. The hypothesis testing further revealed that Community-Based Disaster Risk Management has a statistically significant positive influence on flood resilience in Maiduguri Metropolitan Council, Borno State. The regression analysis produced a correlation coefficient (R) of 0.789, indicating a strong positive relationship between the independent and dependent variables. The coefficient of determination ($R^2 = 0.623$) showed that Community-Based Disaster Risk Management explained 62.3% of the variation in flood resilience, while the remaining 37.7% resulted from other variables not included in the regression model. The ANOVA result ($F = 667.341$; $p = 0.000$) confirmed that the regression model was statistically significant, while the regression coefficient ($\beta = 0.789$; $t = 25.833$; $p = 0.000$) established that Community-Based Disaster Risk Management significantly predicts flood resilience. Consequently, the null hypothesis was rejected, and the alternative hypothesis was accepted. These findings strongly support the earlier assertions made in the introduction that Community-Based Disaster Risk Management enhances resilience through community participation, preparedness, risk assessment, disaster education, and early warning systems. The findings are consistent with Bello and Salisu (2022), who argued that community-driven flood management strengthens resilience by promoting local ownership, community empowerment, and sustainable disaster

risk reduction. Their study emphasized that resilient communities are those in which local residents actively participate in identifying hazards, planning interventions, and implementing mitigation measures. The findings are equally supported by Nwosu and Eze (2023), whose study demonstrated that disaster education significantly improves preparedness and reduces household vulnerability in flood-prone communities. Likewise, Ogu et al. (2023) found that integrating indigenous knowledge with scientific disaster management improves adaptive capacity and strengthens community resilience. These findings reinforce the present study's conclusion that effective Community-Based Disaster Risk Management promotes long-term flood resilience. The study also aligns with Okafor and Nnamani (2024), who reported that community-based approaches significantly reduce flood vulnerability by empowering residents to participate actively in disaster management. Similarly, Ibrahim and Yusuf (2025) concluded that Community-Based Disaster Risk Management initiatives improved early warning systems, communication, preparedness, and emergency response in North East Nigeria. Furthermore, Obiajuru (2026) observed that community resilience programmes in Borno State significantly reduced disaster impacts despite ongoing security challenges by strengthening local participation, community leadership, and institutional collaboration.

Conclusion

The study examined the influence of Community-Based Disaster Risk Management (CBDRM) on flood resilience in Maiduguri Metropolitan Council, Borno State, North East Nigeria. The findings established that Community-Based Disaster Risk Management is a critical and effective strategy for enhancing the resilience of communities exposed to recurrent flooding. The descriptive analysis demonstrated that community risk assessment significantly contributes to flood resilience, as respondents strongly agreed that hazard identification, flood mapping, community consultations, indigenous knowledge, and continuous risk assessment improve preparedness and reduce flood vulnerability. These findings underscore the importance of proactive risk identification in enabling communities to anticipate flood hazards, develop appropriate mitigation measures, and minimize disaster-related losses. The study further established that community participation plays a significant role in strengthening flood resilience. The findings revealed that active involvement of community members in disaster preparedness programmes, environmental sanitation campaigns, volunteer emergency services, and collective decision-making significantly enhances the capacity of communities to withstand, respond to, and recover from flood disasters. Community participation promotes social cohesion, collective responsibility, local ownership of disaster management initiatives, and sustainable implementation of flood risk reduction strategies. The regression analysis further confirmed that Community-Based Disaster Risk Management has a statistically significant positive

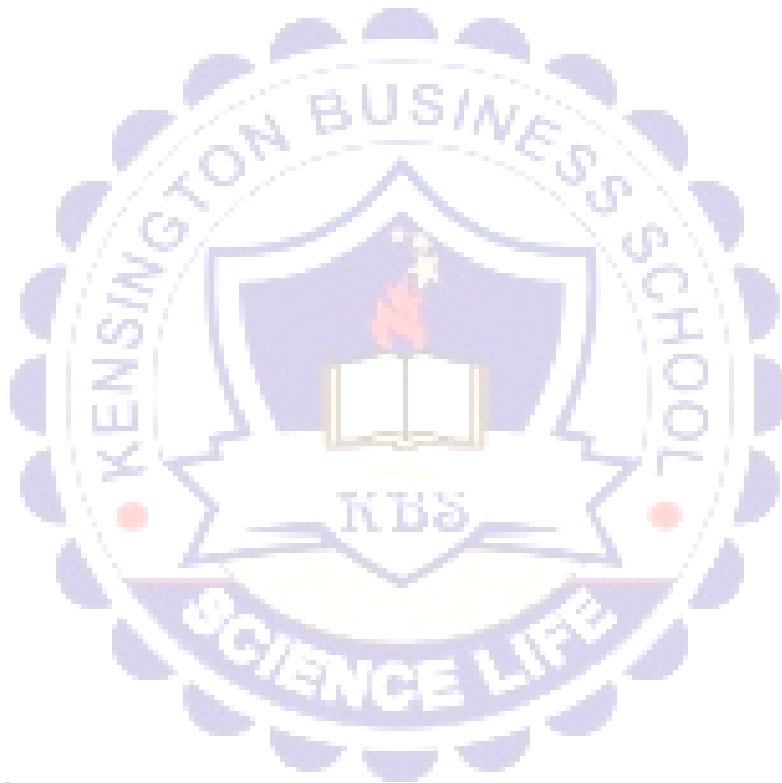
influence on flood resilience in Maiduguri Metropolitan Council. The strong positive correlation between the study variables indicates that improvements in community risk assessment, public participation, disaster education, indigenous knowledge integration, and early warning systems substantially improve community resilience. The coefficient of determination further demonstrated that Community-Based Disaster Risk Management accounts for a significant proportion of the variation in flood resilience, emphasizing its strategic importance in disaster risk reduction. The rejection of the null hypothesis confirmed that Community-Based Disaster Risk Management significantly influences flood resilience in the study area. This implies that communities that are actively involved in disaster planning, preparedness, risk assessment, and response are more capable of minimizing disaster impacts and recovering more quickly than communities that rely solely on external emergency interventions..

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Community risk assessment should be institutionalized by the Borno State Government, Maiduguri Metropolitan Council, the National Emergency Management Agency (NEMA), and the Borno State Emergency Management Agency (BOSEMA). Regular hazard mapping, vulnerability assessments, and flood risk identification exercises should be conducted with the active participation of local communities before every rainy season.
2. Community participation in disaster management should be strengthened through the establishment and continuous support of Community Disaster Management Committees in all flood-prone communities within Maiduguri Metropolitan Council. These committees should coordinate preparedness activities, organize environmental sanitation campaigns, and mobilize community volunteers during emergencies.
3. Comprehensive disaster education and public awareness programmes should be implemented regularly through schools, religious organizations, traditional institutions, community associations, radio, television, and social media. These programmes should educate residents on flood prevention, evacuation procedures, first aid, emergency response, and environmental conservation.
4. Early warning systems should be modernized and expanded by integrating meteorological forecasts, hydrological monitoring, mobile phone alerts, community radio broadcasts, public address systems, and local volunteer networks. Early warning information should be timely, accurate, accessible, and communicated in local languages to ensure that all residents receive adequate notice before flood events.

5. Indigenous knowledge should be integrated with scientific disaster management practices. Traditional knowledge regarding rainfall patterns, river behaviour, environmental indicators, and local coping mechanisms should complement modern flood forecasting, hazard mapping, and disaster preparedness programmes to improve resilience.
6. Government should invest in resilient infrastructure by constructing and maintaining effective drainage systems, flood control structures, retention basins, embankments, and stormwater management facilities. Routine desilting of drainage channels and strict enforcement of urban planning regulations should be prioritized to reduce flood risks.



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