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# Community-Based Adaptation Strategies to Flood: Settling the Issue of Sustainable Urbanisation in Ringim

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ABSTRACT

Flooding poses a significant threat to urban areas in semi-arid regions, particularly in Ringim, where rapid urbanisation, climate vulnerability and socio-economic factors exacerbate the impacts of floods. This study explores the role of community-driven approaches in addressing flooding issues to advance sustainable urbanisation in Ringim, Jigawa State, Nigeria. Sustainable urban development in such flood-prone regions requires adaptive strategies that respond to local needs and capacities, aiming to address and resolve challenges in achieving urban sustainability. This research evaluates the effectiveness of current Community-Based Adaptation (CBA) strategies in mitigating flood impacts in Ringim, focusing on how these strategies contribute to the goal of sustainable urbanisation. Data were collected through five Focus Group Discussions (FGDs) with community leaders, Non-Governmental Organisations (NGO) representatives, public officers, professionals, and academics, ensuring diverse perspectives from key stakeholders. The data were analysed qualitatively in QSR NVivo to identify codes and common themes, successes, and persistent challenges. Findings reveal that community involvement significantly improves adaptation efficacy, especially when local knowledge and cooperative action guide flood preparedness and response. However, gaps remain in resource allocation and technical support, limiting long-term sustainability. This study highlights the critical role of locally informed adaptation strategies in fostering resilient urban development and suggests that policymakers and development agencies prioritise community engagement within urban planning. The study is limited to qualitative insights from a single semi-arid community, which may not represent all flood-prone urban areas. Future research could expand to comparative analyses of similar semi-arid regions to refine adaptation strategies across diverse urban landscapes.

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## INTRODUCTION

Flooding is a persistent challenge in semi-arid regions, where rapid urbanisation and climate change converge to intensify environmental risks. Ringim, located in Jigawa State, Nigeria, faces recurrent floods that disrupt livelihoods, damage infrastructure, and threaten the community's socio-economic stability (Muhammad & Rilwanu, 2020). These issues are compounded by the region's rapid urban expansion, which, without adequate planning, exacerbates environmental vulnerability (Mairiga & Ibrahim, 2021). Sustainable urbanisation in Ringim requires a multifaceted approach that not only addresses the immediate impacts of flooding but also fosters long-term resilience against future climate-related events (Aliyu, 2017).

Community-based adaptation (CBA) has emerged as a promising strategy for managing flood risks, as it empowers local stakeholders to participate actively in disaster preparedness, response, and recovery (Piggott-McKellar et al., 2019; Rahman & Huq, 2021). This approach leverages local knowledge, promotes shared responsibility, and aligns with the unique social, economic, and environmental contexts of the area (Alam & Kumar, 2023; McNamara & Buggy, 2017). In Ringim, community-led flood adaptation initiatives may hold the key to not only mitigating flood impacts but also advancing sustainable urbanisation goals.

This study evaluates the effectiveness of current CBA strategies to flood in Ringim by drawing insights from focus group discussions (FGDs) conducted with a range of stakeholders, including community leaders, NGOs, public officers, professionals, and academics. Through this qualitative approach, the study seeks to identify successful practices, understand areas that require improvement, and address issues related to sustainable urbanisation in flood-prone areas. By focusing on the Ringim context, this research aims to contribute to the growing body of knowledge on climate adaptation and sustainable urban development in semi-arid regions.

## BACKGROUND OF STUDY

Flooding is a critical environmental challenge affecting urban areas worldwide, particularly in semi-arid regions where climate variability exacerbates the risks associated with rapid urbanisation. Studies indicate that flooding not only disrupts infrastructure and livelihoods but also poses significant threats to social and economic development (Mastrorillo et al., 2016). In Nigeria, where communities like Ringim face recurrent flooding, the need for effective adaptation strategies is increasingly recognised (Okonkwo, 2013; Bello et al., 2017; Echendu, 2020).

CBA refers to locally driven strategies that enhance resilience to climate-related risks by integrating community knowledge, participation, and social structures into adaptation planning (Reid, 2014). Unlike top-down approaches that rely on centralised policies and scientific expertise, CBA prioritises local experiences, socio-cultural practices, and grassroots initiatives to develop context-specific adaptation solutions (Ayers & Forsyth, 2009). In urban areas like Ringim, where flood risks are influenced by population density, infrastructure, and economic activities, CBA involves a blend of traditional practices and modern interventions. While rural communities often rely heavily on indigenous knowledge (e.g., seasonal water diversion techniques), urban settings integrate technical knowledge and participatory governance, such as community-led drainage maintenance, early warning systems, and locally driven urban planning initiatives (Ensor & Berger, 2018). Ringim qualifies as an urban area due to its administrative role, infrastructure, economic diversity, and population density. As the headquarters of Ringim Local Government Area (LGA) in Jigawa State, it functions as a governance and service hub, a key characteristic of urban centres. The presence of formal institutions, including schools, healthcare facilities, paved roads, and commercial markets, further supports its urban classification. While agriculture remains part of the

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local economy, economic activities in Ringim are diverse, encompassing commerce, transportation, and small-scale industries, which align with urban economic structures. Its higher population density and road networks connecting it to major cities facilitate trade and mobility, reinforcing its urban identity. Therefore, despite some agricultural activities, Ringim meets the criteria of an urban area, making it distinct from rural settlements.

CBA has emerged as a viable approach to managing flood risks, emphasising local involvement in the adaptation process (Smit & Wandel, 2006; Reid, 2014; Filho et al., 2023). This approach harnesses local knowledge, engages stakeholders in decision-making, and promotes ownership of adaptation strategies, which can lead to more effective and sustainable outcomes (Kamarulzaman et al., 2016; Mastrorillo et al., 2016; Jaimerena, 2018; Gómez-Baggethun, 2022). Studies have shown that when communities are empowered to participate actively in the adaptation process, they can better identify vulnerabilities, develop appropriate responses, and enhance resilience against flooding (Ensor & Berger, 2009; Folke et al., 2010; Wilson, 2012; Ensor et al., 2018; McClymont et al., 2020).

In the context of sustainable urbanisation, CBA contributes to broader development goals by integrating environmental, social, and economic considerations into urban planning (Satterthwaite, 2011, 2017; Satterthwaite et al., 2020). Sustainable urbanisation requires adaptive strategies that not only mitigate the impacts of climate-related hazards but also promote long-term ecological and socio-economic sustainability (UN-Habitat, 2016). In semi-arid regions, where water scarcity and land degradation are prevalent, incorporating community perspectives into urban planning is essential for achieving sustainability (Mastrorillo et al., 2016).

However, while the potential benefits of CBA are significant, challenges remain. Limited access to financial resources, insufficient technical expertise, and inadequate governmental support can hinder the effectiveness of community-led initiatives (Crisp et al., 2016; Soliman, 2019; Westoby et al., 2021). Moreover, the interplay between local and external actors can complicate the implementation of adaptation strategies, leading to conflicts or misalignment of objectives (Eriksen et al., 2021; Lesnikowski et al., 2021).

Recent studies highlight the importance of understanding the socio-political context in which CBA occurs, suggesting that successful adaptation strategies must be context-specific and tailored to local needs (Piggott-McKellar et al., 2019; Drolet, 2021; Fischer, 2021; Mfitumukiza et al., 2020; Rahman & Huq, 2021; Alam & Kumar, 2023). Therefore, examining the unique socio-economic and environmental conditions of Ringim is crucial for evaluating the effectiveness of CBA strategies in enhancing sustainable urbanisation.

The literature emphasises the importance of community involvement in adaptation efforts, the integration of environmental and socio-economic considerations in urban planning, and the need for context-specific approaches. This study aims to build on these insights by evaluating the effectiveness of current CBA strategies in Ringim and identifying areas for improvement in promoting sustainable urbanisation.

## Research Question

How do community-based adaptation strategies address flood risks and enhance sustainable urbanisation in Ringim?

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### Research Objective

To evaluate the effectiveness of community-based adaptation strategies in addressing flood risks and advancing sustainable urbanisation in Ringim, Jigawa State, Nigeria.

## MATERIALS AND METHOD

This qualitative study was conducted to evaluate the effectiveness of CBA strategies in addressing flood risks and advancing sustainable urbanisation in Ringim, Jigawa State, Nigeria. This study utilised a participatory approach through FGDs to gather in-depth insights from a diverse range of stakeholders within the community.

### Data Collection

Five FGDs were organised, involving participants from various sectors, including community leaders, NGO representatives, public officers, professionals, and academics. Each focus group comprised four to eight participants, ensuring a rich diversity of perspectives. The discussions were designed to elicit information on existing CBA strategies, successes and challenges faced in implementation, and the perceived impact of these strategies on sustainable urbanisation.

The FGDs were facilitated using a semi-structured interview approach, which included open-ended questions to encourage discussion and explore participants' experiences and opinions (Khan & Abedin, 2022). The discussions were audio-recorded with the consent of the participants and subsequently transcribed for analysis.

### Data Analysis

The transcribed data were analysed using thematic analysis in QSR NVivo, a method that allows for the identification and interpretation of patterns and themes within qualitative data (Robins & Eisen, 2017; Braun & Clarke, 2022). The analysis involved the following steps:

(i) **Familiarisation with Data**

The researcher reviewed the transcripts multiple times to become deeply familiar with the content.

(ii) **Generating Initial Codes**

Key pieces of information related to CBA strategies and sustainable urbanisation were coded, highlighting significant statements and ideas.

(iii) **Identifying Themes**

The initial codes were then grouped into broader themes that reflected the collective experiences and perspectives of the participants.

(iv) **Reviewing Themes**

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Themes were reviewed to ensure they accurately represented the data and were distinct from one another.

(v) **Defining and Naming Themes**

Clear definitions and descriptions were assigned to each theme, capturing the essence of the data related to the study objectives.

## Ethical Considerations

Ethical approval for the study was obtained from the relevant authorities in Ringim. Informed consent was secured from all participants before the discussions, and confidentiality was maintained throughout the research process (Mirza et al., 2023; Karunarathna et al., 2024). Participants were assured that their contributions would be anonymised and used solely for research purposes (Karunarathna et al., 2024).

## The Study Area


Fig. 1. The Location of Ringim on a Map of Nigeria from Google Map

Source: Authors (2024)

Ringim is a LGA in Jigawa State, Nigeria. Geographically, it lies at approximately 12.1514° N latitude and 9.1622° E longitude (Figure 1). The administrative center of the LGA is the town of Ringim, which serves as the focal point for governance and local activities. Covering a land area of 1,057 square kilometres, Ringim is a region with significant agricultural and socio-economic activities, making it essential to both local and state development (Mairiga & Ibrahim, 2021). According to the 2006 national census, Ringim had a population of 192,024 people (National Population Commission (NPC) & National Bureau of Statistics (NBS), 2016), with numbers expected to increase due to both natural growth and

migration trends. This demographic and geographic profile highlights Ringim's importance within Jigawa State, as well as its potential vulnerabilities to environmental challenges, such as seasonal flooding, which impact the community's livelihood and adaptation strategies. Ringim is situated in the northeastern region of the country, characterised by its semi-arid climate, which significantly influences its socio-economic activities and environmental conditions (Lawal et al., 2020; Mairiga & Ibrahim, 2021). The area is known for its unique blend of cultural heritage and agricultural practices, primarily relying on subsistence farming, livestock rearing, and small-scale trade.

### Geographical and Climatic Characteristics

Ringim covers a land area of approximately 1,741 square kilometers and is bordered by several other local government areas, including Hadejia to the east and Kazaure to the west. The topography is predominantly flat, with some undulating terrain, making it vulnerable to flooding, particularly during the rainy season, which typically lasts from June to September (Muhammad & Rilwanu, 2020). Average annual rainfall in the region ranges from 600 to 800 millimeters, with significant variability from year to year.

The climate in Ringim is characterised by distinct wet and dry seasons. The dry season is marked by high temperatures, often exceeding 40°C, while the wet season brings cooler temperatures but can also lead to flooding due to intense rainfall. The combination of these climatic conditions poses significant challenges for the local population, particularly in terms of water management, agriculture, and urban development.

### Socio-Economic Context

The population of Ringim is predominantly composed of the Hausa-Fulani ethnic group, with a rich cultural history that influences social structures and community interactions. Agriculture is the primary economic activity, with crops such as millet, sorghum, and maize cultivated for subsistence and local markets. However, the region faces challenges related to food security, land degradation, and limited access to resources, which are exacerbated by flooding events (Diary, 2015).

In recent years, rapid urbanisation has been observed in Ringim, driven by population growth and rural-urban migration. This urban expansion has led to increased pressure on existing infrastructure and services, making the community more susceptible to flood risks (Muhammad & Rilwanu, 2020). In response to these challenges, various CBA strategies have emerged, aimed at enhancing resilience to flooding and promoting sustainable urban development.

## RESULTS

The FGDs yielded significant insights regarding the prevailing adaptation strategies employed by the community, along with the associated challenges and prospects for enhancing resilience to flood events in Ringim, Jigawa State.

### Demographics of the Participants in the FGDs

The FGD participants embody a heterogeneous amalgamation of community constituents and professional individuals, each contributing significant insights pertinent to flood adaptation strategies within Ringim, Jigawa State (Table 1).

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The cohort of community leaders is predominantly comprised of elderly males, primarily engaged in agricultural activities, characterised by modest financial resources and limited educational qualifications, thereby imparting profound local knowledge and traditional practices derived from their extensive tenure in the community.

Members of NGOs are predominantly male, encompassing a spectrum of occupations from traders to artisans, possessing educational qualifications ranging from secondary to tertiary levels, with moderate income levels and considerable duration of residency, thus presenting pragmatic viewpoints regarding the mobilisation of local resources.

The professionals' group, consisting of architects, urban planners, and engineers, is characterised by high educational attainment and financial stability, thereby offering technical insights into infrastructure development, underpinned by substantial residency experience.

Public officers are composed of seasoned civil servants with advanced educational credentials, who contribute specialised knowledge in policy formulation and administrative processes, thereby exerting considerable influence within the realm of local governance.

The academic group is predominantly male, with the inclusion of one female lecturer, all of whom possess advanced academic qualifications and contribute research-oriented perspectives, coupled with relatively higher income levels, thereby facilitating a connection between academic expertise and community exigencies.

Table 1. Demography of all Participants in the FGDs

| FGD Group | Participants | Gender | Age | Occupation | Qualification | Marital Status | Income (#) | Years of Residency |
|---|---|---|---|---|---|---|---|---|
| Community Leaders (CL) (N=7) | 1 | Male | 63 | Farmer | Non-formal | Married | 25,000 | Since birth |
| | 2 | Male | 61 | Farmer | Secondary | Married | 28,000 | Since birth |
| | 3 | Male | 63 | Farmer | Non-formal | Married | 25,000 | Since birth |
| | 4 | Male | 54 | Teacher | Degree | Married | 25,000 | Since birth |
| | 5 | Male | 60 | Farmer | Primary | Married | 15,000 | 40 |
| | 6 | Male | 60 | Trader | Primary | Married | 20,000 | 45 |
| | 7 | Male | 61 | Farmer | Primary | Married | 25,000 | 47 |
| NGO's (NG) Members (N=5) | 1 | Male | 50 | Trader | Degree | Married | 30,000 | 43 |
| | 2 | Male | 34 | Artisan | Secondary | Married | 15,000 | Since birth |
| | 3 | Male | 45 | Trader | Diploma | Married | 20,000 | Since birth |
| | 4 | Male | 43 | Artisan | Diploma | Married | 50,000 | Since birth |
| | 5 | Male | 40 | Farmer | Degree | Married | 15,000 | 25 |
| Professional (PRO) Members (N=7) | 1 | Male | 49 | Architect | Masters | Married | 95,000 | 30 |
| | 2 | Male | 45 | Architect | Masters | Married | 80,000 | 25 |
| | 3 | Male | 50 | Town Planner | Bachelor | Married | 75,000 | 35 |
| | 4 | Male | 38 | Land Surveyor | Higher Diploma | Married | 65,000 | 20 |

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| FGD Group | Participants | Gender | Age | Occupation | Qualification | Marital Status | Income (#) | Years of Residency |
|---|---|---|---|---|---|---|---|---|
| | 5 | Male | 40 | Civil Engineering | Bachelor | Married | 95,000 | 20 |
| | 6 | Male | 38 | Architect | Masters | Married | 80,000 | 18 |
| | 7 | Male | 41 | Builder | Higher Diploma | Married | 45,000 | 20 |
| Public Officer's (PO) Members (N=4) | 1 | Male | 54 | Civil Servant | Degree | Married | 130,000 | 45 |
| | 2 | Male | 39 | Civil Servant | Masters | Married | 110,000 | 25 |
| | 3 | Male | 48 | Civil Servant | Higher Diploma | Married | 85,000 | Since birth |
| | 4 | Male | 44 | Civil Servant | Degree | Married | 90,000 | 30 |
| Academic (ACD) Members (N=5) | 1 | Male | 42 | Lecturer I | Masters | Married | 150,000 | 25 |
| | 2 | Male | 38 | Lecturer II | Masters | Married | 130,000 | 20 |
| | 3 | Male | 49 | Senior Lecturer | PhD | Married | 185,000 | 30 |
| | 4 | Female | 44 | Lecturer I | Masters | Married | 150,000 | 28 |
| | 5 | Male | 40 | Lecturer II | Masters | Married | 130,000 | 25 |

Source: Authors (2024)

The varying socio-economic statuses, educational attainments, and professional experiences of the participants in the FGDs exemplify both the inherent challenges and potential opportunities within the community; their prolonged residency in Ringim signifies a profound comprehension of local exigencies and constraints about flood adaptation initiatives.

## Key Themes and Insights

The FGDs illuminated numerous persistent themes, underscoring the intricate interrelationship among socio-economic, environmental, and infrastructural elements that collectively shape the community's capacity to effectively adapt to flooding. The analysis of the FGDs revealed several codes and key themes related to the effectiveness of CBA strategies in addressing flood risks and enhancing sustainable urbanisation in Ringim. The condensed results from the analysis are organised into three main categories: successful adaptation strategies, challenges faced, and perceived impacts on sustainable urbanisation.

Table 2 summarises the key codes and themes derived from the analysis of all FGD conversations and condenses the themes to the three most common among the five FGDs, offering a structured view of the findings on community-based adaptation in Ringim.

Table 2. Codes and Themes that Emanated from The Analysis of the FGDs

| SN | Theme | Code | Description |
|---|---|---|---|
| 1 | Successful Adaptation Strategies | Community Mobilisation | Emphasises the importance of collective action and participation in flood preparedness activities. |
| | | Traditional Knowledge | Involves using indigenous practices and ancestral methods for flood management, seen as effective and familiar. |

 

| | | | |
|---|---|---|---|
| | | Collaborative Efforts | Highlights partnerships between community members, NGOs, and government agencies to strengthen resilience. |
| 2 | Challenges Faced | Resource Limitations | Refers to a lack of adequate funding and materials, which hinders the implementation of strategies. |
| | | Technical Knowledge Gaps | Identifies a need for training in modern flood management techniques, impacting the effectiveness of efforts. |
| | | Coordination Issues | Describes difficulties in communication and alignment among stakeholders, leading to fragmented efforts. |
| 3 | Perceived Impacts on Sustainable Urbanisation | Improved Livelihoods | Positive impact on local economies through sustainable practices, leading to better flood resilience. |
| | | Community Empowerment | Increased involvement of residents in decision-making, fostering a sense of agency and responsibility. |
| | | Social Cohesion | Strengthened bonds among community members as they work together on adaptation strategies, fostering unity. |

Source: Authors (2024)

## Successful Adaptation Strategies

**Community Mobilisation and Awareness:** Participants emphasised the importance of community mobilisation in enhancing awareness about flood risks and the need for preparedness. Local leaders have facilitated workshops and training sessions that educate community members on flood management practices, leading to increased collective action during flood events.

**Traditional Knowledge Integration:** The integration of traditional knowledge in flood adaptation strategies was highlighted as a significant strength. Community members shared their ancestral practices of water management, such as constructing earthen dikes and utilising natural drainage systems, which have proven effective in reducing flood impacts.

**Collaboration with NGOs and Government Agencies:** Partnerships with NGOs and government bodies were recognised as crucial for successful adaptation initiatives. Participants noted that these collaborations have resulted in the provision of resources, technical assistance, and financial support for community-led projects, such as the construction of drainage systems and flood barriers.

**Sustainable Agricultural Practices:** The adoption of sustainable agricultural practices was cited as an effective strategy for reducing vulnerability to flooding. Participants discussed the implementation of crop rotation, agroforestry, and soil conservation techniques, which not only improve food security but also enhance the resilience of agricultural systems to flood-related disruptions.

## Challenges Faced

**Limited Resources and Funding:** A significant challenge identified was the lack of financial resources and funding for CBA projects. Many participants expressed frustration over the difficulty in accessing funds to implement large-scale infrastructure improvements and long-term adaptation measures.

**Insufficient Technical Knowledge:** While community knowledge is valuable, participants acknowledged a gap in technical expertise related to modern flood management practices. The absence of

trained personnel to guide the design and implementation of adaptation strategies has hindered the effectiveness of some initiatives.

**Coordination and Communication Gaps:** Challenges in coordination among community members, NGOs, and government agencies were noted. Participants reported instances of miscommunication and lack of clear roles, leading to overlapping efforts or gaps in implementation.

**Perceived Impacts on Sustainable Urbanisation**

**Improved Community Resilience:** Participants overwhelmingly agreed that CBA strategies have led to increased resilience to flooding. By fostering collaboration and preparedness, the community is better equipped to respond to flood events, reducing the overall impact on livelihoods and infrastructure.

**Enhanced Socio-Economic Stability:** The implementation of successful adaptation measures has contributed to improved socio-economic stability in the community. Participants noted that sustainable agricultural practices have led to better yields and food security, which in turn supports local economies.

**Increased Awareness and Engagement:** The focus on community mobilisation and education has resulted in heightened awareness of climate issues among residents. Many participants reported a greater sense of agency and engagement in local governance and urban planning processes.

The findings highlight the importance of CBA strategies in mitigating flood risks and promoting sustainable urbanisation in Ringim. While several successful practices have been identified, challenges remain that require attention from local leaders, policymakers, and external partners to enhance the effectiveness of these strategies.

The entirety of the interaction dynamics within the Focus Group Discussions (FGDs) is further elucidated through the examination of word frequency as represented in a word frequency table and a word cloud, which accentuates the viewpoints of the stakeholders. Table 3 lists the most frequently used words in the study, along with each word's length, occurrence count, and weighted percentage of total word usage. "Community" appears most frequently (645 times, 2.73%), emphasising its centrality in discussions about flood adaptation. Other common words include "flood" (1.77%), "government" (1.68%), and "strategies" (1.25%), highlighting themes of governance, planning, and response to flooding. Terms such as "drainage," "systems," and "adaptation" reflect the focus on infrastructural and adaptive measures, while words like "people," "local," and "Ringim" indicate a community-centered approach. Together, these words provide insight into key areas of concern and focus within the study, particularly around community, governmental involvement, and adaptation infrastructure.

Table 3. Word Frequency of 25 Most Occurring Words Used by The Participants in The FGDs

| S/N | Word | Length | Count | Weighted Percentage (%) |
|---|---|---|---|---|
| 1 | Community | 9 | 645 | 2.73 |
| 2 | Flood | 5 | 419 | 1.77 |
| 3 | Government | 10 | 398 | 1.68 |
| 4 | Strategies | 10 | 296 | 1.25 |
| 5 | Drainage | 8 | 294 | 1.24 |

| S/N | Word | Length | Count | Weighted Percentage (%) |
|---|---|---|---|---|
| 6 | Communities | 11 | 273 | 1.15 |
| 7 | Systems | 7 | 270 | 1.14 |
| 8 | Flooding | 8 | 227 | 0.96 |
| 9 | Adaptation | 10 | 212 | 0.90 |
| 10 | Floods | 6 | 204 | 0.86 |
| 11 | People | 6 | 164 | 0.69 |
| 12 | Sand | 4 | 162 | 0.68 |
| 13 | Building | 8 | 151 | 0.64 |
| 14 | Local | 5 | 146 | 0.62 |
| 15 | Based | 5 | 136 | 0.57 |
| 16 | Management | 10 | 135 | 0.57 |
| 17 | Food | 4 | 134 | 0.57 |
| 18 | Yes | 3 | 132 | 0.56 |
| 19 | Efforts | 7 | 125 | 0.53 |
| 20 | State | 5 | 122 | 0.52 |
| 21 | Drainages | 9 | 116 | 0.49 |
| 22 | Lack | 4 | 109 | 0.46 |
| 23 | Ringim | 6 | 108 | 0.46 |
| 24 | Urban | 5 | 106 | 0.45 |
| 25 | Walls | 5 | 106 | 0.45 |

Source: Authors (2024)

The word cloud (Figure 2) visually represents the most frequently used words in the study, with larger words indicating higher frequency. The prominence of "community" highlights its central role in the study, suggesting a strong focus on collective approaches and local engagement in flood adaptation. Other notable words like "government," "flood," "strategies," and "drainage" reflect themes around governance, infrastructure, and planning related to flood resilience. Words such as "systems," "adaptation," and "communities" further emphasis the study's focus on structured responses and local collaboration. This word cloud indicates that the study is deeply concerned with how communities, in coordination with government strategies, respond to flooding and manage related challenges. Overall, it underscores the importance of community-centered approaches, governance, and adaptation strategies in managing flood impacts.

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Fig. 2. Word Frequency of Most Frequent Words Used in All FGDs

Source: Authors (2024)

This matrix coding query (Figure 3) visually represents the distribution of coding references across various themes and categories, illustrating the frequency and intensity with which each theme is addressed within the dataset. Themes such as "Cultural and Social Factors," "Inadequate Infrastructure," "Insufficient Community Engagement," and "Lack of Effective Early Warning" show a high density of coding, indicating they are recurring issues or areas of significant concern in the study.

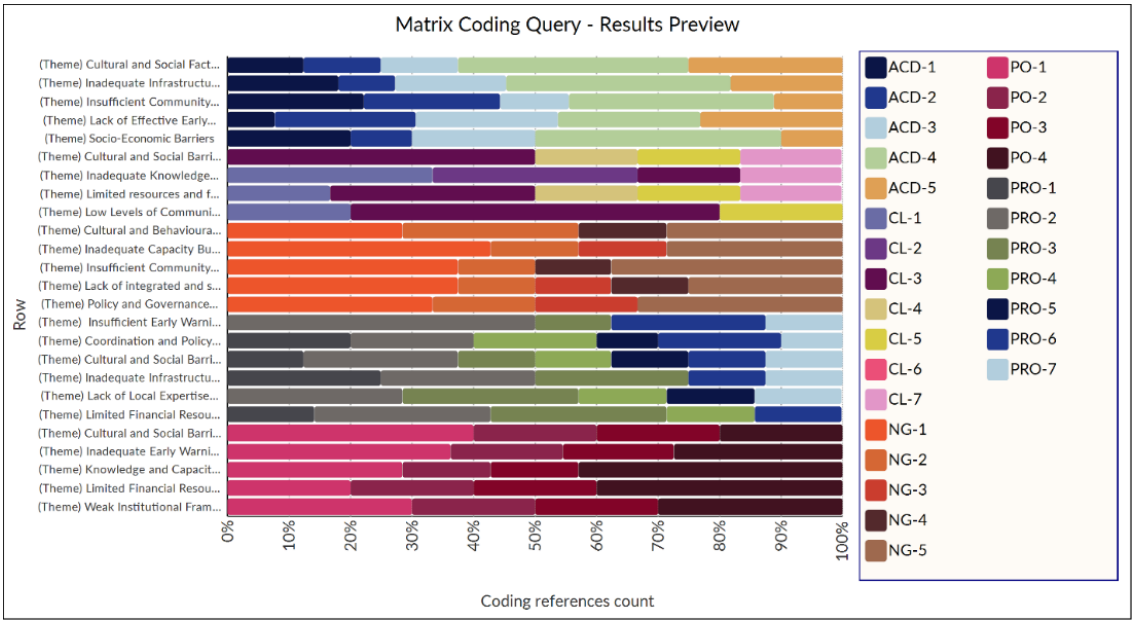


Fig. 3. The 100% Stacked Bar Matrix Coding Query for All of The FGDs

Source: Authors (2024)

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Each colour block represents a different code (ACD-1 to ACD-5, CL-1, etc.), corresponding to different categories or perspectives within the data. The length of the coloured segments in each row indicates the relative importance or emphasis of each theme in the analysis. For example, themes related to "Socio-Economic Barriers" and "Policy and Governance" show a diverse range of responses, suggesting varied opinions or experiences across these topics. In contrast, "Insufficient Early Warning" and "Lack of Local Expertise" show more consistency in coding, possibly indicating a unified perspective on these challenges.

This matrix allows for a visual comparison of how different themes interact and overlap across categories, providing insight into the multifaceted challenges of community-based flood adaptation. The coding density across themes suggests that cultural, infrastructural, and governance issues are key areas impacting community resilience efforts. This analysis helps identify areas where targeted interventions might be most effective in addressing community concerns.

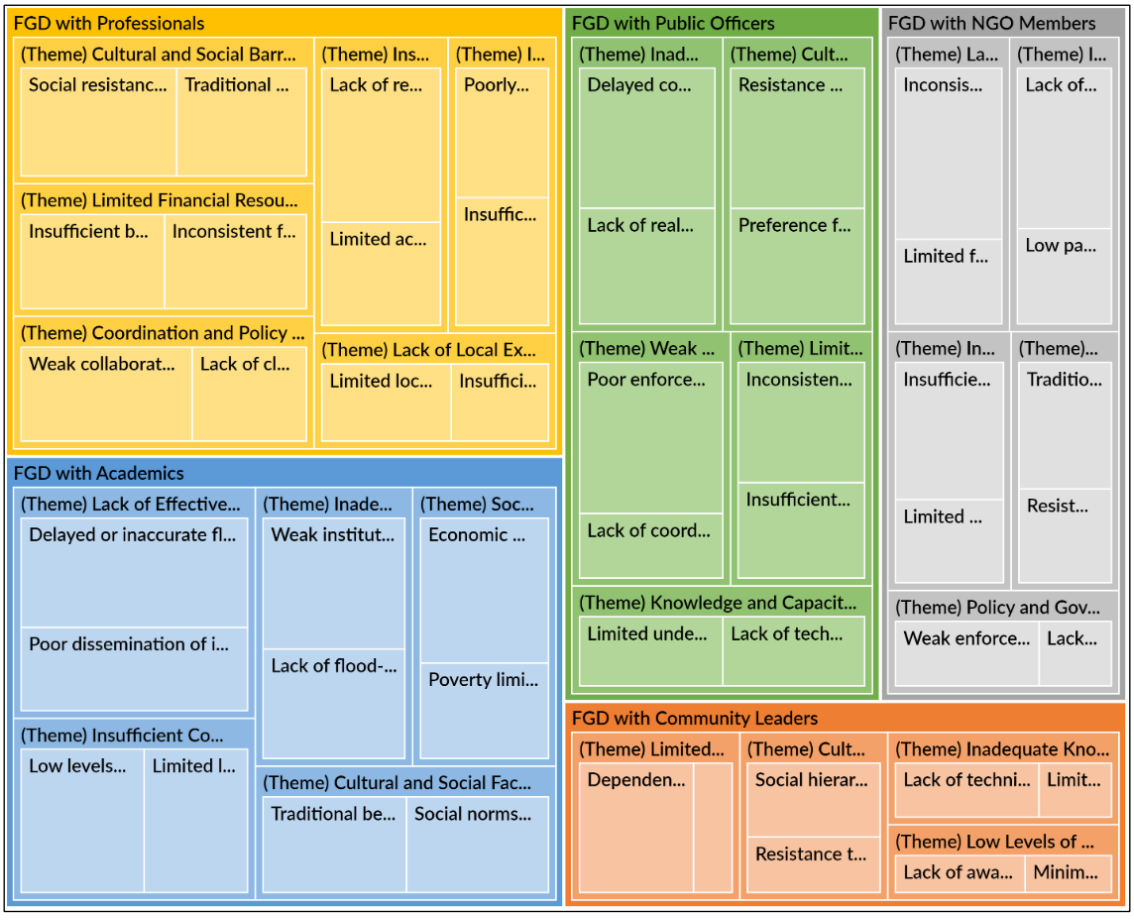


Fig. 4. Hierarchy Charts of Codes for The FGDs

Source: Authors (2024)

The hierarchy matrix chart (Figure 4) shows feedbacks from different focus groups, revealing key themes and challenges:

 

(i) **Professionals** – Noted cultural resistance, financial issues, and a lack of local expertise.

(ii) **Public Officers** – Highlighted inadequate infrastructure, weak policy enforcement, and limited resources.

(iii) **NGO Members** – Focused on low community involvement and inconsistent funding.

(iv) **Academics** – Pointed out weak warning systems, economic barriers, and a lack of community awareness.

(v) **Community Leaders** – Emphasised dependency on aid, cultural norms, and low awareness.

Across all groups, common barriers included cultural resistance, financial constraints, and knowledge gaps, indicating the need for holistic, culturally sensitive solutions.

**Triangulation of the Findings**

Triangulation is a vital methodological approach used to enhance the validity and reliability of research findings by integrating multiple data sources, perspectives and methods (Moon, 2019; Donkoh & Mensah, 2023). In this study, triangulation was employed by gathering insights from various stakeholders through FGDs, including community leaders, NGO representatives, public officers, and professionals. The convergence of findings from these diverse groups provides a comprehensive understanding of CBA strategies and their impacts on sustainable urbanisation in Ringim.

**Convergence of Perspectives**

(i) **Community Mobilisation and Awareness**

All stakeholder groups unanimously emphasised the significance of community mobilisation and awareness in enhancing flood preparedness. Community leaders highlighted the effectiveness of local workshops and training sessions, while NGO representatives acknowledged their role in facilitating these initiatives. Public officers corroborated these views by noting the observed increase in community engagement during flood events, indicating a shared understanding of the importance of proactive measures.

(ii) **Integration of Traditional Knowledge**

The integration of traditional knowledge emerged as a recurring theme across all FGDs. Community members and leaders spoke about the value of ancestral practices in flood management, while NGOs recognised the necessity of incorporating these practices into modern adaptation strategies. This convergence reinforces the importance of leveraging local knowledge to enhance the effectiveness of flood adaptation efforts.

(iii) **Collaboration and Partnerships**

The need for collaboration among community members, NGOs, and government agencies was a consistent point of discussion. Participants from all sectors acknowledged that successful adaptation strategies often resulted from effective partnerships. This collective recognition

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underscores the significance of coordinated efforts in enhancing the resilience of Ringim to flooding.

## Challenges and Barriers

### *Key Themes and Insights*

#### (i) Resource Limitations

All participant groups identified limited resources and funding as a major barrier to implementing effective adaptation strategies. Community leaders expressed frustration over the lack of financial support, while NGO representatives discussed the challenges they face in securing funds for community projects. Public officers noted that government resources are often insufficient to meet the demands of flood management, highlighting a common concern across sectors.

#### (ii) Technical Knowledge Gaps

A shared understanding of the need for enhanced technical expertise was evident among participants. While community leaders highlighted their traditional practices, they also acknowledged the gaps in modern flood management knowledge. NGOs and public officers emphasised the importance of capacity-building initiatives to bridge this gap, suggesting a unified recognition of the need for training and support.

#### (iii) Coordination Issues

Coordination and communication challenges were reported by all stakeholder groups. Community leaders expressed the need for clearer roles in collaborative efforts, while NGO representatives noted instances of overlapping initiatives. Public officers echoed these concerns, emphasising that improved communication is essential for the effective implementation of adaptation strategies. This convergence of viewpoints suggests that addressing coordination issues is a priority for enhancing the impact of community-based adaptation.

The triangulation of findings from diverse stakeholder perspectives reinforces the validity of this study's results and highlights the importance of CBA strategies in mitigating flood risks and promoting sustainable urbanisation in Ringim. The consistent themes identified across different groups indicate a collective recognition of the strengths, challenges, and opportunities within the community.

## DISCUSSION

The findings of this study illuminate the effectiveness of CBA strategies in addressing flood risks and enhancing sustainable urbanisation in Ringim, Jigawa State, Nigeria. By evaluating the perspectives of various stakeholders through FGDs, this study provides valuable insights into successful practices, challenges faced, and the overall impact on community resilience and urban sustainability.

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## Addressing the Objectives

The primary objective of this study was to evaluate the effectiveness of CBA strategies in mitigating flood risks. The results demonstrate that community mobilisation and awareness-raising initiatives are pivotal to enhancing preparedness and response during flood events. As one community leader remarked, *"When we come together and share our experiences, we learn how to protect our homes and help each other during floods."* This sentiment reflects the broader finding that active community participation fosters a collective sense of responsibility, echoing the views of Reid et al. (2014), who emphasise the importance of local engagement in climate adaptation efforts.

The integration of traditional knowledge into adaptation strategies further supports the study's objective. Participants highlighted the effectiveness of ancestral practices, such as constructing earthen barriers and utilising natural drainage systems, which resonate with findings from Mastrorillo et al. (2016) that advocate for the inclusion of local knowledge in modern adaptation frameworks. One participant noted, *"Our forefathers knew how to manage the floods; we must not forget their wisdom."* This acknowledgement of traditional practices underscores the need for contextualised adaptation strategies that respect local customs and experiences.

## Challenges and Opportunities

While the findings reveal successful adaptation strategies, they also highlight significant challenges that impede effective implementation. Limited financial resources emerged as a critical barrier, as articulated by an NGO representative: *"Without funding, our hands are tied. We have great ideas, but we cannot make them a reality."* This sentiment aligns with Soliman et al. (2019), who identified funding constraints as a common obstacle for community-led adaptation initiatives. Addressing these financial limitations is essential for scaling successful strategies and ensuring their sustainability.

The lack of technical knowledge was another prominent challenge. Participants expressed a desire for training and capacity-building initiatives to enhance their understanding of modern flood management practices. A community member stated, *"We need experts to show us new ways to protect our community from floods. We want to learn."* This highlights a gap that can be bridged through collaboration with NGOs and government agencies, as emphasised by Satterthwaite (2011), who argued that building local capacity is crucial for effective adaptation.

## Impacts on Sustainable Urbanisation

The findings also reveal that CBA strategies have contributed to improved socio-economic stability and resilience in Ringim. As participants reported, the implementation of sustainable agricultural practices has led to better yields and increased food security. One farmer mentioned, *"Since we started using better methods, we can feed our families even when floods come."* This reflects the findings of Ensor and Berger (2018), who found that sustainable practices can enhance livelihoods and promote long-term resilience.

This study highlights the social impacts of CBA efforts. Participants expressed a heightened sense of agency and engagement in local governance. A public officer noted, *"The community is now more involved in decision-making processes. They know their needs and can advocate for them."* This active participation aligns with the principles of sustainable urbanisation, which emphasise community involvement in planning and development (UN-Habitat, 2016).

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### Implication of The Study

The implications of this study underscore the importance of CBA strategies in enhancing flood resilience and promoting sustainable urbanisation in Ringim. Practically, empowering local communities through training and capacity-building initiatives can improve preparedness and response to flooding, while integrating traditional knowledge into modern adaptation practices enhances their effectiveness. Theoretically, the findings of this study contribute to the literature on CBA by highlighting the interplay between indigenous practices and contemporary frameworks, offering a foundation for future research. Policy-wise, stakeholders need to prioritise funding for community-led initiatives, foster inter-agency collaboration, and incorporate local knowledge into urban planning processes.

### Limitations of the Study

This study has several limitations that may affect the findings and their generalisability. It relies solely on qualitative data from FGDs, which may introduce subjectivity and limit the breadth of perspectives captured, particularly since the sample size was relatively small and may not fully represent all community members in Ringim.

The focus on CBA strategies specifically related to flooding may overlook other environmental challenges and adaptation practices that are crucial for a comprehensive understanding of sustainability issues in the region. The dynamic nature of climate change means that findings may evolve, necessitating ongoing research to evaluate the long-term effectiveness of these strategies. The reliance on self-reported data may introduce biases, as participants could be influenced by social desirability or community expectations in their responses.

## CONCLUSION

This study has explored the effectiveness of CBA strategies in addressing flood risks and promoting sustainable urbanisation in Ringim, Jigawa State, Nigeria. Through FGDs with diverse stakeholders, the research identified several successful adaptation practices, as well as the challenges that hinder their full implementation.

The findings indicate that community mobilisation and awareness-raising are crucial for enhancing preparedness and resilience against flooding. By leveraging traditional knowledge and fostering collaboration among community members, NGOs, and government agencies, Ringim has made significant strides in managing flood risks. Participants emphasised the importance of integrating local practices into modern adaptation strategies, reflecting a recognition of the value of Indigenous knowledge in climate resilience efforts.

However, this study also highlighted critical challenges, including limited financial resources and gaps in technical knowledge, which impede the effectiveness of community-led initiatives. Addressing these barriers is essential for scaling successful adaptation efforts and ensuring their sustainability in the face of ongoing climate variability.

Moreover, this study demonstrated that effective CBA strategies contribute not only to mitigating flood risks but also to enhancing socio-economic stability and community engagement in urban governance. The increased involvement of residents in decision-making processes signifies a shift towards more inclusive and sustainable urban development.

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In light of these findings, policymakers and development practitioners must support CBA initiatives by providing adequate funding and fostering collaborative partnerships and technical training.

Future research could focus on several key areas to enhance understanding of CBA strategies in Ringim and beyond. Quantitative assessments of community resilience could be implemented to measure the impact of adaptation efforts on socio-economic stability. Comparative studies between Ringim and other flood-prone regions could identify best practices for community engagement and adaptation approaches. Exploring how climate change affects traditional knowledge related to flood management would further inform adaptation strategies.

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## CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

## AUTHORS' CONTRIBUTIONS

The corresponding author assumed responsibility for the conceptualisation and design of the research study, as well as for data collection, transcription, analysis, and the formulation of the manuscript. The process of data cleansing and the formulation of recommendations on tabulation procedures were specifically administered by the first co-author. The second co-author conducted a thorough examination of the concepts, providing insights and recommendations regarding the software employed in the final manuscript. Both the co-authors facilitated the review process, implemented revisions, and sanctioned the submission of the article. All authors have meticulously reviewed and endorsed the final manuscript, signifying their collective concurrence with its content and conclusions.

## REFERENCES

Alam, M. A., & Kumar, V. (2023). Assessment of Community-Based Risk (CBR) and Indigenous Knowledge on Climate Change Adaptation: An Overview. *Indigenous Knowledge and Disaster Risk Reduction: Insight Towards Perception, Response, Adaptation and Sustainability*, 539–566. https://doi.org/10.1007/978-3-031-26143-5_23

Aliyu, K. A. (2017). Disaster mitigation and response of government: Comparative studies between Kelantan, Malaysia and Jigawa, Nigeria. *Jurnal Studi Pemerintahan*, *8*(2).

 

https://doi.org/10.18196/jgp.2017.0050.277-289

Ayers, J., & Forsyth, T. (2009). Community-based adaptation to climate change. *Environment: Science and Policy for Sustainable Development*, *51*(4), 22–31.

Bello, N. A., Durosinmi, W., & Abdulkarim, R. (2017). Assessment of adaptation strategies to flooding impacts in Nigeria-A review. *Urban Design*, *1*, 135–145. https://doi.org/10.31058/j.ud.2017.11001

Braun, V., & Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative Psychology*, *9*(1), 3. https://doi.org/10.1037/qup0000196

Crisp, R., McCarthy, L., Parr, S., Pearson, S., & Berry, N. (2016). *Community-led approaches to reducing poverty in neighbourhoods: A review of evidence and practice*.

Diary, J. (2015). *Jigawa State Comprehensive Development Framework*. https://www.investjigawa.gov.ng/wp-content/uploads/2021/03/COMPREHENSIVE-DEVELOPMENT-FRAMEWORK-2ND-EDITION.pdf

Donkoh, S., & Mensah, J. (2023). Application of triangulation in qualitative research. *Journal of Applied Biotechnology and Bioengineering*, *10*(1), 6–9. https://doi.org/10.15406/jabb.2023.10.00319

Drolet, J. L. (2021). Societal adaptation to climate change. In *The Impacts of Climate Change* (pp. 365–377). Elsevier. https://doi.org/10.1016/B978-0-12-822373-4.00011-2

Echendu, A. J. (2020). The impact of flooding on Nigeria's sustainable development goals (SDGs). *Ecosystem Health and Sustainability*, *6*(1). https://doi.org/10.1080/20964129.2020.1791735

Ensor, J., & Berger, R. (2009). Community-based adaptation and culture in theory and practice. *Adapting to Climate Change: Thresholds, Values, Governance*, 227–239.

Ensor, J. E., Park, S. E., Attwood, S. J., Kaminski, A. M., & Johnson, J. E. (2018). Can community-based adaptation increase resilience? *Climate and Development*, *10*(2), 134–151. https://doi.org/10.1080/17565529.2016.1223595

Eriksen, S., Schipper, E. L. F., Scoville-Simonds, M., Vincent, K., Adam, H. N., Brooks, N., Harding, B., Lenaerts, L., Liverman, D., & Mills-Novoa, M. (2021). Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance? *World Development*, *141*, 105383. https://doi.org/10.1016/j.worlddev.2020.105383

Filho, W. L., Wolf, F., Totin, E., Zvobgo, L., Simpson, N. P., Musiyiwa, K., Kalangu, J. W., Sanni, M., Adelekan, I., & Efitre, J. (2023). Is indigenous knowledge serving climate adaptation? Evidence from various African regions. *Development Policy Review*, *41*(2), e12664. https://doi/org/10.1111/dpr.12664

Fischer, H. W. (2021). Decentralization and the governance of climate adaptation: Situating community-based planning within broader trajectories of political transformation. *World Development*, *140*, 105335. https://doi.org/10.1016/j.worlddev.2020.105335

Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience

 

thinking: integrating resilience, adaptability and transformability. *Ecology and Society*, *15*(4). https://www.jstor.org/stable/26268226

Gómez-Baggethun, E. (2022). Rethinking work for a just and sustainable future. *Ecological Economics, 200*, Article 107506. https://doi.org/10.1016/j.ecolecon.2022.107506

Jaimerena, B. A. (2018). *Cultivating resilience towards flood safety: local knowledge for landscape design*. http://dspace.conicyt.cl/handle/10533/250022

Kamarulzaman, N. H., Vaiappuri, S. A. L. K. N., Ismail, N. A., & Mydin, M. A. O. (2016). Local knowledge of flood preparedness: Current phenomena to future action. *Jurnal Teknologi*, *78*(5), 85–89. https://doi.org/10.11113/jt.v78.8246

Karunarathna, I., Gunasena, P., Hapuarachchi, T., & Gunathilake, S. (2024a). *Comprehensive data collection: Methods, challenges, and the importance of accuracy*. ResearchGate.

Karunarathna, I., Gunasena, P., Hapuarachchi, T., & Gunathilake, S. (2024b). The crucial role of data collection in research: Techniques, challenges, and best practices. *Uva Clinical Research*, 1–24. https://doi.org/10.13140/RG.2.2.33267.13605

Khan, N. A., & Abedin, S. (2022). Focus group discussion. In *Principles of Social Research Methodology* (pp. 377–387). Springer. https://doi.org/10.1007/978-981-19-5441-2_26

Lawal, A. T., Barau, S. S., & Umoru, G. I. (2020). Resources use efficiency of Garden egg (Solanum melongena) Production in Ringim Local Government Area of Jigawa State, Nigeria. *Journal of Community & Communication Research*, *5*(1), 184–189.

Lesnikowski, A., Biesbroek, R., Ford, J. D., & Berrang-Ford, L. (2021). Policy implementation styles and local governments: the case of climate change adaptation. *Environmental Politics*, *30*(5), 753–790. https://doi.org/10.1080/09644016.2020.1814045

Mairiga, N. M., & Ibrahim, M. (2021). Assessment of indigenous knowledge in managing environmental challenges: A case study of Ringim local government area of Jigawa state, Nigeria. *International Journal Of Scientific Advances*, *2*(4). https://doi.org/10.51542/ijscia.v2i4.25

Mastrorillo, M., Licker, R., Bohra-Mishra, P., Fagiolo, G., Estes, L. D., & Oppenheimer, M. (2016). The influence of climate variability on internal migration flows in South Africa. *Global Environmental Change*, *39*, 155–169. https://doi.org/10.1016/j.gloenvcha.2016.04.014

McClymont, K., Morrison, D., Beevers, L., & Carmen, E. (2020). Flood resilience: A systematic review. *Journal of Environmental Planning and Management*, *63*(7), 1151–1176. https://doi.org/10.1080/09640568.2019.1641474

McNamara, K. E., & Buggy, L. (2017). Community-based climate change adaptation: a review of academic literature. *Local Environment*, *22*(4), 443–460. https://doi.org/10.1080/13549839.2016.1216954

Mfitumukiza, D., Roy, A. S., Simane, B., Hammill, A., Rahman, M. F., & Huq, S. (2020). Scaling local and community-based adaptation. *Global Commission on Adaptation Background Paper*.

 

Mirza, H., Mirza, C., & Bellalem, F. (2023). Ethical considerations in qualitative research: Summary guidelines for novice social science researchers. *Social Studies and Research Journal*, *11*(1), 441–449.

Moon, M. D. (2019). Triangulation: A method to increase validity, reliability, and legitimation in clinical research. *Journal of Emergency Nursing*, *45*(1), 103–105. https://doi.org/ 10.1016/j.jen.2018.11.004

Muhammad, I., & Rilwanu, Y. (2020). Effects of flood on environmental quality in Ringim, Jigawa State, Northern Nigeria. *International Journal of Science for Global Sustainability (IJSGS)*, *6*(3). http://journals.fugusau.edu.ng

National Population Commission (NPC), & National Bureau of Statistics (NBS). (2016). *National Population Estimates* . Population Forecasts by State and Gender (2007 - 2009).

Okonkwo, I. (2013). *Effective flood plain management in Nigeria: Issues, benefits and challenges. Transparency for Nigeria, 2013.* Transparency for Nigeria,. http://transparencyng.com

Piggott-McKellar, A. E., McNamara, K. E., Nunn, P. D., & Watson, J. E. M. (2019). What are the barriers to successful community-based climate change adaptation? A review of grey literature. *Local Environment*, *24*(4), 374–390. https://doi.org/10.1080/13549839.2019.1580688

Rahman, M. F., & Huq, S. (2021). Community-based adaptation to climate change. *Our Warming Planet: Climate Change Impacts and Adaptation*, *2*, 144.

Reid, H. (2014). A natural focus for community-based adaptation. *Community-Based Adaptation to Climate Change: Emerging Lessons. Practical Action Publishing, Rugby*, 35–54. https://doi.org/10.3200/ENV.51.4.22-31

Reid, H., & Huq, S. (2014). Mainstreaming community-based adaptation into national and local planning. In *Climate and Development* (Vol. 6, Issue 4, pp. 291–292). Taylor & Francis. https://doi.org/10.1080/17565529.2014.973720

Robins, C. S., & Eisen, K. (2017). Strategies for the effective use of NVivo in a large-scale study: Qualitative analysis and the repeal of Don't Ask, Don't Tell. *Qualitative Inquiry*, *23*(10), 768–778. https://doi.org/10.1177/1077800417731089

Satterthwaite, D. (2011). Why is community action needed for disaster risk reduction and climate change adaptation? In *Environment and Urbanization* (Vol. 23, Issue 2, pp. 339–349). SAGE Publications Sage UK: London, England. https://doi.org/10.1177/0956247811420009

Satterthwaite, D. (2017). The impact of urban development on risk in sub-Saharan Africa's cities with a focus on small and intermediate urban centres. *International Journal of Disaster Risk Reduction*, *26*, 16–23. https://doi.org/10.1016/j.ijdrr.2017.09.025

Satterthwaite, D., Archer, D., Colenbrander, S., Dodman, D., Hardoy, J., Mitlin, D., & Patel, S. (2020). Building resilience to climate change in informal settlements. *One Earth*, *2*(2), 143–156. https://doi.org/10.1016/j.oneear.2020.02.002

Smit, B., & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, *16*(3), 282–292. https://doi.org/10.1016/j.gloenvcha.2006.03.008

 

Soliman, A. M. (2019). So it's always a chance: community-led solutions to new urban expansion. *New Cities and Community Extensions in Egypt and the Middle East: Visions and Challenges*, 159–179. https://doi.org/10.1007/978-3-319-77875-4_9

UN-Habitat. (2016). *Urbanization and Development Emerging Futures*. https://unhabitat.org/sites/default/files/download-manager-files/WCR-2016-WEB.pdf

Westoby, R., Clissold, R., McNamara, K. E., Ahmed, I., Resurrección, B. P., Fernando, N., & Huq, S. (2021). Locally led adaptation: drivers for appropriate grassroots initiatives. *Local Environment*, *26*(2), 313–319. https://doi.org/10.1080/13549839.2021.1884669

Wilson, G. A. (2012). Community resilience, globalization, and transitional pathways of decision-making. *Geoforum*, *43*(6), 1218–1231. https://doi.org/10.1016/j.geoforum.2012.03.008



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