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Research Article

Post-Flood Recovery and Adaptive Livelihood Strategies Among Vulnerable Households in Makurdi and Guma LGAs of Benue State, Nigeria

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ABSTRACT

Recurring flooding in the Benue Valley continues to undermine the socio-economic stability of riparian communities, yet the sustainability of household recovery strategies remains insufficiently understood. This study examined post-flood recovery and adaptive livelihood strategies among households in flood-prone areas of Makurdi and Guma Local Government Areas, Benue State, Nigeria. A quantitative approach was adopted, using structured questionnaires administered to 396 households. Data were analysed using descriptive and inferential statistics in the Statistical Package for Social Sciences (SPSS) version 26.0. Findings indicate that flooding is a recurrent and severe phenomenon in the study area, with 55.1% of respondents experiencing displacement three or more times within a decade. Key impacts included structural damage to housing (36.0%), loss of stored crops and seeds (30.6%), and widespread loss of primary income sources (66.2%). Recovery efforts were largely self-financed, with 44.9% relying on borrowing and 62.1% still in debt. Institutional support was limited, as 71.2% of households received no government assistance, while 98.0% had no insurance coverage. Households adopted various coping mechanisms, including livelihood diversification (45.0%) and complete shifts in income sources (24.0%), reflecting adaptive responses to persistent flood risk. However, 63.9% of respondents reported that the strategies were temporary and unsustainable. Chi-square analysis revealed significant associations between occupation and location ($x^2 = 200.7$, $p < 0.001$) and between survival strategies and location ($x^2 = 209.7$, $p < 0.001$). Rural households relied more on farming and distress-based coping strategies, while urban households exhibited more diversified and financially oriented responses. These findings underscore the need for targeted interventions that enhance long-term livelihood recovery and resilience.

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1 Introduction

Flooding has become one of the most persistent climate-related hazards affecting livelihoods in Nigeria, with Benue State among the most vulnerable states. Located within the lower Benue River Basin, the state is intersected by the River Benue, a major transboundary river whose seasonal overflow has intensified in recent decades. While flooding along the Benue River has always been part of the natural hydrological cycle, changing rainfall patterns, upstream dam releases, land use change, and rapid population growth along floodplains have increased both the frequency and severity of flood events (Agada & Nirupama, 2015; Ologunorisa et al., 2021). Communities in Makurdi and Guma Local Government Areas, situated directly on the river's floodplain, experience recurrent inundation that disrupts housing, agriculture, health, and local economies almost annually (Hula & Udoh, 2015; Dam & Adamgbe, 2018).

Existing literature has extensively documented the physical drivers and immediate impacts of flooding in Benue State, including loss of lives, destruction of houses, crop failure, and outbreaks of waterborne diseases (Awopetu et al., 2013; Isma'il & Kersha, 2018). Several studies have also assessed flood vulnerability, risk perception, and short-term coping responses, such as evacuation, reliance on social networks, and emergency relief (Shabu & Tyonum, 2013; Gbaa, 2022). Far less attention has been paid to what happens after the floodwaters recede. While the causes and impacts of floods are well established, empirical evidence on how affected households rebuild their livelihoods over time remains limited, fragmented, and often unreliable. Most studies stop at immediate coping strategies or relief interventions, offering little insight into whether households actually recover, adapt, or simply return to the same vulnerable conditions that expose them to repeated losses (Dam et al., 2021; Nofiu & Baharudin, 2024).

This gap is significant because post-flood recovery is not a single event but a prolonged process shaped by income levels, access to assets, institutional support, and the ability to adapt livelihoods to changing environmental risks. In flood-prone agrarian economies like Makurdi and Guma, where farming and small-scale trading dominate, repeated disruption can push households into chronic poverty traps, especially when recovery relies heavily on borrowing, asset sales, or informal assistance (Mbah et al., 2020; Ajijola & Adedire, 2023). Without understanding how households navigate this recovery phase, policy responses risk remaining reactive, focusing on short-term relief rather than addressing structural vulnerabilities that undermine long-term resilience.

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This study is therefore justified by the need to shift the analytical and policy focus from emergency response to sustainable recovery pathways. With proper examination of post-flood recovery and adaptive livelihood strategies among vulnerable households in Makurdi and Guma LGAs, the study contributes empirical evidence on how people adjust, diversify, or transform their livelihoods in response to recurrent flooding. Such insights are critical for designing interventions that move beyond temporary relief towards long-term adaptation, financial inclusion, livelihood support, and risk reduction. In a context where floods are no longer exceptional events but recurring realities, understanding recovery as an ongoing livelihood process may be one of the most important steps toward building genuine resilience in Benue State and similar floodplain environments. The major aim of this study is to evaluate post-flood recovery processes and the adaptive livelihood strategies adopted by vulnerable households in Makurdi and Guma LGAs, with a view to identifying sustainable pathways for long-term resilience.

2 Materials and Methods

2.1 Study Area

The study focuses on Makurdi and Guma Local Government Areas (LGAs) in Benue State, North-Central Nigeria. This region is situated within the Benue Trough, a major geological formation that facilitates a vast drainage network dominated by the River Benue. The selection of these two LGAs provides a comparative lens into how different socio-economic landscapes, urban/peri-urban versus rural/agrarian, negotiate the aftermath of catastrophic flooding.

Makurdi, the capital city of Benue State, serves as a critical administrative and commercial hub. Geographically, it lies between latitudes 7°38′N and 7°50′N and longitudes 8°24′E and 8°38′E. The city is bisected by the River Benue, making it highly susceptible to seasonal overbanking (Figure 1). As an urban centre, the study area encompasses high-density residential zones such as Wadata and Idye, alongside peri-urban developments like Gyado Villa. In Makurdi, the impact of flooding is characterized by significant infrastructural damage and disruption of the informal economy. Previous assessments by Ologunorisa et al. (2021) highlight that urban flood events in the Benue valley are exacerbated by poor drainage systems and the encroachment of buildings onto natural floodplains. The livelihood structures here are diverse, ranging from civil service and artisanry to petty trading, all of which face severe asset poverty following flood-induced displacement.

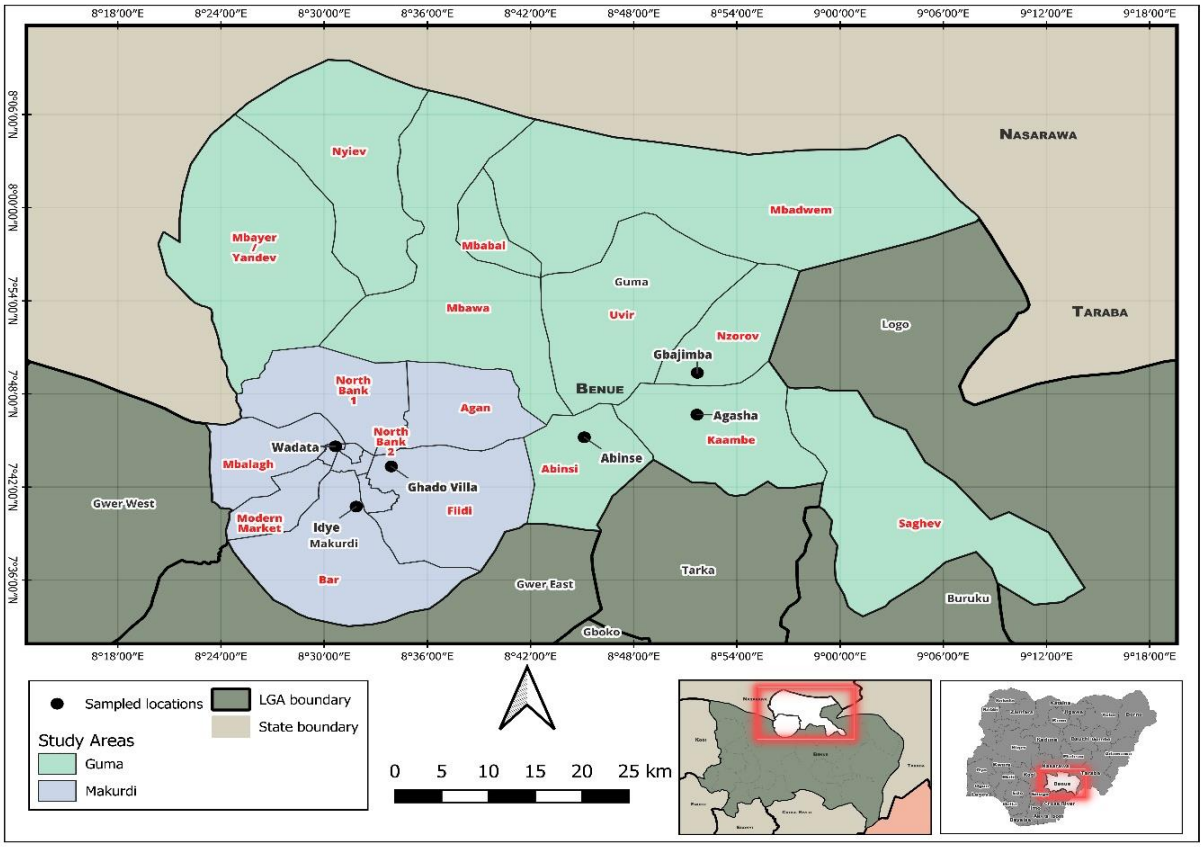

Figure 1: Map of Makurdi and Guma LGAs in Benue State

Contrasting the urban nature of Makurdi, Guma LGA is predominantly rural and serves as one of the primary food baskets of the state. Geographically, Guma is located to the north of Makurdi, with its administrative headquarters at Gbajimba. The LGA is situated between Latitudes 7°40'N and 8°10'N, and Longitudes 8°30'E and 9°10'E. The study focuses on the agrarian communities of Agasha, Abintse, and Gbajimba, which are situated along the fertile but flood-prone banks of the Benue River. The socio-economic fabric of Guma is built almost entirely on agriculture, specifically the cultivation of yams, rice, cassava, and maize. As noted by Ikyapa et al. (2022), the recurring nature of floods in Benue State has led to a cycle of chronic food insecurity and forced seasonal migration to upland areas.

Both LGAs experience a tropical wet and dry climate (Köppen's *Aw* category), characterized by a rainy season from April to October. The hydrological regime is influenced by the discharge from the Lagdo Dam in Cameroon and localized intense rainfall. This climatic context creates a precarious environment for households, as the intensity of the "Climate Variability Induced Water Stress" as noted by Okafor et al. (2017), which continues to redefine the threshold of local resilience in the Kaduna and Benue River basins alike.

2.2 Data Sources

The study employed a quantitative research design, utilizing a cross-sectional survey approach to examine post-flood recovery and adaptive livelihood strategies. This design was considered appropriate because post-flood recovery in the Benue Valley is a measurable socio-economic process, reflected in quantifiable metrics such as asset loss, frequency of displacement, and shifts in income levels. Consistent with the arguments of Nunan et al. (2022), the complexity of livelihood systems in climate-stressed environments requires a methodological approach capable of capturing the scale of economic disruption through standardized indicators.

A descriptive component was used to systematically document the socio-economic characteristics of affected households and the spatial extent of flood impacts in Makurdi and Guma Local Government Areas. Structured household questionnaires were administered to quantify key variables, including the frequency and duration of displacement, the magnitude of asset and income loss, and access to formal and informal support mechanisms. This approach aligns with established flood studies in Makurdi that emphasize the value of robust descriptive data for understanding vulnerability patterns within flood-prone corridors (Shabu & Tyonum, 2013). Inferential dimension was also incorporated to test the relationships between geographic location (Urban vs. Rural) and household adaptive capacity. Utilizing non-parametric statistical tests, specifically the Pearson Chi-Square (x^2) test, the study was able to determine the statistical significance of associations between household location and specific recovery outcomes, such as primary occupation and the choice of survival strategies. This analytical framework allowed for a rigorous comparison of how urban and rural structural differences influence resilience, moving beyond simple description to provide statistically grounded insights into the drivers of household vulnerability.

The strength of this quantitative design lies in its reliability and generalizability. By utilizing a standardized instrument across a large sample (N=396), the study minimized researcher bias and provided a clear, replicable snapshot of the recovery landscape. This data-driven approach is consistent with the integrative frameworks suggested by Rakib et al. (2017) for identifying critical gaps in disaster management and household resource allocation.

2.3 Sampling Size

A multi-stage sampling procedure was adopted to ensure adequate representation of both urban and rural flood-prone contexts. Six communities were purposively selected across Makurdi and Guma LGAs based on historical flood exposure, proximity to the River Benue, and dominant livelihood characteristics. In Makurdi LGA, Wadata, Gyado Villa, and Idye were selected to reflect dense urban and peri-urban settings, while Agasha, Abintse, and Gbajimba in Guma LGA represented predominantly agrarian rural communities. Questionnaire allocation across communities followed a proportional stratified approach, resulting in a total sample size of 400 (though 4 of the questionnaires did not return) households. At the household level, systematic random sampling was applied, with every *n*th household selected from a central landmark within each community. The household head, or in their absence a senior adult member, was interviewed.

Table 1: Sample Size.

LGA	Community	Population Share	No. of questionnaires allocated
Makurdi	Wadata	25%	100
	Gyado Villa	20%	80
	Idye	15%	60
Guma	Agasha	15%	60
	Abintse	10%	40
	Gbajimba	15%	60
Total		**100%**	**400**

Primary data were collected via structured questionnaires, administered by the researchers to mitigate literacy constraints and ensure data quality. To ensure the robustness of the instrument, it underwent face and content validation by experts in environmental

management and rural development. A pilot test was conducted in a non-sampled flood-prone community to refine question clarity, eliminate ambiguity, and ensure internal consistency. The sampling frame utilized a stratified approach based on geographic location (Urban vs. Rural), specifically targeting households defined as vulnerable due to their physical proximity to the River Benue floodplain and their high socio-economic dependency on climate-sensitive livelihoods. Trained research assistants fluent in the native languages facilitated the field data collection. The questionnaire covered household demographics, asset bases, recovery timelines, livelihood adjustments, and the use of coping strategies, including potentially maladaptive responses such as asset liquidation and high-interest borrowing.

2.4 Data Analyses

Data were analysed using SPSS version 26.0 through descriptive and inferential statistics. This mixed analytical approach enabled a nuanced understanding of post-flood recovery across different socio-spatial groups in the study area.

3 Results and Discussion

3.1 Demographic Characteristics of Respondents

Table 2 presents the distribution of respondents by gender across the two study locations. The result shows that out of the 396 households surveyed, 60.1% were from Makurdi LGA, while 39.9% were from Guma LGA. On gender distribution, the study recorded a higher participation of males, who constituted 63.89% of the total sample, compared to females at 36.11%. This disparity is evident in both LGAs: in Makurdi, 68% of respondents were male and 32% were female, while in Guma, the distribution was slightly more balanced but still male-dominated at 58% and 42%, respectively.

The predominance of male respondents in this study aligns with existing literature on flood impact assessments in Benue State, where household surveys typically interface with the household head a role culturally and traditionally reserved for men in North-Central Nigeria. This finding corroborates the work of Mbah et al. (2020), who reported a male majority among respondents when assessing food insecurity in the region, and mirrors the methodology of Dam and Adamgbe (2018), who specifically targeted household heads in their study of flood disaster risk response in Makurdi. However, this demographic distribution obscures the deeply gendered reality of disaster vulnerability and recovery. While men primarily navigate the external, formal recovery processes such as securing credit or interacting with disaster agencies, women often shoulder the disproportionate burden of internal household management and emotional labor during and after displacement. As Rakib et al. (2017) highlighted, women in flood-prone regions frequently manage the "invisible" aspects of resilience, including food rationing, the care of vulnerable family members in crowded IDP camps, and the maintenance of social hygiene under precarious conditions. Consequently, the reliance on male household heads for data collection may underreport the specific physiological and socio-economic shocks experienced by women, such as the loss of home-based petty trading assets or the increased risks to reproductive health and personal safety during periods of environmental chaos.

Table 2: Distribution of Respondents by Gender

Location	Frequency (Male)	Frequency (Female)	Total (n)	(%) Male	(%) Female	Total
Makurdi LGA	162	76	238	68	32	100
Guma LGA	91	67	158	58	42	100
Grand Total	**253**	**143**	**396**	**64**	**36**	**100**

Complementing the gender data, Figure 2 illustrates the age distribution of the respondents. The data reveals a mature and economically active respondent base, with the largest group falling within the 41-50 years category (30.6%), followed closely by those aged 31-40 years (26.3%). Combined, over 55% of the respondents are in their prime working years. The 51-60 and 61-above categories account for 18.2% and 13.9% respectively, while the youngest cohort (18-30 years) represents the smallest portion at 11.1%.

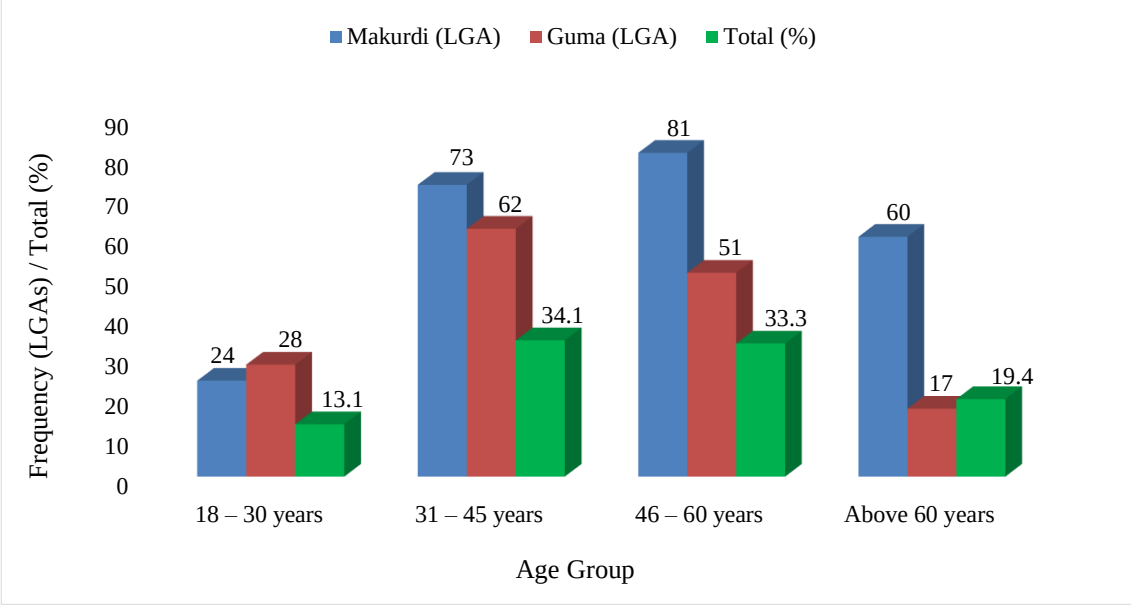

Figure 2: Distribution of Respondents by Age

The concentration of respondents in the 31-50 age bracket is significant for recovery analysis, as this group typically serves as the primary breadwinners and decision-makers within the household. Their age suggests a level of "experiential memory" regarding recurrent flooding in the Benue Valley, which is vital for developing adaptive livelihood strategies. This aligns with Ologunorisa et al. (2021), who suggest that older, more established household heads often possess better-developed indigenous coping mechanisms compared to younger cohorts who may lack the resources or historical context to navigate severe environmental shocks.

3.2 Primary Occupation of Respondents

The occupational distribution of the respondents, as detailed in Table 3, reveals a population with a strong primary dependence on agriculture, though with significant internal variation between the two LGAs. Nationally, farming emerged as the most common primary source of livelihood, accounting for 46.0% of the total sample. This is followed by trading at 24.0%, civil service at 14.6%, and artisanship at 11.1%. A small minority of 4.3% identified with other occupational categories. The high proportion of respondents engaged in farming underscores the acute economic vulnerability of the study area to hydro-meteorological hazards. As nearly half of the households rely directly on rain-fed agriculture, flood events do not merely cause physical displacement but strike at the core of their economic survival, as noted by Mbah et al. (2020) regarding food insecurity among farm families in Benue State.

A comparative analysis of the two Local Government Areas reveals a sharp contrast between the urban-leaning economy of Makurdi and the agrarian nature of Guma. In Guma LGA, an overwhelming 89.2% of respondents are farmers, with minimal representation in the civil service (1.3%) or artisanship (1.3%). Conversely, Makurdi presents a more diversified occupational mix where trading (34.5%) and civil service (23.5%) are more prominent than farming (17.2%). This disparity suggests that while Guma households face direct, catastrophic losses to productive land and crops, Makurdi households may experience more indirect economic shocks, such as the disruption of commercial supply chains and infrastructure. This finding corroborates the observations of Ahile et al. (2024), who established that the "Food Basket" status of Benue State ironically heightens the population's susceptibility to flood shocks, as the primary livelihood of the rural majority is easily submerged.

Table 3: Primary Occupation of Respondents

Occupation	Makurdi LGA (Frequency/%)	Guma LGA (Frequency/%)	Total (Frequency/%)
Farming	41 (17.2%)	141 (89.2%)	182 (46.0%)
Trading	82 (34.5%)	13 (8.2%)	95 (24.0%)
Civil Service	56 (23.5%)	2 (1.3%)	58 (14.6%)
Artisan	42 (17.6%)	2 (1.3%)	44 (11.1%)
Other	17 (7.2%)	0 (0.0%)	17 (4.3%)
Total	**238 (100%)**	**158 (100%)**	**396 (100%)**

The presence of traders (24.0%) as the second-largest occupational group overall particularly in Makurdi is consistent with the findings of Ajaero et al. (2018), who highlighted that livelihood migration and diversification often occur when agricultural income is disrupted. The vulnerability of this occupational mix is further emphasized by Nofiu and Baharudin (2024), who identified that households facing recurrent environmental hazards often shift toward trading and non-farm activities as a critical survival strategy. This suggests that while farming remains the dominant occupation in Guma, the more varied occupational structure in Makurdi reflect an ongoing transition toward more resilient, non-land-based livelihoods in response to recurrent flooding.

Table 4 addresses the differences in livelihood patterns among flood-affected households. The chi-square test revealed a statistically significant relationship between occupation and location ($\chi^2 = 200.7$, df = 4, $p < 0.001$). This finding indicates that livelihood patterns differ significantly between urban (Makurdi) and rural (Guma) areas.

Table 4: Chi-Square Test of Occupation by Location

Test	Value	df	p-value
Pearson Chi-Square	200.7	4	0.0001

The results show that rural respondents are predominantly engaged in farming, whereas urban respondents are more diversified across trading, civil service, and artisan occupations. This disparity suggests that rural households are more exposed to flood-induced disruptions in agricultural activities, while urban households benefit from more varied income sources, hence are more resilient and better able to recover from environmental shocks.

3.3 Monthly Income Level of Respondents

Figure 3 illustrates the monthly income distribution of the respondents, serving as a critical indicator of their economic resilience and adaptive capacity. The results reveal a high prevalence of low-income earners within the flood-prone communities of Makurdi and Guma. The largest proportion of respondents (41.9%) earns below ₦30,000 monthly, while another 35.9% earns between ₦30,000 and ₦70,000. Collectively, a staggering 77.8% of the surveyed households subsist on a monthly income of ₦70,000 or less. In contrast, only a small fraction (6.0%) reported an income exceeding 150,000. This income profile indicates a population with high economic vulnerability, where the majority live near or below the poverty line. These findings align with the systematic review by Nofiu and Baharudin (2024), which emphasizes that smallholder farmers who constitute a significant portion of this study's sample are often characterized by high poverty levels that intrinsically link their economic status to their flood vulnerability.

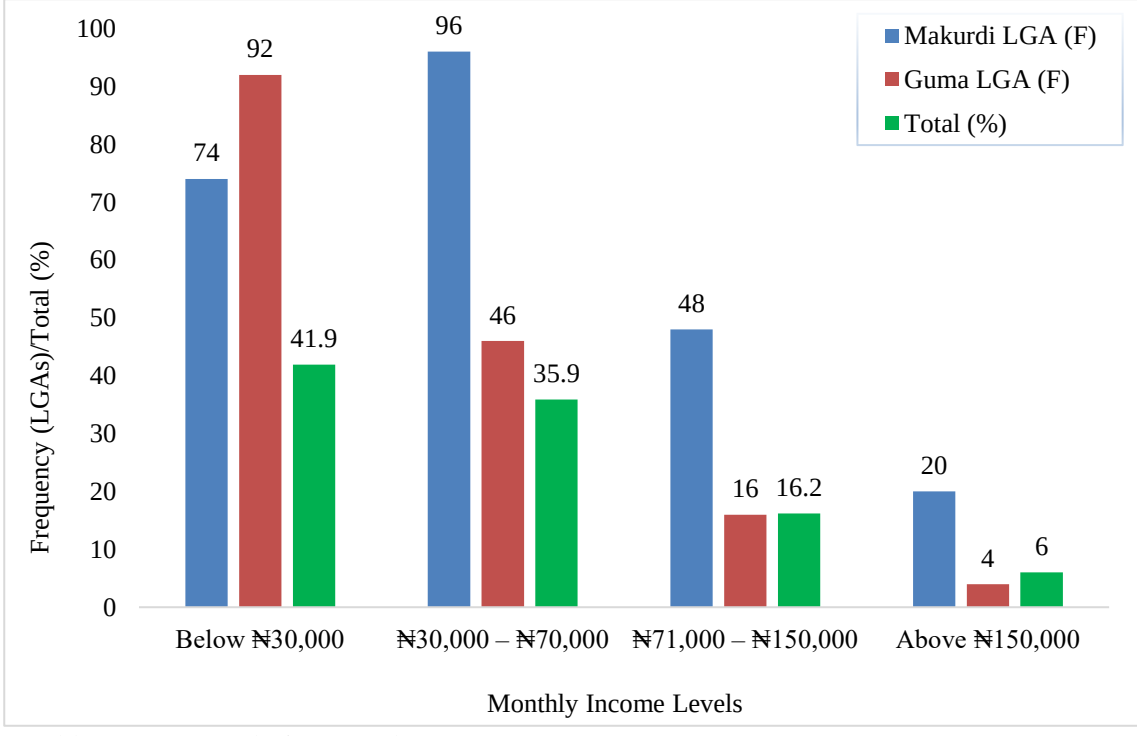

Figure 3: Monthly Income Level of Respondents

The preponderance of respondents earning below ₦30,000 suggests a severely limited capacity for formal financial coping mechanisms, such as purchasing flood insurance or investing in resilient building materials. This echoes the observations of Awopetu et al. (2013), who noted that flooding in the Makurdi metropolitan area further depresses the socio-economic status of residents, often trapping them in a persistent cycle of poverty. Furthermore, Mbah et al. (2020) identified household income as a primary determinant of food security among farm families in Benue State. With over three-quarters of the respondents earning modest incomes, their ability to secure food and essential services during displacement is heavily compromised. This economic fragility likely explains a high reliance on social capital and external aid during crises, supporting Obiora's (2014) conclusion that resource-constrained vulnerable groups often lack the independent financial strategies necessary for long-term recovery.

3.4 Frequency of Displacement in the Last 10 Years

Figure 4 illustrates the frequency of displacement experienced by respondents over the last decade, indicating that displacement is a chronic, systemic issue rather than an isolated event for the majority of the population. A staggering 55.1% of respondents reported being displaced three or more times within the last 10 years, while 29.0% have been displaced twice. Collectively, 84.1% of the surveyed households are repeat victims of flood-induced displacement. In contrast, only 12.9% have experienced displacement once, and a negligible minority of 3.0% reported never being displaced. This high recurrence reveals that the study area is under persistent stress from hydrological hazards, validating the observations of Gbaa (2022), who noted that flooding in Guma LGA occurs with a frequency that necessitates comprehensive management strategies far beyond ad-hoc emergency responses.

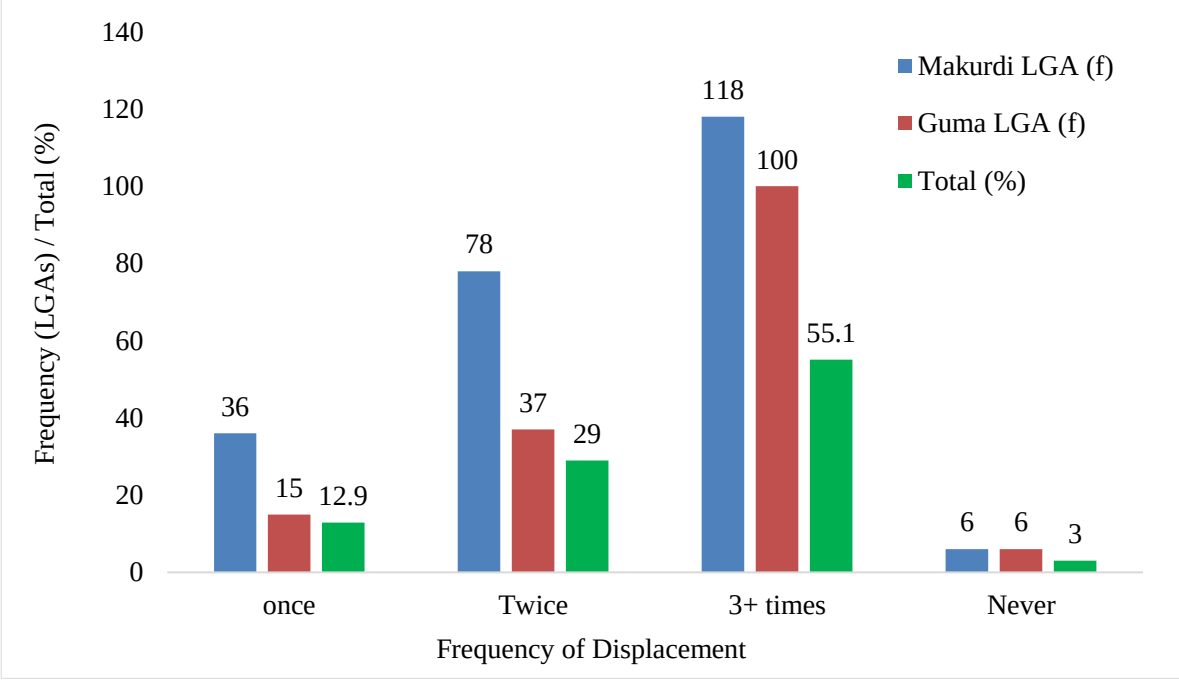

Figure 4: Frequency of Displacement in the Last 10 Years

The fact that 97% of respondents have faced displacement at least once suggests that the regional vulnerability identified in earlier literature has persisted and potentially worsened. This pattern of repetitive displacement corroborates the findings of Hula and Udoh (2015), whose assessment of Makurdi established that most residents had experienced prior flooding yet remained inadequately prepared for its recurrence. Furthermore, these results align with Dam and Adamgbe (2018), who reported that 83% of urban households in Makurdi were aware of the annual nature of these events. The empirical evidence of frequent, multiple displacements (3+ times) confirms that for residents of the Benue floodplain, flooding is an anticipated seasonal reality. This displacement fatigue complicates long-term recovery, as households are often forced to restart their livelihoods before they have fully recovered from the previous flood cycle.

3.5 Estimated Duration of Displacement

Table 5 details the duration of displacement experienced by respondents, providing a temporal dimension to the flood-induced disruptions in Makurdi and Guma. The data indicates that displacement is rarely a brief occurrence; the majority of respondents (49.0%) were displaced for 1 to 3 months, coinciding with the peak flood and recession season of the River Benue. A significant proportion (28.3%) faced displacement for 4 to 6 months, while 10.6% remained away from their homes for over 6

months. Only a small minority (12.1%) were able to return in less than one month. This reveals that for nearly 88% of the victims, displacement constitutes a medium-to-long-term disruption rather than a momentary shock. The prevalence of the 1-3 month window aligns with regional hydrological patterns where floodwaters typically peak in September or October and recede slowly. This extended duration is critical because, as Islam et al. (2016) observed, longer flooding periods directly correlate with more severe consequences for livelihoods, as stagnant water increases pollution and prolongs the disruption of local supply chains.

Table 5: Estimated Duration of Displacement

Duration of Displacement	Makurdi LGA (Frequency/%)	Guma LGA (Frequency/%)	Total (Frequency/%)
Less than 1 month	38 (16.0%)	10 (6.3%)	48 (12.1%)
1 – 3 months	134 (56.3%)	60 (38.0%)	194 (49.0%)
4 – 6 months	54 (22.7%)	58 (36.7%)	112 (28.3%)
Over 6 months	12 (5.0%)	30 (19.0%)	42 (10.6%)
Total	**238 (100%)**	**158 (100%)**	**396 (100.0%)**

A comparative look at the locations reveals that respondents in Guma LGA tend to experience longer displacement durations than those in Makurdi. While 56.3% of Makurdi respondents return within 1-3 months, over half of the Guma respondents (55.7%) are displaced for four months or longer (36.7% for 4-6 months and 19.0% for over 6 months). This disparity may be attributed to the rural nature of Guma and its proximity to primary floodplains, where drainage is slower, and infrastructure for water recession is minimal. The fact that nearly 40% of the total sample remains displaced for extended periods suggests that the impact lingers well beyond the physical recession of water. This supports the findings of Dam et al. (2021), who reported that the vast majority of households in Makurdi fail to recover quickly due to the extensive time required for structural reconstruction and debris clearance, a struggle that is clearly intensified for the rural households in Guma.

3.6 Impact on Primary Source of Income

Figure 5 assesses the severity of the flood's impact on the respondents' primary sources of income, providing a clear visualization of the economic devastation within the study area. The results paint a grim picture: the largest proportion of respondents (34.9%) reported a "Total Loss" of their income source, while another 31.3% described the impact as "High." Collectively, 66.2% of the surveyed households experienced severe economic disruption, effectively paralyzing their financial stability. Conversely, only a negligible fraction of the population was spared significant harm, with only 3.5% reporting "Minimal Impact" and 9.6% reporting "Low Impact." This high prevalence of severe loss underscores the extreme fragility of livelihoods in Makurdi and Guma LGAs, which are predominantly dependent on climate-sensitive sectors like farming and small-scale trading. These findings align closely with Ajaero et al. (2018), who reported that 59% of households in similar flood-prone areas suffered "very severe damages," leading to a notable decline in livelihood status.

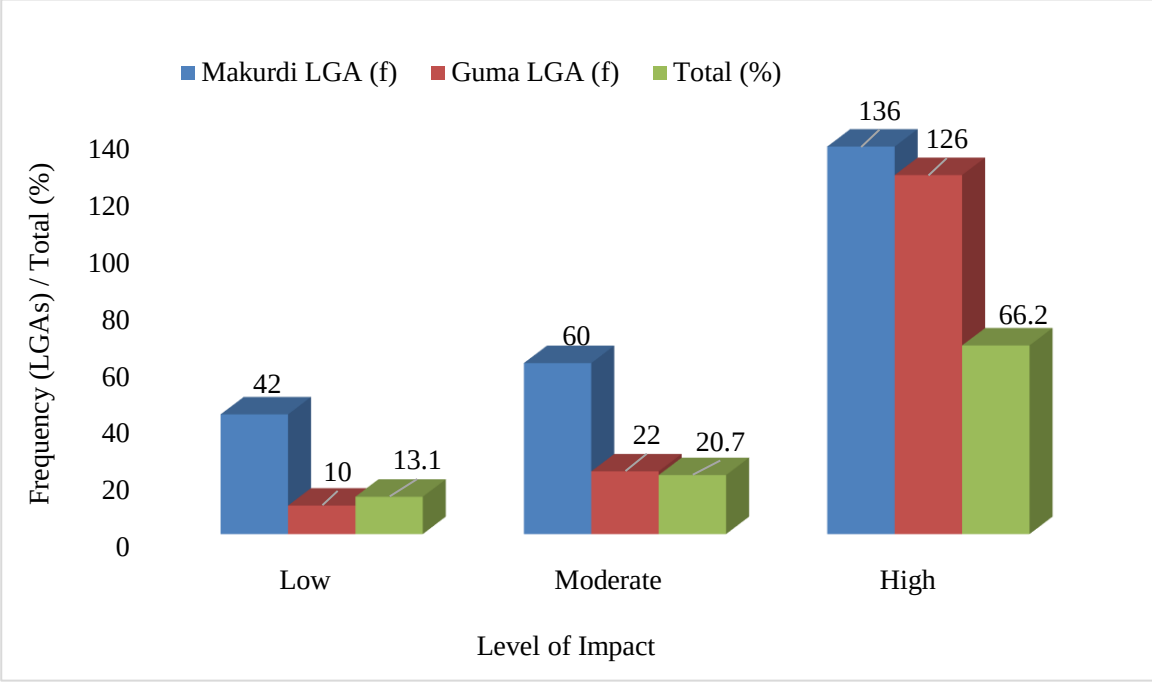

Figure 5: Impact on Primary Source of Income

The severity observed in this study (66.2%) is slightly higher than previously recorded figures, potentially reflecting the intensifying nature of recent flood events or the cumulative exhaustion of household resources due to the repeated displacements discussed in Figure 4. This economic paralysis corroborates the findings of Ikyapa et al. (2022), who concluded that floods have a "significant impact on socio-economic activities" in the Makurdi area. The devastation of income sources validates the vulnerability assessment by Nofiu and Baharudin (2024), which highlighted that smallholder farmers who make up the bulk of this study's respondents are uniquely susceptible to "poverty traps" triggered by recurring environmental shocks. The high rate of total income loss explains the heavy reliance on emergency borrowing and asset liquidation observed in later sections of this study, as households struggle to bridge the gap between disaster and recovery.

3.7 Survival Strategies Adopted

Table 6 highlights the immediate survival strategies adopted by households to navigate the acute aftermath of flooding. The findings reveal that borrowing money was the most prevalent strategy, utilized by 44.9% of the respondents. This high reliance on credit underscores an immediate liquidity crisis, where nearly half of the surveyed population is forced into debt to meet basic needs following a disaster. This is followed by the depletion of personal savings, which accounted for 23.2% of the responses. Together, these two strategies show that 68.1% of households rely almost exclusively on private, informal safety nets. This finding strongly aligns with Ajijola and Adedire (2023), who observed that due to minimal government support, households in urbanized floodplains primarily rely on personal reserves and social capital to survive. The data suggests that for a majority of the population, a flood event is not just a physical disaster but a catalyst for immediate financial instability and indebtedness.

Table 6: Immediate Survival Strategies Adopted

Survival Strategy	Makurdi LGA (Frequency/%)	Guma LGA (Frequency/%)	Total (Frequency/%)
Borrowed money	112 (47.1%)	66 (41.8%)	178 (44.9%)
Spent savings	72 (30.3%)	20 (12.6%)	92 (23.2%)
Sold assets	34 (14.2%)	40 (25.3%)	74 (18.7%)
Charity/Begging	20 (8.4%)	32 (20.3%)	52 (13.2%)
Total	**238 (100%)**	**158 (100%)**	**396 (100.0%)**

The study further reveals that 18.7% of respondents were forced to sell productive assets, such as land, livestock, or equipment, to generate emergency funds, while 13.2% resorted to begging or relying on charity. The sale of productive assets represents a "negative coping strategy" that sacrifices long-term livelihood security for short-term survival. This echoes the findings of Nofiu and Baharudin (2024), who noted that while some households attempt to diversify, many are forced into distress measures that exacerbate the "poverty trap." Similarly, Obiora (2014) highlighted that vulnerable groups in Benue State often lack robust institutional survival mechanisms, leading to the permanent loss of critical assets. The cumulative reliance on debt and asset liquidation (63.6%) indicates that the "recovery" process for most households begins from a position of significantly diminished economic capacity, making them even more vulnerable to the next flood cycle.

Table 7 shows the difference in Survival Strategy by Location. The chi-square result revealed a statistically significant association between location and survival strategies ($\chi^2 = 209.7$, df = 3, $p < 0.001$), directly addressing the study objective on adaptive livelihood strategies.

Table 7: Chi-Square Test of Survival Strategy by Location

Test	Value	df	p-value
Pearson Chi-Square	209.7	3	0.000

The findings indicate that urban households rely more on financial coping mechanisms such as borrowing and the use of savings. In contrast, rural households are more likely to depend on distress-based strategies such as selling assets and relying on charity. These patterns reflect disparities in access to financial resources, livelihood diversification, and institutional support systems.

3.8 Long-term Livelihood Change Post-Displacement

Figure 6 illustrates the long-term shifts in livelihood strategies adopted by households following displacement, acting as a clear indicator of structural changes in the local economy. The results show that the most prevalent long-term strategy, adopted by 45.2% of respondents, was the diversification of income sources. This suggests a deliberate strategic move away from reliance on a single, weather-dependent occupation toward a more varied portfolio. While 30.8% of households returned to their previous livelihoods once floodwaters receded, nearly a quarter (24.0%) made a complete break from their past by switching to entirely new sources of income. Collectively, a significant majority of 69.2% of households implemented fundamental changes to their income-generating activities. This high rate of diversification and switching provides strong empirical evidence for the adaptive behaviours described by Ajaero et al. (2018), who noted a distinct shift from agricultural to non-agricultural sectors as households seek less climate-sensitive income streams.

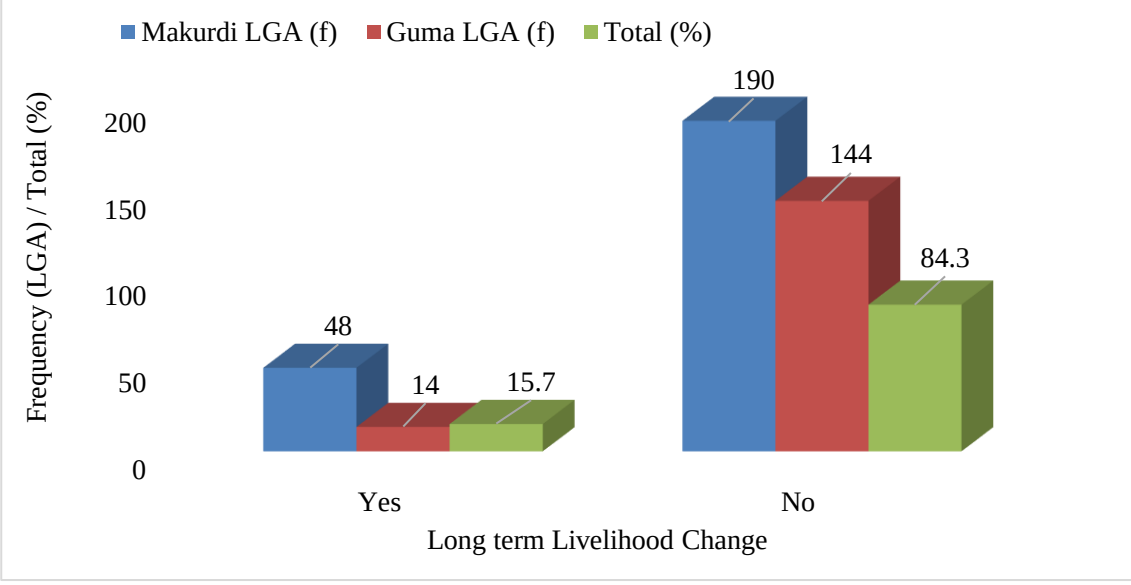

Figure 6: Long-term Livelihood Change Post-Displacement

This trend further validates the framework proposed by Nofiu and Baharudin (2024), which identifies livelihood diversification as a critical survival mechanism for smallholder farmers facing recurrent hazards. The data suggests that households are acutely aware of the risks associated with their traditional primary occupations and are actively spreading economic risk to mitigate future

shocks. However, the 30.8% who returned to their previous livelihoods presents a more complex narrative. While this could be interpreted as "bouncing back," given the high frequency of recurrent flooding and severe economic impacts, returning to the status quo may instead indicate a "poverty trap" where households lack the necessary capital or skills to transition to more secure alternatives. This aligns with the observations of Dam et al. (2021), who noted that returning to identical vulnerable conditions often sets the stage for a repeating cycle of disaster and incomplete recovery.

3.9 Adaptation Measures Adopted by Farmers

Figure 7 details the specific adaptive measures adopted by the farming population, providing a comparative insight into how households in Makurdi and Guma LGAs mitigate flood impacts on their agricultural activities. The findings reveal a significant divergence in strategy based on location and resource access. Early planting and harvesting emerged as the most dominant strategy, particularly in rural Guma where it is utilized by 63.5% of farmers, compared to 43.9% in Makurdi. This strategy involves adjusting the crop calendar to ensure that crops mature before the peak flood season in September and October. The heavy reliance on this measure, especially in Guma, demonstrates that farmers are actively utilizing indigenous knowledge of seasonal hydrological patterns to safeguard their livelihoods. This is consistent with Shabu and Tyonum (2013), who noted that residents in the Benue Valley frequently align their activities with the river's cycle. However, while effective for predictable seasonal rises, this strategy remains highly vulnerable to the early-onset or flash flood events that are becoming more frequent due to climate variability.

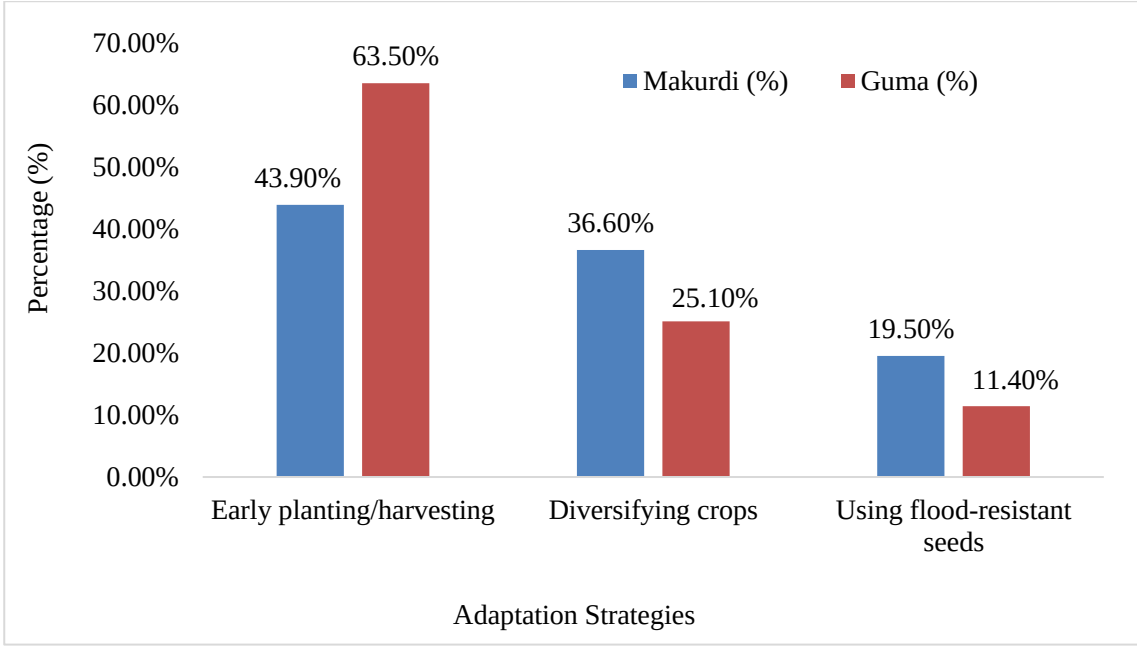

Figure 7: Adaptation Measures Adopted by Farmers

Crop diversification was the second most common measure, showing a higher adoption rate in Makurdi (36.6%) than in Guma (25.1%). The adoption of diversification aligns with Mbah et al. (2020), who identified agricultural variety as a key factor for food security in Benue State. By planting a mix of crops with varying maturation periods, farmers particularly those in urban-proximate Makurdi attempt to prevent total livelihood failure, echoing Nofiu and Baharudin's (2024) emphasis on diversification as a primary coping mechanism.

The use of flood-resistant seeds was the least common strategy in both areas, though adoption was nearly double in Makurdi (19.5%) compared to Guma (11.4%). This disparity suggests that households in Makurdi may have better financial capacity or closer proximity to markets providing improved inputs. The overall low adoption of resilient seeds (12.7% aggregate) points to a significant gap in access to modern agricultural technology. This supports the argument by Ahile et al. (2024) that the adaptive capacity of local farmers is often bottlenecked by a lack of access to advanced resources and reinforces the findings of Ajijola and Adedire (2023) regarding the consequences of minimal government intervention in distributing improved, water-resilient crop varieties to the most vulnerable rural cohorts.

3.10 Possession of Insurance among Respondents

Figure 8 reveals a near-total absence of formal financial risk transfer mechanisms within the study area, highlighting a critical structural vulnerability. A staggering 98.0% of respondents reported having no form

of insurance coverage against flood disasters, leaving only a negligible minority of 2.0% with any form of insurance policy. This virtually non-existent penetration of insurance leaves households fully exposed to the financial shocks of recurrent flooding, forcing them to absorb catastrophic losses directly. As a result, victims are left with no choice but to rely on the depletion of meagre savings or the accumulation of high-interest debt, as observed in the previous sections regarding survival strategies. This finding underscores the fact that for the vast majority of residents in Makurdi and Guma, there is no institutional buffer to provide a "soft landing" after a disaster.

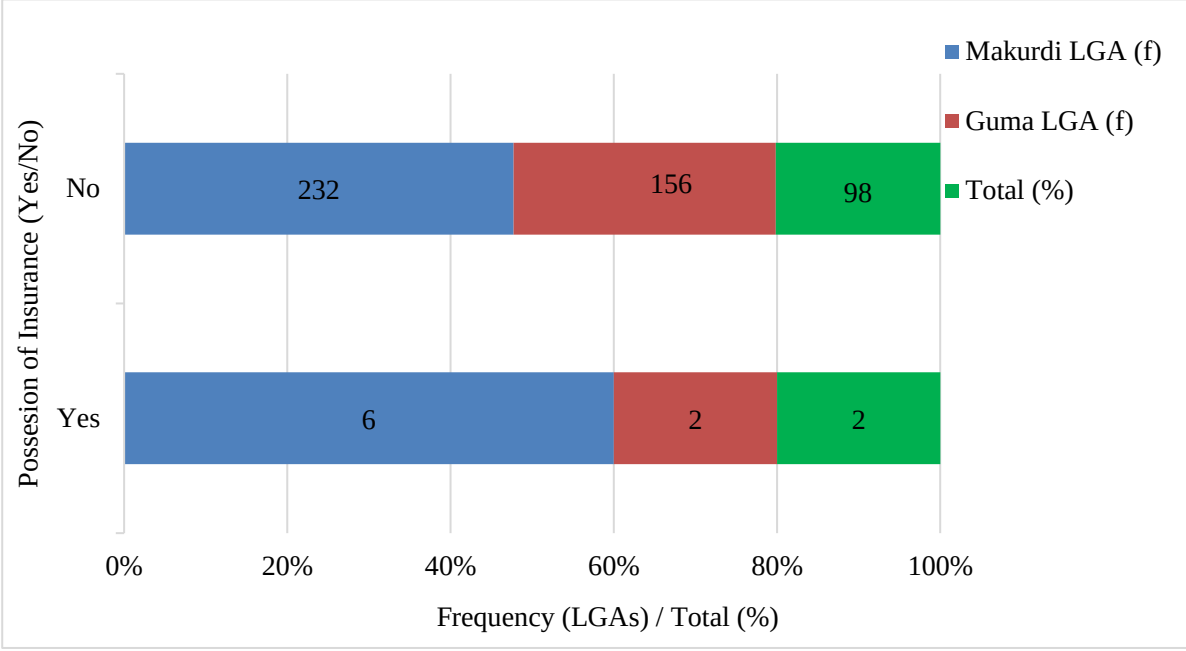

Figure 8: Possession of Insurance among Respondents

This result suggests a significant disconnect between long-standing policy recommendations and the reality of financial inclusion, as the calls for flood insurance programs made by researchers like Ogwuche and Abah (2014) remain largely unheeded over a decade later. This implementation gap validates the observations of Ajijola and Adedire (2023), who noted that in the absence of formal support systems, households in Nigerian floodplains are forced to rely on "prayers, savings, and friends" rather than institutionalized safety nets. This absence of insurance coverage is a primary driver of the "poverty trap" described by Nofiu and Baharudin (2024); without the recapitalization provided by insurance payouts, smallholder farmers and traders are forced to restart their livelihoods from zero after every flood event, making sustainable recovery and long-term resilience nearly impossible to achieve.

3.11 Current Debt Status Due to Flood Recovery

Table 8 illustrates the profound financial aftermath of flood recovery efforts, revealing a significant debt burden on the affected population. The findings show that 62.1% of respondents are currently in debt as a direct result of attempting to recover from flood damages, while 37.9% reported being debt-free. A comparative analysis shows that the crisis is even more acute in Guma LGA, where 73.4% of households are currently in debt, compared to 54.6% in Makurdi. This high prevalence of indebtedness indicates that for the majority of survivors, "recovery" is synonymous with financial entrapment. This result is a logical consequence of the immediate survival strategies identified earlier, where borrowing was the most common response to the crisis. The persistence of this debt suggests that these loans have transitioned from short-term relief into long-term liabilities, a situation exacerbated by the low monthly income levels reported by over 77% of the respondents.

Table 8: Respondent's current debt Status Due to Flood Recovery

Current Debt Status	Makurdi LGA (Frequency/%)	Guma LGA (Frequency/%)	Total (Frequency/%)
Yes (In debt)	130 (54.6%)	116 (73.4%)	246 (62.1%)
No	108 (45.4%)	42 (26.6%)	150 (37.9%)
Total	238 (100%)	158 (100%)	396 (100.0%)

This cycle of indebtedness aligns with the socio-economic impact assessments of Awopetu et al. (2013), who observed that flooding in Makurdi effectively erodes the financial stability of residents, leaving them more vulnerable to future shocks. The data suggests that in the absence of external financial aid or insurance (which was nearly non-existent at 2%), households are forced to privately finance their own reconstruction through high-interest informal debt. This reliance on credit validates the observations of Ajijola and Adedire (2023) regarding the lack of government support systems in urbanized floodplains. The results support the "vulnerability trap" described by Nofiu and Baharudin (2024), where low-income residents and smallholder farmers are perpetually pushed back into poverty by recurrent environmental shocks before they can achieve any meaningful level of financial recovery.

3.12 Perceived Sustainability of Recovery Strategies

Table 9 presents the respondents' self-assessment regarding the long-term viability of their adopted recovery strategies, revealing a pervasive lack of confidence in current measures. The results show that a significant majority of respondents (63.9%) categorize their strategies as "Not Sustainable," viewing them merely as temporary stop-gap measures. This sentiment is particularly acute in Guma LGA, where 72.8% of households described their recovery path as unsustainable, compared to 58.0% in Makurdi. Only a negligible 5.3% of the total sample expressed confidence in the "Very Sustainable" nature of their recovery. This high rate of perceived unsustainability provides a critical insight into the "resilience deficit" within the Benue floodplain, strongly corroborating the findings of Dam et al. (2021), who reported that the vast majority of households in Makurdi fail to achieve full recovery between flood cycles.

Table 9: Perceived Sustainability of Recovery Strategies

Level of Sustainability	Makurdi LGA (Frequency/%)	Guma LGA (Frequency/%)	Total (Frequency/%)
Sustainable	16 (6.7%)	5 (3.2%)	21 (5.3%)
Somewhat Sustainable	84 (35.3%)	38 (24.0%)	122 (30.8%)
Not Sustainable	138 (58.0%)	115 (72.8%)	253 (63.9%)
Total	238 (100%)	158 (100%)	396 (100.0%)

The finding that nearly two-thirds of the population views their recovery as a temporary fix suggests that households are trapped in a cycle of "absorptive" coping rather than "transformative" adaptation. As noted by Nunan et al. (2022), recovery measures in the Global South often fail because they prioritize immediate survival over addressing underlying vulnerabilities. In this study, the reliance on depleting savings, selling productive assets, and accumulating debt solves immediate crises but erodes the long-term asset base required for sustainable living. This mirrors the conclusions of Ajijola and Adedire (2023), who argued that without institutional support for durable solutions like flood-resistant infrastructure or formal insurance, households remain perpetually vulnerable. The data suggests that each recovery phase may actually leave households more economically fragile than the last, making a "Very Sustainable" recovery nearly impossible to achieve under current conditions.

3.13 Receipt of Government Assistance

Figure 9 illustrates the distribution of respondents who received assistance from government agencies, such as NEMA or SEMA, following flood disasters. The data reveals a significant gap in institutional support coverage, as the vast majority of respondents (71.2%) reported receiving no government assistance whatsoever. Conversely, only 28.8% of the surveyed households acknowledged receiving some form of aid from government bodies. This finding highlights a critical deficiency in the disaster response framework for Benue State, quantifying the "minimal" nature of state intervention. This low level of institutional support strongly corroborates the findings of Ajijola and Adedire

(2023), who noted that the scarcity of government aid forces households in urbanized floodplains to rely almost exclusively on informal safety nets, such as personal savings and social capital.

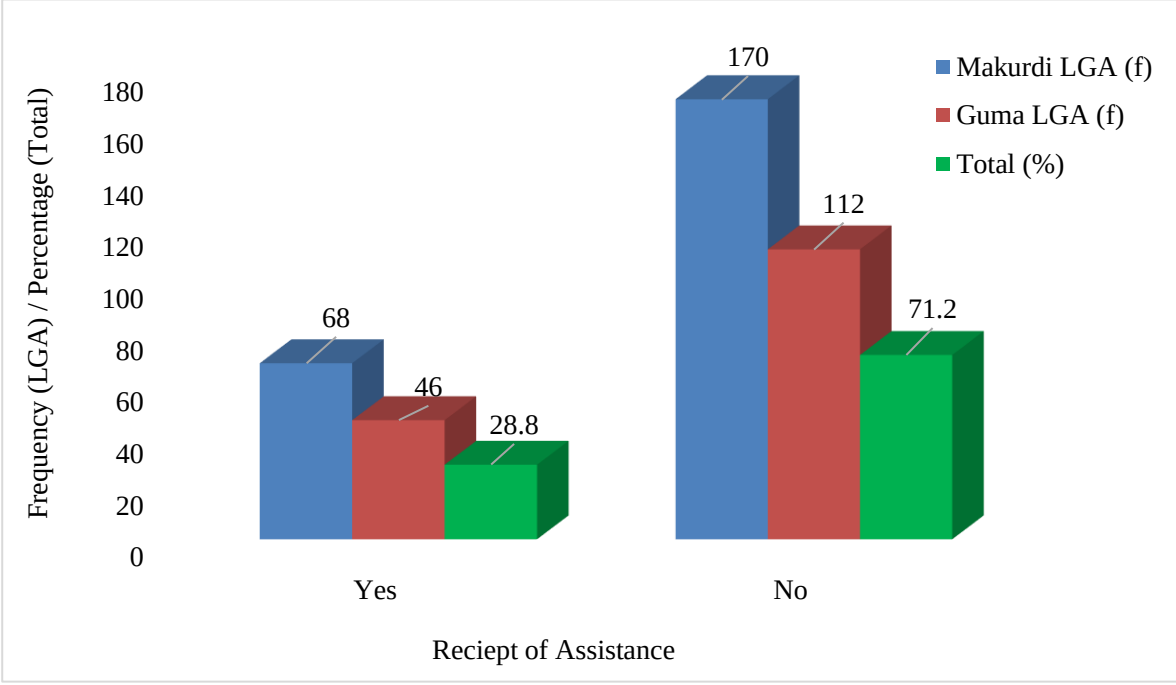

Figure 9: Receipt of Government Assistance

The absence of government support for over 70% of the victims provides essential context for the high levels of indebtedness (62.1%) and the use of unsustainable recovery strategies observed in earlier sections. When the state fails to provide timely and adequate relief, households are forced to self-finance their recovery through high-interest borrowing or the liquidation of productive assets. This dynamic supports the argument by Candra et al. (2023), who emphasized that consistent government support is a prerequisite for enhancing community resilience. The limited reach of aid in Makurdi and Guma suggests that the burden of disaster risk management is being shifted almost entirely onto vulnerable households. Furthermore, as suggested by Isma'il and Kersha (2018), the persistence of environmental and health crises in the region implies that even for the 28.8% who did receive aid, the interventions may be purely "band-aid" in nature, failing to address the structural mitigation needed for long-term recovery.

3.14 Nature of Support Received by Beneficiaries

Table 10 provides a detailed breakdown of the specific types of assistance received by the minority of respondents who accessed support, revealing a disaster response framework overwhelmingly focused on immediate, short-term relief. The data shows that food and blankets constituted the vast majority of aid, accounting for 80.7% of the total support received. This concentration is even more pronounced in Guma LGA, where 91.3% of beneficiaries received only food or blankets, compared to 73.5% in Makurdi. In stark contrast, support geared toward long-term reconstruction was minimal; temporary shelter was provided to only 10.5% of beneficiaries, while building materials essential for repairing the widespread structural damage were received by a mere 6.2%. Financial grants or loans were virtually non-existent, reaching only 2.6% of the group, all of whom were located in Makurdi. This "relief-centric" approach aligns with the findings of Mbah et al. (2020), who noted that while food aid addresses acute hunger during floods, it fails to address the underlying destruction of household assets.

Table 10: Nature of Support Received by Beneficiaries

Support Type	Makurdi (Frequency/%)	Guma (Frequency/%)	Total (Frequency/%)
Food / Blankets	50 (73.5%)	42 (91.3%)	92 (80.7%)
Temporary Shelter	10 (14.7%)	2 (4.3%)	12 (10.5%)
Building Materials	5 (7.4%)	2 (4.4%)	7 (6.2%)
Financial Grant / Loan	3 (4.4%)	0 (0.0%)	3 (2.6%)
Total Recipients	**68 (100%)**	**46 (100%)**	**114 (100%)**

The negligible provision of building materials (6.2%) and financial capital (2.6%) offers a clear explanation for the high rate of unrecovered households previously reported by Dam et al. (2021). Without the necessary materials or funds to rebuild the 36.0% of houses destroyed by the floods, households are often forced to remain in substandard conditions or remain displaced long after the waters recede. This validates the critique by Nunan et al. (2022), who argued that recovery measures in the Global South frequently prioritize superficial, consumable relief over structural interventions. Treating a chronic, systemic problem like annual displacement with temporary solutions like food distribution, the current aid framework fails to break the "vulnerability trap" described by Nofiu and Baharudin (2024). This lack of transformative support reinforces the observations of Ajijola and Adedire (2023) regarding the inadequacy of post-disaster interventions in Nigerian floodplains, where the core risk factors such as poor housing and capital loss remain largely unaddressed.

3.15 Receipt of Assistance from NGOs, Religious Organizations, or Private Donors

Figure 10 illustrates the distribution of respondents who received assistance from non-governmental sources, including NGOs, religious organizations, and private donors. The data indicates that these non-state actors played a notably more significant role in providing disaster relief than government agencies. Specifically, 52.5% of the respondents reported receiving assistance from these private and civil society sources, while 47.5% stated they did not receive any help from such organizations. This indicates that for over half of the affected population, the primary safety net was social or faith-based rather than administrative.

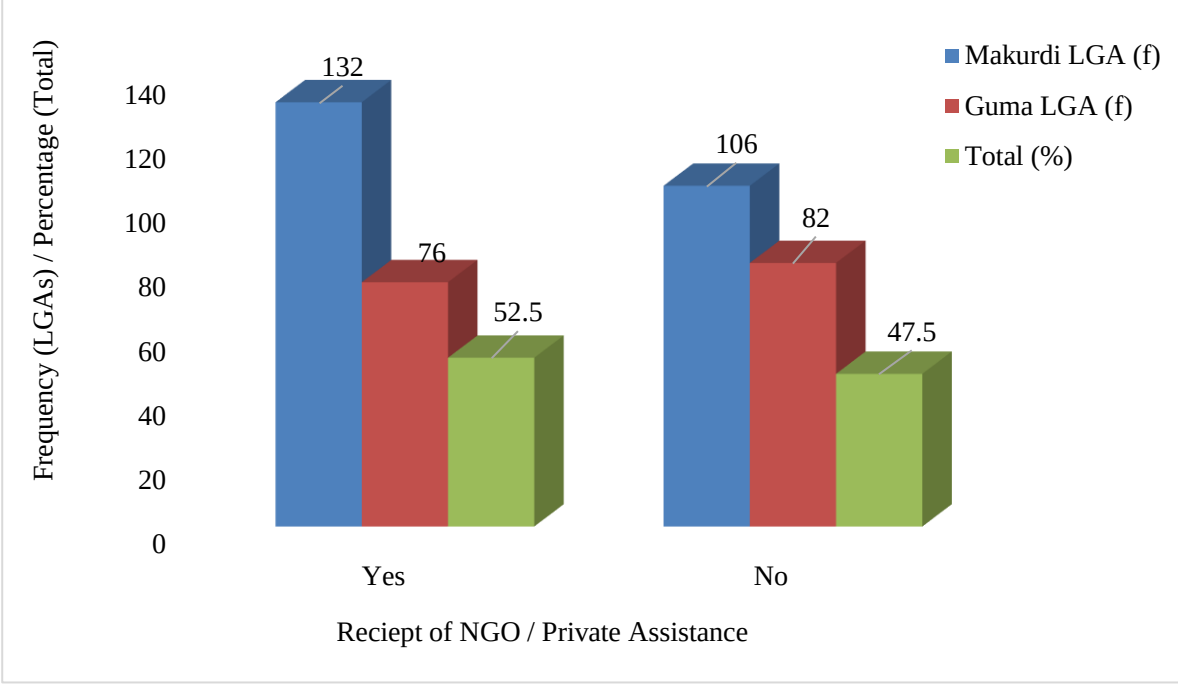

Figure 10: Receipt of Assistance from NGOs, Religious Organisations, or Private Donors

The finding that 52.5% of respondents received aid from NGOs and religious body's stands in sharp contrast to the significantly lower level of government support (28.8%) reported previously. This disparity highlights the critical role of civil society in filling the vacuum left by state institutions, an observation that aligns with Ajijola and Adedire (2023) regarding the heavy reliance on informal networks and "friends" in flood-prone Nigerian communities. However, the fact that nearly half of the population (47.5%) still received no assistance from these sources' points to a persistent and significant aid deficit. This widespread exclusion corroborates the work of Nofiu

and Baharudin (2024), who emphasized that coping capacity often depends on "social capital networks," suggesting that those without strong religious or communal connections are the most likely to be left without any form of support.

3.16 Receipt of Early Warning Information

Figure 11 visualizes the frequency with which respondents receive early warning information regarding impending floods, revealing a significant gap in the reach and consistency of current communication systems. According to the data, 48.0% of the respondents fall into the "Always/Sometimes" category, while a slight majority of 52.0% reported receiving warnings "Rarely/Never." This indicates that more than half of the households in the study area lack reliable or consistent access to actionable alerts. The disparity is particularly noticeable in Guma LGA, where 94 respondents reported rarely or never receiving warnings compared to 64 who receive them always or sometimes. In contrast, Makurdi LGA shows a higher frequency of information flow, with 126 respondents receiving warnings always or sometimes, suggesting that urban centers may have better-established communication channels than rural areas.

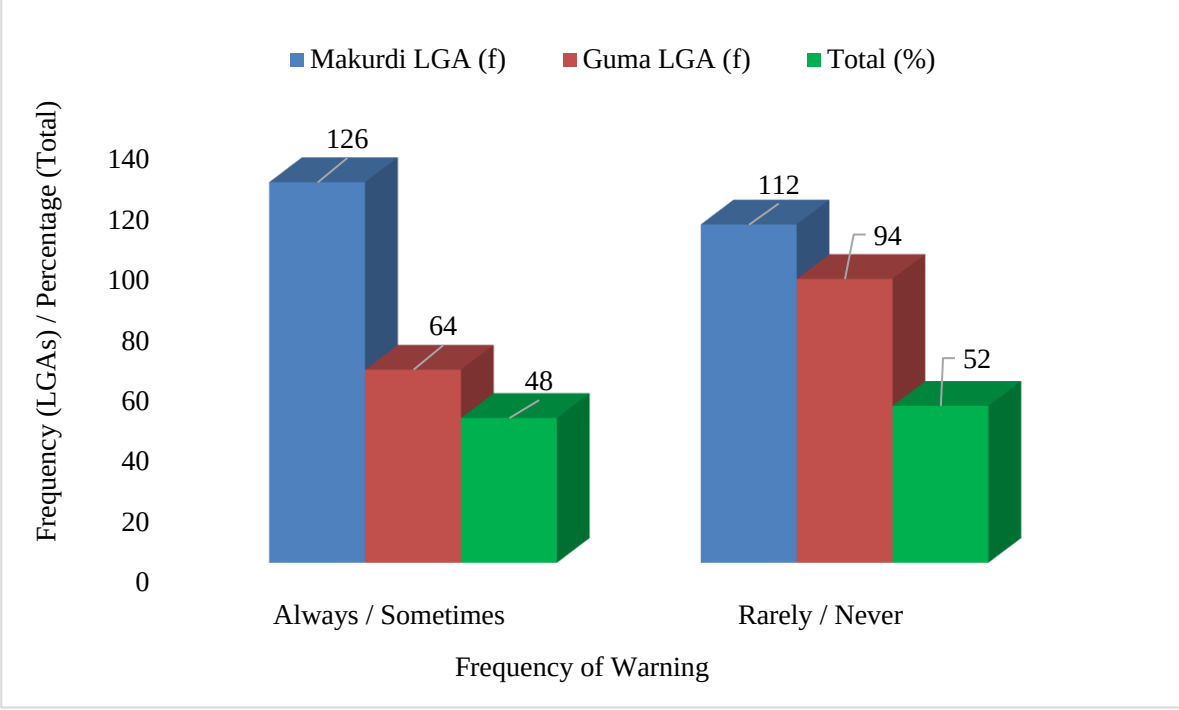

Figure 11: Receipt of Early Warning Information

This finding aligns with the conclusions of Hula and Udoh (2015), who found that residents in the region are generally not adequately prepared for flooding due to the absence of timely information. The fact that 52.0% of the population lacks consistent warnings explains the high level of structural damage and asset loss reported in previous sections; without advance notice, households cannot implement effective evacuation or asset protection strategies. While Dam and Adamgbe (2018) previously noted a high general awareness of the annual nature of floods, the current result suggests that specific, real-time warnings for particular events are still critically lacking. This communication gap validates the recommendations of Julius and Kotter (2024) and Gbaa (2022), who both emphasize that localized early warning systems and community education are essential tools for reducing flood impacts. The data suggests that current dissemination channels are failing to reliably penetrate the most vulnerable segments of the population.

3.17 Primary Source of Early Warning Information

Table 11 identifies the primary channels through which respondents receive early warning information, highlighting a reliance on a blend of formal media and localized observation. Radio and TV emerge as the most dominant sources, utilized by 40.9% of the total respondents, suggesting that mass media remains the most effective tool for broad outreach in the region. However, a significant portion of the population (26.3%) relies on the direct observation of river levels, while 20.7% receive information through community leaders. Social media accounts for the remaining 12.1%, reflecting a growing but still secondary digital outreach. The heavy reliance on Radio/TV aligns with standard disaster communication strategies in Nigeria, but the fact that over a quarter of the population must rely on personal observation points to a critical gap in the "last mile" connectivity of formal, automated warning systems.

Table 11: Primary Source of Early Warning Information

Source of Information	Makurdi (Frequency/%)	Guma (Frequency/%)	Total (N=396)
Radio/TV	114 (47.9%)	48 (30.4%)	162 (40.9%)
Observation of river levels	44 (18.5%)	60 (38.0%)	104 (26.3%)
Community Leaders	38 (16.0%)	44 (27.8%)	82 (20.7%)
Social Media	42 (17.6%)	6 (3.8%)	48 (12.1%)
Total	**238 (100%)**	**158 (100%)**	**396 (100%)**

This dependency on visual confirmation and indigenous knowledge validates the findings of Syarif et al. (2022), who noted that community-led mitigation often involves localized monitoring. However, relying on physical observation is inherently risky, as it frequently provides insufficient lead time for effective evacuation a factor that likely contributes to the high displacement and asset loss figures previously discussed. The significant role of community leaders (20.7%), particularly in Guma where it reached 27.8%, supports the argument by Julius and Kotter (2024) that community-based initiatives are essential components of flood management. Integrating these traditional leadership structures into the formal early warning chain could significantly enhance the credibility and reach of alerts, especially for the 38.0% of Guma residents who currently depend on Manual River monitoring.

3.18 Most Critical Support Needed for Long-term Recovery

Figure 12 illustrates the community's prioritization of long-term recovery needs, revealing a clear preference for structural mitigation and financial empowerment over relocation. The most critical support identified by respondents was the construction of embankments and dams, with 36.4% citing this as their top priority. This was followed by financial grants and loans at 29.8%, and the provision of farm inputs such as seeds and fertilizers at 21.7%. Notably, permanent relocation was the least desired option, selected by only 12.1% of respondents. The data shows a geographic divergence in needs: while Makurdi residents overwhelmingly prioritized structural embankments (112 respondents), those in Guma showed a much higher demand for farm inputs (76 respondents) compared to their urban counterparts.

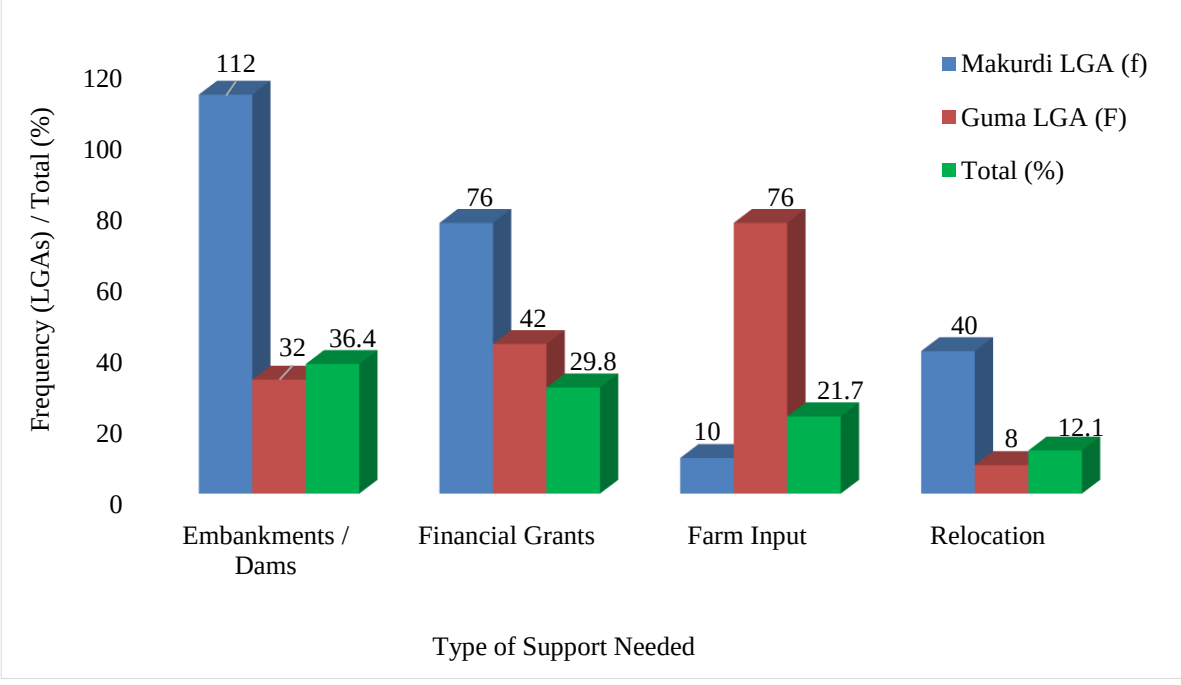

Figure 12: Most Critical Support Needed for Long-term Recovery

The strong demand for embankments (36.4%) suggests that residents prefer in-situ adaptation to safeguard their current homes and livelihoods rather than retreating from the floodplain. This finding aligns with Julius and Kotter (2024), who noted high support for engineering solutions like drainage systems in similar flood-prone regions. Furthermore, the high prioritization of financial grants (29.8%) directly addresses the debt burden previously identified in this study, where 62.1% of households reported being in debt due to flood recovery. This request for capital supports the position of Nofiu and Baharudin (2024), who argued that external financial injections are necessary to break the "poverty trap" for smallholder farmers. The low preference for relocation

(12.1%) highlights the complexity of place attachment and economic ties to the river, implying that policies favouring forced retreat may face significant resistance unless viable economic alternatives are provided.

4 Conclusion

This study examined post-flood recovery and adaptive livelihood strategies among vulnerable households in Makurdi and Guma Local Government Areas of Benue State. The findings establish that flooding along the Benue River is not merely an occasional shock but a recurring structural stressor that has fundamentally reshaped household resilience across both urban and rural communities. The demographic profile of the area is characterized by high socio-economic vulnerability, with a majority of households depending on climate-sensitive sectors such as farming and petty trading while earning relatively low monthly incomes. Primary flood impacts are concentrated on structural housing destruction, the loss of stored crops and seeds, and severe disruption to primary income sources. Displacement is rarely a brief occurrence, often extending well beyond the flood season and resulting in prolonged livelihood interruptions that delay the recovery process.

Recovery landscape in the Benue Valley is characterized by a heavy reliance on informal safety nets and localized survival tactics rather than structured institutional support, a trend that directly contradicts the proactive objectives outlined in Nigeria's National Policy on Disaster Management. Immediate survival is largely dominated by high-interest borrowing and the depletion of personal savings, which frequently traps a majority of survivors in a cycle of long-term indebtedness. While households demonstrate significant agency through income diversification and the application of indigenous agricultural knowledge, such as the strategic use of early planting and harvesting, these efforts are fundamentally constrained by a lack of access to formal insurance and modern flood-resistant technologies. This highlights a critical gap in achieving Sustainable Development Goal (SDG) 13, which calls for strengthened resilience and adaptive capacity to climate-related hazards.

Institutional interventions remain largely relief-oriented and limited in reach, focusing primarily on temporary consumables like food and blankets rather than the financial grants or durable building materials mandated for reconstruction under national disaster frameworks. Consequently, most residents perceive their current recovery paths as unsustainable stop-gap measures that fail to address the root causes of vulnerability. To align with the Sendai Framework for Disaster Risk Reduction and Nigeria's national targets, it is concluded that sustainable recovery must transition from reactive, ad-hoc relief to integrated planning that prioritizes structural mitigation and robust early warning systems. To foster long-term resilience and move toward the realization of SDG 1 (No Poverty) and SDG 11 (Sustainable Cities and Communities), the government and relevant agencies should prioritize the construction of protective infrastructure like embankments while providing households with access to low-interest recovery grants and climate-resilient agricultural inputs to break the persistent cycle of loss.

Acknowledgments

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Declarations

This study involved human participants and was conducted in accordance with established ethical standards for social and environmental research. Informed consent was obtained from all respondents before data collection. Participation was voluntary, and respondents were assured of the confidentiality and anonymity of their responses. No personal identifiers were recorded in the course of the study.

References

Agada, S., & Nirupama, N. (2015). A serious flooding event in Nigeria in 2012 with specific focus on Benue State: a brief review. Natural Hazards, 77(2), 1405-1414. https://doi.org/10.1007/S11069-015-1639-4

Ahile, S. I., Tyozua, J. M., Uyeh, M. A., & Bazarbaev, I. D. (2024). Flood Disasters and the Threat to Food Security in Benue State. African Journal of Environmental Science and Renewable Energy, 15(1), 113-123. https://doi.org/10.62154/jfv9ey54

Ajaero, C. K., Ajaero, C. K., Mozie, A. T., & Abu, I. N. (2018). Migrating from Migratory Waters to Migration of Livelihoods. Social Indicators Research, 136(1), 319-333. https://doi.org/10.1007/S11205-016-1524-X

Ajijola, S. O., & Adedire, F. M. (2023). Contextualizing Household Adaptation to Flooding in Urbanized Floodplain Areas: Pre-disaster Adaptation, Coping Capacity and Post-Disaster Intervention. British Journal of Earth Sciences Research. https://doi.org/10.37745/bjesr.2013/vol11n46376

Awopetu, R. G., Awopetu, S. O., & Awopetu, M. S. (2013). The impact of flood on the socio-economic status of residents of Wadata and Gado-villa communities in the Makurdi metropolitan area of Benue State, Nigeria. In Disaster Management and Human Health Risk III. WIT Transactions on The Built Environment, Vol 133, 347-357. https://doi.org/10.2495/DMAN130311

Candra, M. C., Pradipta, H. T., Utomo, L. N., Muhammad, S. K., & Manurung, M. A. (2023). *Making a resilient community: Preparedness of vulnerable communities in disaster mitigation based on disaster risk map*. In IOP Conference Series: Earth and Environmental Science (Vol. 1264, 012014). IOP Publishing. https://doi.org/10.1088/1755-1315/1264/1/012014

Dam, D. P., & Adamgbe, E. M. (2018). Flood disaster risk response of urban households in developing countries: case study of Makurdi town, Nigeria. International Journal of Agriculture and Environmental Research, 4(1) https://doi.org/10.53555/eijaer.v4i1.30

Dam, D. P., Yaro, M. A., Kwanga, G. M., & Nyajo, A. (2021). An Assessment of Post-Flood Disaster Risk Recovery and Reconstruction Responses of Urban Households in Makurdi Metropolis, Nigeria. Social Science Research Network. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3807066

Gbaa, S. (2022). Analysis of Flood Disaster Adaptation Strategies among People of Guma Local Government Area, Benue State, Nigeria. Indonesian Journal Of Earth Sciences, 2(2), 226-235. https://doi.org/10.52562/injoes.v2i2.415

Hula, M. A., & Udoh, J. C. (2015). An assessment of the impact of flood events in Makurdi, Nigeria. Civil and Environmental Research, 7(10), 53–60. https://www.iiste.org/Journals/index.php/CER/article/download/26231/26877

Ikyapa, T. P., Abdulhamid, A., Rilwanu, T. Y., Daura, M. M., & Alogo, P. A. (2022). Appraisal of Socio-economic, Infrastructural and Environmental Impacts of Flood in Makurdi Local Government Ares of Benue State, Nigeria. Journal of Sustainability and Environmental Management (JOSEM) 1(2), 210–217. https://doi.org/10.3126/josem.v1i2.45364

Islam, S., Roy Tusher, T., & Kabir, Md. H. (2016). Impacts of flood on Char livelihoods and its adaptation techniques by the local people. The Bangladesh Journal of Scientific Research, 28(2), 123-135. https://doi.org/10.3329/BJSR.V28I2.26783

Isma'il, M., & Kersha, A. J. (2018). Assessment of the Environmental Effects of Flooding in Makurdi Area of Benue State, Nigeria. Journal of Scientific Research and Reports, 20(5), 1-11. https://doi.org/10.9734/JSRR/2018/9848

Julius, O. B., & Kotter, D. R. (2024). Impact of adaptive strategies in urban flood management in Lokoja, Kogi State, Nigeria. International Journal of Convergent and Informatics Science Research, 6(9). https://doi.org/10.70382/hijcisr.v06i9.004

Mamodu, A., Kor, J. D., Chukwu, N. J., Waziri, S. H., Ofor, N. P., & Alhassan, D. U. (2015a). Flood vulnerability assessment using field observation and geospatial techniques: a case study of Makurdi, Benue State, Nigeria. 1(1), 43359.

Mamodu, A., Kor, J. D., Waziri, S. H., Ofor, N. P., & Alhassan, D. U. (2015b). Geospatial Science Flood Vulnerability Assessment Using Field Observation and Geospatial Techniques; a Case Study of Makurdi, Benue State, Nigeria.

Mbah, E. N., Yanjoh, E. T., & Iorhemba, S. T. (2020). Strategies for Coping with Food Insecurity during Flood Disaster among Farm Families in Benue State, Nigeria. 39-46. https://doi.org/10.9734/AJAAR/2020/V13I130097

Mngutyo, A. I. D. (2012). An Investigation of the Influence of Flooded Household Environments on Maternal Health of Flood Plain Dwellers in Makurdi, Central Nigeria. Social Science Research Network. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2131849

Ndabula, C., & Oyatayo, K. T. (2021). Spatial Multi-Criteria Evaluation of Proportional Accountability of Flood Causal Factors and Vulnerable Areas in Makurdi, Benue State, Nigeria. https://doi.org/10.7176/jrdm/77-03

Nofiu, B., & Baharudin, S. A. (2024). The vulnerability of smallholder farmers to flooding, poverty, and coping strategies: a systematic review. Mesopotamia Journal of Agriculture, 52(2), 1-13. https://doi.org/10.33899/mja.2024.149253.011424

Nunan, F., Barnes, C., & Krishnamurthy, S. (2022). Rebuilding livelihoods to reduce disaster vulnerabilities. In *The Routledge handbook on livelihoods in the Global South* (1st ed., pp. 460-469). Routledge. https://doi.org/10.4324/9781003014041

Obiora, C. J. (2014). Survival Strategies for Climate Change Induced Stress among Women Farmers in Benue State, Nigeria. Research on Humanities and Social Sciences, 4(2), 87-90. https://www.iiste.org/Journals/index.php/RHSS/article/download/10666/10996

Ogwuche, J. A., & Abah, I. A. (2014). Assessment of Flood Disaster Vulnerability for Flood Insurance Programme in Part of Makurdi Floodplain, Benue State, Nigeria. Journal of Ecology and the Natural Environment, 1(1), 1-5.

Okafor, G. C., Sadiku, S. O. E., Okhimamhe, A. O., & Eichie, J. (2017). Households Vulnerability and Adaptation to Climate Variability Induced Water Stress on Downstream Kaduna River Basin. American Journal of Climate Change, 06(2), 247-267. https://doi.org/10.4236/AJCC.2017.62013

Ologunorisa, T. E., Obioma, O., & Eludoyin, A. O. (2021). Urban flood event and associated damage in the Benue valley, Nigeria. Natural Hazards, 1-22. https://doi.org/10.1007/S11069-021-05052-6

Rakib, M. A., Rakib, M. A., Islam, S., Iliopoulos, N., & Bhuiyan, M. A. H. (2017). Flood vulnerability, local perception and gender role judgment using multivariate analysis: A problem-based "participatory action to Future Skill Management" to cope with flood impacts. Weather and Climate Extremes, 18, 29-43. https://doi.org/10.1016/J.WACE.2017.10.002

Shabu, T., & Tyonum, T. E. (2013). Residents Coping Measures in Flood-Prone Areas of Makurdi Town, Benue State. 1(6), 120-125. https://doi.org/10.12691/AEES-1-6-4

Syarif, E., Maddatuang, M., Hasriyanti, H., & Saputro, A. (2022). Exploration of Knowledge and Community Preparedness in Flood Disaster Mitigation. Geosfera Indonesia, 7(3), 277. https://doi.org/10.19184/geosi.v7i3.35066

Werdana, A. R., & Damaiyanti, V. P. (2024). Livelihood Strategy Masyarakat Pasca Banjir di Desa Bincau Muara Kecamatan Kabupaten Banjar. https://doi.org/10.20527/h-js.v3i1.84