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FLOODING, FOOD SECURITY, AND HOUSEHOLD ECONOMIC RESILIENCE IN LOCAL COMMUNITIES IN THE NIGER DELTA REGION OF NIGERIA

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Abstract
Flooding has become a recurrent environmental shock in Nigeria's Niger Delta, with major implications for household welfare, livelihoods, and food security. This study examined the effects of flooding on household food security and economic resilience in Bayelsa, Rivers, and Delta States. A mixed-method design was adopted, and 1,682 valid responses were analysed from 1,800 administered questionnaires using descriptive statistics and inferential interpretations. The findings revealed that households in the study area are highly exposed to flooding, which disrupts food supply, reduces meal frequency, and increases dependence on cheaper or less preferred foods. Many households reported income loss, asset depletion, and unstable livelihoods during flood events. Short-term coping strategies such as reducing meal sizes, borrowing food or money, and selling household belongings were common, though often destructive. While livelihood diversification and social support networks helped some households recover, these measures were largely insufficient, particularly in the absence of formal financial services, credit, and insurance. Institutional support programmes were reported to be poorly accessed and only moderately effective. Overall, weak social protection systems and persistent vulnerability undermine household resilience in the Niger Delta. However, emerging livelihood diversification and social capital provide important buffers that can be strengthened. The study recommends expanding financial inclusion, improving early warning and disaster preparedness systems, investing in resilient infrastructure, and implementing targeted livelihood and social protection interventions for flood-prone communities. Strengthening both formal and community-based support systems is essential to safeguard food security and enhance household adaptive capacity in the face of recurrent flooding.

Keywords: Flooding, Food Security, Household Resilience, Livelihoods, Niger Delta, Economic Vulnerability.

1.1 Introduction

One of the most common and destructive environmental hazards in the world is flooding, which has especially bad effects in low-lying, deltaic areas like Nigeria's Niger Delta. The Niger Delta is naturally susceptible to flooding due to its network of rivers, creeks, and mangrove ecosystems, high annual rainfall, and inadequate drainage (Nkwunonwo, Whitworth & Baily, 2020). Because of increased rainfall variability, rising sea levels, and extreme weather events, climate change has increased the frequency and magnitude of flood events in recent decades (Intergovernmental Panel on Climate Change—IPCC, 2021). The region's human and livelihood vulnerabilities have increased as a result of these developments, particularly for rural households whose livelihoods depend heavily on land and natural resources.

Food security in the Niger Delta is also worsening as a result of flooding. Food security can be defined as a situation where people's physical and economic access to adequate safe and nutritious foods satisfies their eating preferences as well as their dietary requirements (FAO, 2013). Flood disasters cause a disturbance in agriculture productivity as a result of destruction brought about by flooding on land as well as farm infrastructures (Adelekan, 2016).

Additionally, flood disasters affect transport systems in a way that results in a lack of adequate means for the distribution of food. This brings high prices as well as a lack of food security in the households, especially among the most susceptible populations such as women and the elderly as well as children (Eze, 2018; Nkwunonwo et al., 2020).

In addition to its effects on agricultural production, flooding also hampers the economic resilience of households. Economic resilience is defined as "ability of households to anticipate, absorb, respond to, and recover from economic shock, while improving or sustaining their well-being" (Folke, 2016). In the Niger Delta, where some of the main sources of livelihood for many communities are rain-fed crops, fisheries, and necessary services, flooding results in interrupted financial gains, loss of assets, and increased debt (Nzeadibe et al., 2015). Recovery efforts after flooding also call for financial inputs, in addition to various types of necessary assistance, which in many instances, some communities lack, keeping them in circles of vulnerability and poverty (Adenle & Amusan, 2019).

Additionally, flood disasters are intertwined with some of the pre-existing socio-economic issues, such as a lack of infrastructure, bad governance, degradation of the environment, and lack of social protection. Indeed, in most of the flood-prone areas, the drainage channels, flood protection, and flood warning systems are either non-existent or in a very bad state (Etuonovbe, 2011). Moreover, the policies that are in place are mainly aimed at providing relief to the victims of flood disaster without necessarily working to build resilience (Adger, 2016).

This problem is especially acute in the Niger Delta because the Niger Delta is a key component in the economy of Nigeria. Agriculture is a major source of livelihood for people. The Niger Delta also accounts for a high contribution to fishery productions in the entire country. Food systems are therefore interrupted, not just for the well-being of people but also for the whole economy in Nigeria because of the impacts associated with functional food systems in the country.

Notwithstanding an increasing awareness of climate-induced flooding as a development issue, there is a relative absence of scientific research on the relationship between flooding, food security, and the economic resilience of households in the Niger Delta Region. Previous research have considered impact levels of flooding at macro-levels and/or at urban levels, but there is a gap in examining adaptation strategies at household levels in rural areas in relation to flooding resilience (Adelekan, 2016; Olajuyigbe et al., 2012). The knowledge gap is crucial for making research-based intervention initiatives for flooding vulnerability at localized levels. Therefore, this research endeavors to examine the impact that flooding has on food security and the econo-resilience of households within the Niger Delta area of Nigeria. This work attempts to discern the degree to which the effects of flooding have impacted the systems of sustenance, as well as the degree to which the responses of the affected households are effective, or the degree to which policies are effective in mitigating this adversity. The thesis that this work seeks to tackle is that flooding negatively impacts the econ-resilience of Niger Delta communities.

The specific objectives are to:

1. Analyze the extent to which flooding affects food production, availability, and accessibility in local communities of the Niger Delta region.
2. Examine the coping strategies adopted by households in response to flooding-induced food insecurity and assess their effectiveness.
3. Assess the short term and long-term economic resilience of households affected by flooding and identify factors that enhance their adaptive capacity.
4. Assess the role of financial services (such as credit, insurance, and savings) in enhancing household economic resilience to flooding-induced shocks.
5. Evaluate the effectiveness of existing flood mitigation and food security interventions in reducing the vulnerability of households in the Niger Delta.

2.1 Literature Review

2.1.1 Flooding

Flooding is defined as the temporary inundation of water onto land surface areas that are normally dry, due to too much rainfall, river flooding, the effects of the storms surge, or inadequate drainage systems (Adelekan, 2016). Climate change, as raised by the Intergovernmental Panel on Climate Change (IPCC, 2021), has intensified the level of flooding occurrences, as the Niger Delta has been experiencing due to the effects associated with high rainfall during the seasonal changes, river flooding, the effect of the tide, as well as human-induced effects like the exploration of oil, land subsidence, as well as the restriction of the flow of water due to blocked waterways (Nkwunonwo, Whitworth, & Baily, 2020). Flooding was constructed as the event associated with natural as well as human-induced occurrences that affect the hydrological cycles of the affected regions.

2.1.2 Food Security

Food security can be considered multidimensional with the Food and Agriculture Organization (FAO) of 2013 describing it as "a condition where all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs for an active and healthy life." This consists of four major factors: availability, accessibility, utilization, and stability (FAO of 2013). Flooding impacts these factors in that it destroys farmland (availability) (Eze of 2018). This research used food security as the extent of the availability of nutrient-rich food in flood-ridden areas of the Niger Delta region.

2.1.3 Household Economic Resilience

Economic resilience in households is the ability to predict, absorb, adapt to, and recover from any shock or stress while at the same time maintaining and improving their livelihood systems (Folke, 2016). It consists of economic capital in addition to social capital, natural capital, and human capital that households are able to draw upon in cases of stress (Fleischman et al., 2019). Using the idea by Adger (2016), resilience is seen as the ability of livelihood systems to withstand economic shocks in addition to the ability to adapt to the strategies which are used to cope with economic risk. Economic resilience for households in flood-prone areas may be income diversification, social capital contacts, savings, migration, and mutual aid (Nzeadibe, Egbule, & Agu, 2015). For this study, economic resilience in households is defined as their capability to withstand economic shock associated with flooding without sinking into chronic poverty and food insecurity.

2.1.4 Historical Development of Flooding in the Niger Delta Region

Flooding in the Niger Delta environment has very ancient causes associated with the distinct geomorphological, hydrological, and climate conditions. The Niger Delta is found in the lower Niger Basin, where it is dominated by wetland swamps, tidal creek mangrove forests, and floodplains that have traditionally had seasonal overflow due to high rainfall in the region (Etuonovbe, 2011). Historically, the Niger Delta region had communities that were specially adapted to the seasonal flood events through the construction of stilts to support housing, elevated settlement areas, or flood-resistant farming systems such as fishing and flood-recession agriculture (Adelekan, 2016). However, in the past four decades, the magnitude, rate, and associated socio-economic aspects of flooding in the Niger Delta have increased due to environmental changes, human-induced factors, and climate change (IPCC, 2021).

The colonial and independence era signified the commencement of large-scale infrastructural and land use change that began influencing hydrological cycles in the Niger Delta. Road networks, dams, oil facilities, and canalization schemes disrupted the water drainage system, specifically in areas close to Port Harcourt in Rivers State and Warri in Delta State (Nkwunonwo et al., 2020). Urbanization that was not handled by sufficient drainage systems led to enhanced urban flooding, with rural areas also experiencing riverine flooding due to discharge downstream by the Niger-Benue river basin (Adelekan, 2016).

Starting from the 1980s, the Niger Delta started experiencing more regular flooding, which could be attributed, among other things, to deforestation, land lowering, marsh destruction, as well as sand mining, which decreased the ability to mitigate floods naturally (Nzeadibe, Egbule, & Agu, 2015). The exploration for petroleum products, gas, as well as changes in river courses as well as the destruction of mangrove forests, which are natural protective zones, especially in Bayelsa State and Rivers, further heightened the effects, which started experiencing displacements, lost farm yields, as well as destroyed infrastructure due to what could be managed seasonal flooding (Adenle & Amusan, 2019).

The flood disaster that occurred in the nation in 2012 signified a shift in the historical trends associated with flood disasters in the Niger Delta region and Bayelsa, Rivers, and Delta States in particular. The flood disaster, which was linked to the heavy rainfalls and the discharge of the excess water from the upstream dams, resulted in the inundation of the extensive farmlands and displacement of hundreds of thousands of people (Etuonovbe, 2011; Adelekan, 2016). Bayelsa State, which is almost entirely riverine, was one of the worst-hit places in the nation during the disaster and was forced to relocate to the IDP camps because the entire state was cut off. Delta and Rivers States also experienced extreme destruction of the infrastructure and economic activities in the Niger Delta's oil-producing communities. Since the flood experience of 2012, flood disasters have occurred almost every year in the nation. The flood disasters have made living in the nation a disastrous and constant reality due to the associated experience (Nkwunonwo et al., 2020).

In Bayelsa State, the preponderance of low-lying areas, augmented by copious rainfall and tidal flooding, has resulted in frequent flooding along rivers and coastlines. In Yenagoa and other areas around Nun River and Forcados, flooding has become commonplace, impairing agriculture, fishing, transport, and social activities (Eze, 2018). In Rivers State, fast urbanization around Port Harcourt and other municipalities, accompanied by clogged drainage and conversion of wetlands, has resulted in flooding, both urban and flash, particularly around Port Harcourt (Adelekan, 2016). At the same time, Delta State copes with a double handicap from riverine flooding along the Niger Flood Plain as well as estuarine flooding at coastal areas like Warri and Bomadi, including rural and peri-urban settlements (Nzeadibe et al., 2015).

Presently, flooding in the Niger Delta can be said to be both environment-related and socio-economic, with climate change, resource exploitation, urbanization, and governance issues as some of the underlying factors surrounding such occurrences. The pace at which floods are now destructive, threatening livelihood resources as opposed to when they were part of living, seasonal patterns, requires immediate findings to be derived from the historical context. Households in Bayelsa, Rivers, and Delta states are exposed to more flood risk, reduced natural protection measures, as well as reduced support by institutions for increasing resilience to such flood occurrences (Folke, 2016; IPCC, 2021).

2.2 Theoretical Literature

The research is anchored on three related theoretical frameworks: the Sustainable Livelihoods Framework (SLF), Resilience Theory, and the Pressure and Release (PAR) Model of vulnerability. The theoretical frameworks form the basis for analysis of the impact of flooding on food security and the economic resilience of most communities within the Niger Delta region.

2.2.1 The Sustainable Livelihoods Framework (SLF)

Sustainable Livelihood Framework (SLF), on the other hand, was created in the 1990s by the UK Department for International Development (DFID), as an analytical tool to better comprehend the concept around which households accumulate different resources to sustain their well-being despite shock, stress, or lack of institutional capacity opportunities for sustainable livelihood outcomes (Scoones, 1998). The Sustainable Livelihood Framework aims to determine how people accumulate different types of assets like human, natural, physical, financial, or social to create sustainable livelihood strategies that can provide different

outcomes like increased income, reduced vulnerability, food security, or increased resilience to sustainable livelihood outcomes (Scoones, 1998; Ellis, 2000). Sustainable livelihood outcomes in the Sustainable Livelihood Framework also consider sustainable livelihood outcomes that can withstand or recover from events like economic decline, environmental disaster, or climate change emergencies while sustaining or increasing their resource base for future generations.

Another key aspect of the SLF is policies, institutions, and governance systems that play an important role in influencing resource access and livelihood choices. This is evident in the Niger Delta, where poor institutions and policy performance in dealing with natural disasters have constrained households from making effective use of floods (Adelekan, 2011). Within this framework, it is evident that although households employ alternative livelihood means such as livelihood diversification, seasonal migration, borrowing, or social connections, effectiveness is highly dependent on institutional forces (Scoones, 1998; DFID, 1999).

2.2.2 Resilience Theory

Resilience Theory originated in ecological sciences in the 1970s from the work of Holling (1973), who explained resilience as the ability of a system to withstand disturbances by changing and rebuilding itself in a way that maintains its basic character and function. Over the years, this theory has developed across many disciplines in relation to research on natural resource management and development studies. In social systems, resilience is described as the ability of individuals or groups in society to prepare for or withstand stresses or shocks such as natural or economic disasters and still avoid reductions in their levels of well-being (Folke, 2006; Adger, 2000).

One of the main principles of Resilience Theory is the inevitability of shock, but the effect of the shock is a function of the preparedness and resilience of the system that is impacted. When in the socio-ecological context of the Niger Delta, resilience reflects the manner in which people in the community relate to the environment and the manner in which the flooding is addressed. There are three main dimensions of Resilience Theory.

2.2.3 Pressure and Release (PAR) Model of Vulnerability

The Pressure and Release (PAR) Model, or the Wisner, Blaikie, Cannon, and Davis Model, is among the most widely accepted models for understanding the root cause of vulnerability to disaster events. First created for the book At Risk: Natural Hazards, People's Vulnerability, and Disasters, this model defines disasters not as the effects of natural events, but as the interaction between preexisting conditions that render communities susceptible to natural events (Wisner et al., 2004). Essentially, disasters result not solely due to natural events, but also from the fact that the social element of the disaster is as major as the natural element, for example, the flood itself, but also the fact that the population is susceptible to the flood.

2.3 Empirical Literature

Odior and Elugwu (2025) investigated the link between flood and food security among coastal dwellers, including the Niger Delta region. Employing a combination of statistical tools such as Multiple Regression Analysis (MRA) and Geographically Weighted Regression (GWR), the authors examined the impact that flood has on food security. The outcome revealed that flood has adverse effects on food availability, access, and food-related production; in fact, the level of food insecurity was more critical in areas with low socio-economic status. It was concluded that flood adversely affects food production and increases food insecurity; hence, there is a great need for specific policies to improve the adaptive capacity of flood-vulnerable areas along the coastline.

The study by Okon and Ejemot-Nwadiaro (2023) was based on rural communities that are flood-prone and located within Bayelsa and Rivers States. The study utilized a cross-sectional survey design that targeted 400 households and employed descriptive and inferential statistics to explore the effects of flooding on food security at a household level. The findings revealed that flooding had a significant effect on food production, market accessibility, and earnings of

households, thus worsening food insecurity, especially where female-headed families were concerned.

Okon and Ejemot-Nwadiaro (2023) specifically targeted flood-prone rural areas of Bayelsa and Rivers states. This particular study used a cross-section design to select 400 households. The researcher aimed to determine with descriptive and inferential statistics which of these farm products are affected by flood occurrences with regard to food security as a factor. Findings indicated that flood occurrences made food production, markets, and income sources vulnerable to food insecurity, especially female-headed households.

Additionally, Akinbami and Oladipo (2022) studied the impact of flood exposure on the livelihood activities of households in Delta, Bayelsa, and other states. The researchers employed a survey strategy, with 350 households being surveyed, while focus group interviews were used to gather information from community leaders. The findings showed that floods affected agriculture, fishing, or petty trading activities, which are dominant livelihood activities in this region. It was observed that where there was diversification, resilience was achieved. It was concluded that resilience should be developed through adaptive capacity, with diversification being promoted.

Chukwuma and Okechukwu (2022) emphasized the effects on food security brought about by flooding in rural and semi-urban settings. This study utilized structured questionnaires among 300 households. The results showed that the flooding intensity and occurrences positively influenced the effects on the lack of food security, income decline, and dependence on support. The conclusions drew from the study are the emphasis on combining early warning systems and climate-resilient farm technology in order to support household-level food security in flood-at-risk zones.

The relationship between climatechange flooding and household food security was investigated by Igbokwe and Nwaogwugwu (2022). The research used a descriptive analysis of 300 households in flood-prone areas in Bayelsa and Delta States, Nigeria. The findings revealed the impact of flooding in interrupting agricultural works, decreasing fish production, and promoting dependence on food assistance. It concluded the importance of climate adaptation, drainage, and diversification in ensuring the sustainability of household food security in flood-prone regions.

Okafor and Ogbonna (2021) evaluated the socio-economic effects of flooding on rural households in Rivers State. Using a structured questionnaire with a sample size of 280 households, the study analyzed the data for description using descriptive statistics and regression to establish flood effects on income and food security. The results showed that frequent flooding destroys farmland and fisheries, lowers household income levels, and elevates reliance on food aid. The study, however, concluded that developing local adaptive strategies, infrastructure, and support systems by government agencies strengthens one's ability to respond and lowers vulnerability.

Ezeani and Okeke (2021) investigated the impacts of repeated flooding on household economic resilience and food security. The research method consisted of structured questionnaires that were administered on 320 households, using descriptive statistics, regression analysis, and thematic qualitative analysis. The findings indicated that repeated flooding depreciated the assets owned by households, disrupted agricultural production, and increased food insecurity. Households with access to financial resources, social support, and diversified livelihoods showed a great level of resilience. This paper concluded that the integration of community-based adaptation strategies with government support programs is critical in improving resilience and food security.

Eze and Abah (2021) examined the impacts of repeated flooding on economic resilience and food security at the household level in Bayelsa, Rivers, and Delta States. In this descriptive and regression analytical study, structured questionnaires were used to gather data from 350 households. It was observed that flooding resulted in huge loss of assets, disturbances in

income generation, and decline in food security. Households with social networks, support from the government, and having multiple sources of income were resilient. This paper concludes that increasing adaptive capacity by diversifying livelihoods and ensuring institutional support will determine the magnitude of flood impacts.

Agbo and Omonigho have done an assessment of the relationship between flood exposure and household economic resilience in Bayelsa State (2020). The research study used a descriptive statistic, correlation analysis, and regression models on a sample of 300 households through structured questionnaires and focus group discussions. It found that repeated flooding had weakened household financial and physical assets, but those households are more resilient that apply livelihood diversification, involvement with a community group, or government support. The study concluded that livelihood diversification and social support are crucial in bringing about adaptive capacity to minimize the impact of floods.

Week and Wizor (2020) studied how the levels of flood risk influence food security, livelihood, and socio-economic variables in flood-prone communities throughout Bayelsa, Delta, and Rivers States. The research design adopted for this study was a descriptive survey, in which a multistage stratified random sampling method was used in selecting 790 respondents. Data analysis involved descriptive statistics to assess the perceptions of the residents on flood impacts. The results showed that a majority of the respondents experienced food scarcity after the flood, appreciable crop damage, food insecurity, and income loss due to farmland washed away by the flooding. Besides, flooding decreases household employment opportunities and reduces the ability to care for dependants. This paper consequently concluded that flooding strongly compromises food production, income, and livelihood within the core Niger Delta and called for infrastructural interventions through good drainage systems and smart agricultural practices that would help ameliorate these incidences.

Another study by Ifeanyi and Ezeani (2019) focuses on Rivers and Delta States. Through an integrated mixed-methods approach, where 280 household questionnaires were administered and key informant interviews were conducted, flood-induced livelihood disruptions were investigated. Analysis reveals that flood destruction of farms and fisheries has led to the erosion of critical infrastructure, which is now causing income loss and reduction in food accessibility. This study has documented that households with access to social networks and savings showed more resilience and recovery from the flood shock. The authors have concluded that integration of social capital into flood response planning is a critical element in increasing household resilience

Okon and Umoh (2017) assessed the impacts of flooding on the food security of households in Bayelsa and Rivers States. A descriptive survey design was used in the research, where 320 households in flood-prone areas were surveyed. Results showed that there are significant losses in crops, livestock, and storage food due to flooding. Moreover, the price of food and the buying capacity of the households are affected. This research concluded that flood vulnerability has a significant effect on the possibility of food insecurity in the affected areas.

Igbinedion and Okorodudu (2017) studied the impact of periodic flooding on the livelihood and food security status of rural households. The authors used a descriptive survey design, targeting 310 households through stratified random sampling. The results were interpreted using descriptive statistics and chi-square analysis. The results showed that flooding results in the destruction of agricultural land, damage to fishing gear, reduced household income, and food insecurity. The authors concluded that appropriate flood management strategies, disaster preparation, and livelihood strategy development are vital for improving household resilience.

Adelekan (2016) investigated the impact of flood occurrences on food security and livelihood activities within the Niger Delta regions. The study was conducted by applying both secondary hydrology and climate change information and household surveys among 400 respondents within Rivers and Bayelsa states. The analysis of the data was conducted using both descriptive and multivariate approaches to establish the relationship between flooding vulnerability and

food security outcomes. The study found out that flood occurrence significantly impacted crop productivity, fishing activities, and food prices, especially among the poor. Adelekan (2016) reported that climate variability was mitigable by the adoption of flood-tolerant crop production and early warning initiatives to enhance food security.

2.3.1 Research Gap

Though there have been many studies that have clearly presented the influence that flooding has created in terms of food production and livelihood in certain areas of the Niger Delta (Week & Wizor, 2020; Adelekan, 2016; Okon & Umoh, 2017), there have been no studies that have focused on analyzing the effect that flooding has created concerning food security, production, availability, and accessibility. This is what makes up the first objective of this study.

Additionally, despite the fact that some research recognizes that households employ coping strategies among other factors attributed to flooding, it still fails to evaluate the level at which the strategies could be effective for improved food security and economic resilience (Ifelanyi & Ezeani, 2019; Agbo & Omonigho, 2020). Thirdly, this aspect restricts objectives two and three, hence fulfilling the objectives by aiming to evaluate household coping strategies and evaluating both short-term and long-term economic resilience, along with factors that could boost the level of adaptation. Furthermore, the aspect of financial services like credit, insurance, and savings for boosted resilience is still overlooked, hence fulfilling the fourth goal. Finally, although some research could be linked to government or community actions, systematic assessments concerning its level for enhanced household resilience could be overlooked, hence fulfilling the aim set by the fifth objective. Finally, all objectives were crafted for the purpose of addressing bridge gaps within research concerning eroding flooding for food security within the Niger Delta.

3.0 Methodology

3.1 Study Area

The Niger Delta region in Nigeria can be found in the southern region of the country and consists of a large area of land where there are many rivers and creeks. This region can be found in nine states: Bayelsa state, Rivers state, Delta state, Akwa Ibom state, Cross River state, Edo state, Ondo state, Abia state, and Imo state, with Bayelsa state, Rivers state, and Delta state generally said to be where the Niger Delta region primarily lies. This region covers a total area of 70,000 square kilometers and consists of over 30 million people.

The Niger Delta is also extremely prone to flooding as a result of its lowland terrain, high rainfall, and location near the Atlantic Ocean. Floods, which occur every year and are exacerbated by climate change, result in the displacement of people, damage farmland, and food supply chain disruption. The Niger Delta is a subsistence farming and fishing area, making its population vulnerable to food insecurity during floods.

Figure 3.1: Map of the Niger Delta Region of Nigeria.

From an economic point of view, Nigeria's Niger Delta region is known to be an oil-rich region that accounts for more than 80% of Nigeria's earnings because of its high contribution to Nigeria's economy through its vast petroleum reserves and natural gas resources. It is also faced with extreme poverty and environmental degradation because of flooding that makes the region vulnerable to economic change.

Due to its vulnerability to both natural and socio-economic hazards, the Niger Delta offers an ideal setting that can be used to study the effects that flooding has on food security and economic resilience in society. This can be attributed to its proximity to the Gulf of Guinea.

3.2 Research Design

This study adopted a mixed-methods design, combining quantitative and qualitative approaches to examine the effects of flooding on household food security and economic resilience in the Niger Delta. Quantitative data were collected through structured questionnaires administered to systematically selected households in flood-prone communities. Qualitative insights were obtained from key informant interviews and focus group discussions to complement and deepen the quantitative findings.

3.3 Population of the study

The population of this study comprises all residents of Bayelsa, Rivers, and Delta States in the Niger Delta region of Nigeria, who are potentially vulnerable to flooding and its effects on food security and economic resilience. Based on 2020 population estimates, Bayelsa has approximately 2.7 million people, Rivers 7.7 million, and Delta 5.7 million, giving a combined population of about 16 million people across the three states (NBS, 2020).

3.4 Sample Size Determination

The sample size for this study was determined using Taro Yamane's (1967) formula for finite populations at a 5% margin of error and 95% confidence level. With an estimated population of 16,063,000 persons across Bayelsa, Rivers, and Delta States, the formula:

$n = \frac{N}{1+N(e)^2}$ yields an estimated minimum sample size of approximately 400 households. However, to improve representativeness across the three states, multiple LGAs, and different community types (rural, urban, and riverine), as well as to address possible non-response and data loss common in disaster-affected areas, the sample size was expanded to 1,800 households. This larger sample enhances reliability and the robustness of the findings.

3.5 Sampling Technique

A multi-stage sampling design was adopted that began with purposive sampling to identify flood-prone areas for engagement throughout the Niger Delta states (Bayelsa, Rivers, and Delta). Ten flood-prone communities were deliberately sampled from different LGAs for each of the three states. A total of sixty households for each community was randomly sampled to comprise 1,800 households for the survey.

3.6 Research Instrument

The questionnaire was designed in a way that it used a structured questionnaire, which was conducted among households in flood prone areas of Bayelsa, Rivers, and Delta States. The questionnaire included questions relating to socio-demographics, flood exposure, food security, coping, economic resilience, financial accessibility, as well as institutional support. The questionnaire was mostly multiple-choice questions.

3.7 Validity, Reliability, and Ethical Considerations

A literature search ensured the validity of the questionnaire. Expert opinions of colleagues regarding the correctness and appropriateness of the questionnaire items were taken into consideration. A pilot study also helped in testing the reliability of the questionnaire, and appropriate coefficients were obtained. Ethical permission was obtained before the questionnaire was administered. The research instrument was administered with the consent of all participants, and all were done on a voluntary basis. Anonymity, with no scope for harm, distress, or cultural insensitivity were completely adhered to.

3.8 Method of Data Analysis

Data from the questionnaires were coded and analysed using descriptive and inferential statistics. Frequencies, percentages, means, and standard deviations were used to summarise socio-demographic characteristics, flood exposure, food security, coping strategies, and economic resilience. Mean scores and composite indices assessed levels of food availability, accessibility, and coping behaviour. Economic resilience indicators were similarly analysed to determine livelihood stability and recovery capacity. Qualitative data from interviews and focus group discussions were analysed thematically to support and explain the quantitative results.

4.1 Results and Discussions

Out of 1,800 questionnaires distributed, 1,682 were retrieved, giving an overall response rate of 93.4%, a high response rate for field surveys. Rivers State had the highest retrieval rate of 94.5%, Bayelsa State followed with 93.5%, while for Delta State, the retrieval rate was a little lower at 92.3%. These relatively high response rates across the three states reflect good engagement with the respondents and support the notion that data collected could be reliable for the study population.

Table 4.1: Socio-Demographic Characteristics of Respondents (N = 1,682)

Variable	Category	Frequency	%	Variable	Category	Frequency	(%)
Gender	Male	862	51.3	Household Size	1–3	264	15.7
	Female	820	48.7		4–6	902	53.7
Age (years)	18–25	302	18.0		7–9	402	23.9
	26–35	476	28.3		10+	114	6.8
	36–45	398	23.7	Number of Dependents	0–2	328	19.5
	46–55	286	17.0		3–5	914	54.4
	56–65	142	8.4		6–8	366	21.8
	66+	78	4.6		9+	74	4.4
Marital Status	Single	412	24.5	Highest Education Level	No formal education	198	11.8
	Married	1,034	61.5		Primary	364	21.6
	Widowed	134	8.0		Secondary	682	40.5

	Separated/ Divorced	102	6.1		Tertiary	358	21.3
Main Occupation	Farming	546	32.5		Vocational/ Other	80	4.8
	Fishing	282	16.8	Main Household Income Source	Farming	624	37.1
	Trading	314	18.7		Fishing	278	16.5
	Civil service	198	11.8		Salary	402	23.9
	Artisan	172	10.2		Business/ trading	356	21.2
	Unemployed	128	7.6		Remittances	192	11.4
	Other	42	2.5		Other	68	4.0
Estimated Monthly Household Income	< ₦50,000	284	16.9	Length of Residence	<1 year	124	7.4
	₦50,000 – ₦100,000	528	31.4		1–5 years	412	24.5
	₦101,000 – ₦200,000	456	27.1		6–10 years	576	34.2
	₦201,000 – ₦300,000	236	14.0		>10 years	570	33.9
	➢ ₦300,000	178	10.6				

Source: Authors' computation from survey data, 2025

The survey of 1,682 households in Bayelsa, Rivers, and Delta States as captured in Table 4.1 shows a fairly balanced gender composition, with 51.3% male and 48.7% female respondents. Most respondents fall within the economically active age groups of 26–35 (28.3%) and 36–45 years (23.7%), while youth (18–25 years) account for 18%, and those above 56 years make up 13%.

Married respondents constitute the majority (61.5%), suggesting larger household sizes and potential vulnerability or capacity for adaptation. Educationally, 40.5% have completed secondary school, 21.3% have tertiary education, and 11.8% have no formal education, indicating generally moderate literacy levels.

Household size is predominantly 4–6 persons (53.7%), with 3–5 dependents (54.4%), reflecting potential pressures on resources during flooding. Main income sources include farming (32.5%), fishing (16.8%), trading, civil service, and artisan work, with 31.4% earning ₦50,000–₦100,000 monthly, while only 10.6% earn above ₦300,000, suggesting limited financial capacity to cope with flood impacts.

Regarding residential stability, 34.2% of respondents have lived in their communities for 6–10 years, and 33.9% for over 10 years, indicating long-term exposure to flood risks. Overall, the socio-demographic profile highlights households dominated by economically active adults, moderate literacy, multiple dependents, and modest incomes, all of which shape their vulnerability, coping capacity, and resilience to flooding.

Table 4.2: Flood Exposure and Experience of Respondents (N = 1,682)

Variable	Category	Frequency	%	Mean	Standard Deviation
Flood frequency	Once in several years	246	14.6	2.08	0.72
	Once a year	612	36.4		
	More than once a year	824	49.0		
Severity of most recent flood	Mild	286	17.0	2.53	0.87
	Moderate	732	43.5		
	Severe	492	29.3		
	Very severe	172	10.2		
Types of losses experienced	Damage to house	672	40.0	-	-

	Loss of farm crops	814	48.4	-	-
	Loss of fishing gear	276	16.4	-	-
	Loss of household assets	482	28.7	-	-
	Income loss	934	55.5	-	-
	Injury/illness	148	8.8	-	-
	None	178	10.6	-	-
Displaced during last flood	Yes	564	33.5	-	-
	No	1,118	66.5	-	-
Duration of displacement (days)	Mean duration	12.6 days	-	12.6	8.3
Received early warning	Yes	876	52.1	-	-
	No	806	47.9	-	-
Main source of warning	Government agency	326	19.4	-	-
	Community leaders	288	17.1	-	-
	Radio/TV	402	23.9	-	-
	Social media	174	10.3	-	-
	Neighbours	278	16.5	-	-
	None	214	12.7	-	-

Notes on Duration of Displacement:

- Only respondents who answered "Yes" to 4a (n = 748) were asked 4b.
- The majority of displaced households (42.2%) were displaced for 1–2 weeks, indicating moderate disruption.
- A smaller portion (8.8%) experienced displacement longer than one month, reflecting severe flooding impacts in some communities.

Source: Authors' computation from survey data, 2025

The results in Table 4.2 show that flooding is a common event for the study area, since 49% of the respondents said they experience flooding more than once a year, and 36.4% said they have annual flooding. Only a small percentage (14.6%) said they have flooding once every several years. The fact that flooding happens from time to time reflects the reality of flood occurrence within the Niger Delta, considering that households are exposed to frequent risk of flooding and the risk of flooding affecting their agricultural production and their economic resources.

In terms of the level of flood severity, the largest percentages of the respondents were those who experienced moderate (43.5%) and severe (29.3%) flooding. Fewer percentages of the respondents experienced slight (17%) and very severe (10.2%) floods. It may be inferred from the above data that the households experience moderate to severe flood levels, which have the capability to inflict serious damage to properties, crops, and sources of incomes. Regarding the types of flood-related losses, it is observable that the highest percentages of the respondents incurred the loss of income (55.5%) and the loss of crops in farms (48.4%), followed by the loss of housing (40%), loss of domestic assets (28.7%), and the loss of fish rods (16.4%)). Suffered injury or illness was reported by 8.8% of the respondents, while 10.6% of the respondents incurred no losses.

Displacement because of flood impacts was also experienced by 33.5% of the respondents, with a mean duration of displacement of 12.6 days (SD=8.3). This shows the impact of displacement on the disrupted normal domestic routine and possible food insecurity. The short mean displacement duration of the households might indicate that the households are able to quickly return home, but are possibly struggling with reviving their livelihoods. Early warning systems seem to be functionally in use to some extent because while 52.1% of the households got some form of early warning, the remaining 47.9% did not. Of the households that got early warning, the sources were radio/TV, comprising 23.9%, and government institutions, comprising 19.4%; while 12.7% got no early warning.

Table 4.3: Household Food Security Status of Respondents (N = 1,682)

Item	Response	Frequency	%	Mean	Standard Deviation
Worried about not having enough food	Never	184	10.9	1.79	0.92
	Rarely	324	19.3		
	Sometimes	602	35.8		
	Often	572	34.0		
Unable to eat preferred foods	Never	298	17.7	1.62	0.88
	Rarely	412	24.5		
	Sometimes	502	29.9		
	Often	470	27.9		
Ate a limited variety of foods	Never	214	12.7	1.74	0.91
	Rarely	378	22.5		
	Sometimes	604	35.9		
	Often	486	28.9		
Ate smaller meals than needed	Never	262	15.6	1.66	0.89
	Rarely	422	25.1		
	Sometimes	562	33.4		
	Often	436	25.9		
Ate fewer meals per day	Never	356	21.2	1.52	0.88
	Rarely	462	27.5		
	Sometimes	534	31.8		
	Often	330	19.6		
Ran out of food	Never	480	28.5	1.36	0.85
	Rarely	452	26.9		
	Sometimes	432	25.7		
	Often	318	18.9		
Went to sleep hungry	Never	578	34.4	1.18	0.80
	Rarely	402	23.9		
	Sometimes	366	21.8		
	Often	336	20.0		
Went a whole day and night without eating	Never	1,024	60.9	0.75	0.81
	Rarely	338	20.1		
	Sometimes	180	10.7		
	Often	140	8.3		
Did flood-related income loss affect food supply?	Yes	1,046	62.2	-	-
	No	636	37.8	-	-

Source: Authors' computation from survey data, 2025

The household food security experiences of 1,682 respondents in the Niger Delta are shown in Table 4.3. The findings of this survey indicate a serious issue of food insecurity in households and flooding-prone households.

The respondents' concerns about food availability are widespread. A total of 34% of them often worried about having no food, and 35.8% of them sometimes worried about having no food. It is evident from these findings that a high degree of concern about having food exists in households. This is probably because of frequent occurrences of flooding in this region.

The list of food security and insecurity experiences is extensive and includes whether households worried about food availability or concerned about other food-related aspects. The seriousness of food insecurity is very clear in this context. The HFIAS food security experiences of households indicate serious concerns about food availability.

Concerning the quality and quantity of food consumption, it is observed that many of the respondents experience constraints. For example, the items "ate a limited variety of foods" and "ate smaller meals than needed" indicate that more than 60% of the respondents sometimes or often relied on a reduced meal size or variety due to a lack of resources. Correspondingly, "ate fewer meals per day" indicate that 51.4% of the respondents sometimes or often ate fewer meals, relating to aspects of quality and quantity of food consumption in food aid recipient

families that fail to uphold enhanced food consumption despite economic shocks like that caused by flooding in the country.

More extreme experiences of food insecurity are also occurring. The indicators reflecting extreme experiences, such as "go to sleep hungry" and "whole day and night without eating", are concerned, with 20% of households reporting frequent experiences of the former, while 8.3% reported the latter, though these are smaller than the proportions for the other indicators, it is clear that a substantial proportion of households are experiencing extreme food insecurity, which has severe implications for health, productivity, and capacity to be resilient.

The effect of flooding on food security is quite evident. For instance, the item "did flood-related income loss affect food supply?" reveals that 62.2% of the respondents agreed that income lost due to flooding influenced their household's access to food, thus proving the clear connection between flooding, economy, and food security. Households relying on agriculture and fishing activities were the most vulnerable, as destruction of agricultural produce and reduced fishing activities directly lead to reduced access to healthy food.

The mean values for each item range from 0.75 to 1.79, with standard deviations ranging between 0.80 and 0.92, which shows moderate variability in experiences. Also, higher means for items concerning worrying, food variety, and small meals imply that most of these households experience moderate levels of food insecurity, while low means for severe experiences imply that only a proportion is experiencing severe food shortages.

Table 4.4: Coping and Adaptation Strategies Adopted by Households During Floods (N = 1,682)

Strategy	Scale	Frequency	%	Mean	Standard Deviation
Reduce quantity of meals consumed	Not used	142	8.4	3.01	0.95
	Rarely	246	14.6		
	Sometimes	594	35.3		
	Often	700	41.6		
Switch to cheaper/less preferred foods	Not used	98	5.8	2.87	0.92
	Rarely	212	12.6		
	Sometimes	574	34.1		
	Often	798	47.5		
Borrow food or money	Not used	312	18.6	2.49	1.01
	Rarely	466	27.7		
	Sometimes	498	29.6		
	Often	406	24.1		
Sell household assets	Not used	604	35.9	2.09	0.99
	Rarely	486	28.9		
	Sometimes	374	22.2		
	Often	218	13.0		
Migrate temporarily	Not used	712	42.4	2.01	0.94
	Rarely	458	27.2		
	Sometimes	324	19.3		
	Often	188	11.2		
Depend on relatives/friends	Not used	288	17.1	2.67	1.02
	Rarely	412	24.5		
	Sometimes	520	30.9		
	Often	462	27.5		
Diversify livelihood activities	Not used	184	10.9	2.94	0.97
	Rarely	326	19.4		
	Sometimes	574	34.1		
	Often	598	35.6		
Receive relief assistance	Not used	924	55.0	1.88	0.96
	Rarely	332	19.7		
	Sometimes	246	14.6		

	Often	180	10.7		
Effectiveness of strategies	Not effective	288	17.1	-	-
	Moderately effective	782	46.5	-	-
	Highly effective	612	36.4	-	-

Source: Authors' computation from survey data, 2025

Table 4.4 presents the coping and adaptation strategies that households in the Niger Delta region use in response to flooding. The results show that households adopt both reactive and proactive strategies in an attempt to reduce the impacts of floods on food security and livelihood. Of the most used strategies, reduction in the quantity of meals consumed (41.6% often) and substitution with less expensive or less preferred foods (47.5% often) reveal immediate ways in which households respond to limited food availability. In addition, livelihood diversification (35.6% often) is an important adaptive strategy, implying that households try to reduce risk by diversifying into multiple sources of income in order to reduce vulnerability to flood-related shocks.

Strategies that are moderately employed involve borrowing food or money and relying on relatives or friends, as 29.6% sometimes borrowed and 27.5% often relied on social networks. This shows that informal support systems remain important during flooding for households when the financial and institutional support may be poor. Strategies that require higher cost or greater disruption, including selling of household assets (13% often) and temporary migration (11.2% often), are less frequently adopted. This could be because households have extremely limited resources, or these are very costly strategies socio-economically and emotionally.

The reliance on formal relief assistance is low, with 55% not using relief at all and only 10.7% often benefiting from aid, indicating that government or NGO interventions reach a relatively small share of the affected households. Limited uptake of relief measures underlines the critical importance of self-reliance and community-based coping in flood-prone areas. Households perceive their strategies as largely effective: 46.5% reported their strategies were moderately effective, while 36.4% rated them highly effective; only 17.1% considered them to be ineffectual. This portrays a degree of adaptive capacity, even under constrained circumstances, but also points to quite marked inadequacies in the sufficiency and sustainability of these coping measures.

The mean scores across strategies range from 1.88 for relief assistance to 3.01 for reducing meal quantity, while the standard deviations lie between 0.94 and 1.02, suggesting moderate variability in the adoption of strategies by households. Overall, it is evident that households in the Niger Delta are quite active in the use of various coping and adaptation strategies to reduce the impact of flooding, though resource limitations, the intensity of flooding events, and deficiencies in formal support systems render these measures ineffective.

Table 4.5: Household Economic Resilience of Respondents (N = 1,682)

Item	Category	Frequency	%	Mean	Standard Deviation
Does your household have savings?	Yes	742	44.1	-	-
	No	940	55.9	-	-
Were savings used during floods?	Yes	384	51.7*	-	-
	No	358	48.3*	-	-
Do you have assets that can be sold in emergencies?	Yes	936	55.7	-	-
	No	746	44.3	-	-
How quickly can your household recover income after flooding?	Within 1 month	216	12.8	2.56	1.01
	1–3 months	654	38.9		
	3–6 months	572	34.0		

	More than 6 months	240	14.3		
Access to support systems	Family/friends	682	40.5	-	-
	Community groups	424	25.2	-	-
	NGOs	298	17.7	-	-
	Government	246	14.6	-	-
	None	326	19.4	-	-
Overall, how resilient do you consider your household?	Low	482	28.7	2.03	0.84
	Moderate	856	50.9		
	High	344	20.4		

Source: Authors' computation from survey data, 2025

In table 4.6, the financial resilience of the households in the Niger Delta region has been shown to understand the ability to resist and recover from the effects that may come about due to flooding. The results show that only 44.1% of the households save money, while 55.9% of the households save no money at all and have no financial buffer. Among the groups that save money, 51.7% access the money during the flooding season, thereby indicating that the financial aspect acts as a coping mechanism but has limited reach and may run out quickly in the time of need.

Apart from savings, the availability of household assets that, when disposed of, can serve as another resilience component is essential. The results indicated that 55.7% of the respondents exhibited sellable household assets, while 44.3% do not. The results indicated that most of these households lack resources that will help them cope with floods by improving their resilience capabilities as well as making them less vulnerable when it comes to income loss that could be brought about by floods. "The rate of recovery from flooding reflects the level of economic disruption that occurred." According to the data, "12.8% of households can recover their income in one month, 38.9% can recover income in 1-3 months, and 34% can recover income within 3-6 months, while 14.3% will take more than six months to recover economically." The average recovery score of 2.56, using a scale of 1 to 4, with an standard deviation of 1.01, tends to indicate that while some households have the capacity to recover quickly from the flood, the rate of recovery is highly variable, with others facing problems of delayed recovery, especially when they lack financial or other buffers."

Availability of support systems is another important factor influencing resilience. Social support, both informal, such as from families and friends (40.5% and 25.2%, respectively), and formal, from NGOs (17.7%) and government institutions (14.6%), is important. What is, however, noteworthy is that 19.4% of the population had no access to any support system. The dependency on social support systems, especially within social networks, can be both a strength of communities as a resilient mechanism and a weakness of vulnerable households in the absence of institutional interventions.

Table 4.5 also shows that the respondents' estimation of individual household resilience to flooding is reflected in 50.9% of the group rating their resilience as moderate, followed by low at 28.7%, and only 20.4% rating resilience as high with a mean score of 2.03. It appears that, despite the resilience of the communities to flooding, they are largely exposed to flooding shocks due to a lack of savings.

Table 4.6: Access to Financial Services by Households (N = 1,682)

Item	Category	Frequency	%
Access to financial services	Bank account	512	30.5
	Microfinance	248	14.7
	Cooperative	298	17.7
	Insurance	124	7.4
	Informal savings group	418	24.9
	None	346	20.6
Ever received credit/loan	Yes	634	37.7
	No	1,048	62.3

Did access to finance help during flood recovery?	Yes	482	30.0
	No	246	15.0
	Not applicable	954	56.7

Source: Authors' computation from survey data, 2025

Table 4.6 above shows financial service delivery to households within the Niger Delta region, which is essential to improve the capacity of households to withstand shocks caused by floods. The information shows there is low uptake of financial institutions. Only 30.5% of households had a bank account, while 14.7% used microfinance institutions. In addition, only 17.7% of households belonged to cooperatives. Informal ways of saving, such as savings groups, are slightly higher, where 24.9% of respondents belonged to savings groups. The reason for this follows. Notably, however, 20.6% of households did not have any way to access financial services.

With regards to credit/loan facility access, it is noted that only 37.7% of the respondents' households ever received credit/loan facilities to aid in their livelihood activities and that a percentage of 62.3% of the respondents' household members never accessed financial aids either through the formal and semi-formal sources. This low response rate may indicate low collateral value and financial literacy among the respondents' household members.

The usefulness of finance services in the recovery of flood-affected people is also limited in the same manner. From the sample population, 30% said the finance service helped in flood recovery, while 15% said it did not help, and the greatest proportion, 56.7% of the sample, responded 'not applicable.' It's likely that these respondents do not have finance service access in their flood-affected areas. It's clear that the use of finance services may not help in the recovery of flood-related economic losses.

Table 4.6 shows that financial inclusion is a major driver of household economic resilience in the Niger Delta. Ineffectiveness and low usage of credit and its use in useful activities, such as in the aftermath of a flood, decrease households' capacity to absorb the shock of flooding.

Table 4.7: Institutional and Policy Support for Households (N = 1,682)

Item	Category	Frequency	%	Mean	Standard Deviation
Awareness of government flood mitigation or relief programmes	Yes	748	44.5	-	-
	No	934	55.5	-	-
Have you benefited from any programme?	Yes	312	18.6	-	-
	No	1,370	81.4	-	-
Effectiveness of government support	Poor	652	38.8	2.11	0.91
	Fair	628	37.3		
	Good	324	19.3		
	Very Good	78	4.6		
Type of support most needed	Food aid	864	51.4	-	-
	Cash support	678	40.3	-	-
	Housing	512	30.5	-	-
	Farming/fishing inputs	742	44.1	-	-
	Infrastructure	594	35.3	-	-
	Insurance	286	17.0	-	-
	Early warning systems	804	47.8	-	-

Source: Authors' computation from survey data, 2025

From the result in Table 4.7, it is identified that there is a lack of support from institutions to households. Out of the total sample, only 44.5% of the respondents were aware of the government support, while the other 55.5% were not, identifying the gap in communication and support efforts. It is vital to note that the level of awareness does not always equate to the level of received benefits, given that only 18.6% of the households received support from the

aforementioned government initiatives, while the other 81.4% did not receive support from institutional efforts.

Repondent perceptions of the effectiveness of the programmes were found to be relatively low. Most respondents considered the programmes initiated by the Government to be of Poor quality (38.8%) or Fair quality (37.3%), while fewer thought them to be of Good quality (19.3%) or Very Good quality (4.6%). The average effectiveness score of 2.11 (SD = 0.91) indicates a fair degree of dissatisfaction with the kinds of programmes initiated by the Government in regard to their quality or effectiveness. It is also an indication that the Governments' programmes currently in place are inadequate to meet the gravity of the flood-related problems.

The information also indicates what kind of assistance the households consider most essential. More than half (51.4%) of the respondents cited food assistance, followed by early warning systems (47.8%), and assistance for farming or fishing (44.1%) or providing fishing or farming inputs. Other essential types of assistance include financial assistance (40.3%), infrastructure (35.3%), and housing (30.5%), but fewer households ranked assistance for insurance (17%). The above results indicate that the households consider both relief services and structural assistance, such as early warning, inputs, and infrastructure, which can make the households resilient to floods. Table 4.7 shows that the Niger Delta institutional and policy support is not reaching households effectively and that awareness is lacking, which indicates that most households depend on other coping mechanisms due to poor effectiveness.

Table 4.8: Thematic analysis on Open-Ended Responses on Household Challenges and Resilience Measures (N = 1,682)

Question	Common themes / Responses	Frequency	%
Greatest challenge during flooding	Loss of crops/fishery income	598	35.6
	Damage to house/property	486	28.9
	Food insecurity / lack of food	324	19.3
	Health issues / disease outbreaks	132	7.8
	Displacement / relocation	102	6.1
	Limited access to clean water	40	2.4
Measures to improve household resilience	Access to financial support (credit, savings, insurance)	536	31.9
	Government or NGO aid (food, cash, relief materials)	476	28.3
	Improved flood early warning systems	324	19.3
	Diversification of livelihoods	186	11.1
	Infrastructure improvement (roads, drainage)	160	9.5

Source: Authors' computation from survey data, 2025

Table 4.8 indicates that the challenge derived from the loss of crops and fishery income (35.6%) signifies the major problem, establishing a direct relationship between flooding incidents and the resilience of Niger Delta communities, considering the role agricultural and fisheries activities form for Niger delta community households to earn a living. The second major challenge approximating the first is the destruction of houses and properties (28.9%), signifying the impact of flooding, considering the physical safety and security of households flooding disrupts rather than impacting household resilience and livelihood activities.

The issue that stands out here is food insecurity, which comes out as an important issue as the vulnerability level stands at 19.3% due to a lack of proper food during floods. It must be noted that food insecurity and a lack of proper food were discussed above, and it was revealed that floods cause a reduction in food amount, food variety, and food frequency. This indicates that floods cause an impact on health as well because disease outbreaks (7.8%) and a lack of access to clean water (2.4%) also affect the vulnerability of households. Displacement due to floods (6.1%) due to harsh conditions also impacts vulnerability from the same cause.

Regarding a proposed increase in resilience through measures, a large number of households pointed towards interventions for increasing economic and material security. Financial assistance such as credit facilities, savings, and insurance (31.9%), and assistance in terms of

food and cash/relief items from the concerned authority or NGO (28.3%), were identified to be of utmost importance and widely proposed by a large number of households. This highlights that households currently rely on these coping mechanisms when their own capabilities are not adequate.

Preventive and adaptive measures have also been recognized. Enhanced early warning systems (19.3%) were deemed to be fundamental to the preparation and preparedness of households to deal with flood situations and thus protect against economic and food insecurity. Diversification of sector livelihoods (11.1%) has been noted to help share the risk and increase overall resilience to change through a variety of income-generating streams. Infrastructural development, such as drainage, roads, and flood protection (9.5%), was also recommended and reflects the role of engineering aspects of flood resilience and preparedness.

From Table 4.8, it is apparent that the answer provided by the households living in the understudied Niger Delta communities reflects the combined effects of economic, social, and health factors that they face in flood situations. The measures they propose are short-term as well as long-term solutions that lie well beyond the simplistic idea of resilience suggested by the question.

4.2 Discussion of Findings

The study shows that flooding in Bayelsa, Rivers, and Delta States significantly disrupts household food production, availability, and access. Respondents reported reduced meal frequency, limited diet variety, and income-related food insecurity, confirming findings by Adelekan (2016). Households employ coping strategies such as meal reduction, cheaper food substitution, borrowing, and livelihood diversification, which are moderately effective but constrained by resources and flood severity, aligning with Obeta and Okeke (2020).

Economic resilience was moderate: only 44.1% of households had savings, 55.7% had assets to liquidate, and recovery from income loss typically took 1– 6 months. Informal support systems, social networks, and diversified livelihoods enhance recovery, consistent with Onyema et al. (2021). Access to formal financial services was limited, few households had bank accounts, microfinance access, or savings schemes, and only a small fraction found them helpful, reflecting Kankam et al. (2020).

Institutional and policy support was also inadequate: 55.5% of respondents were unaware of government programs, only 18.6% benefited, and most perceived these interventions as ineffective. Priority needs identified include food aid, early warning systems, livelihood inputs, and financial assistance, echoing Obeta and Okeke (2020).

5.1 Conclusion and Recommendations

This study examined the impact of flooding on household food security and economic resilience in Bayelsa, Rivers, and Delta States of the Niger Delta. Data from 1,682 households revealed that flooding significantly reduces food availability and accessibility, lowers meal quality, and disrupts incomes. Households adopt coping strategies such as meal reduction, cheaper foods, borrowing, asset sales, and livelihood diversification, but these are only moderately effective due to limited resources. Economic resilience is constrained by low savings, few assets, and slow recovery, while access to formal financial services and institutional support remains limited and often ineffective. Key threats identified include income loss, property damage, and food insecurity, with respondents prioritizing financial assistance, early warning systems, livelihood diversification, and infrastructure development. Overall, flooding severely undermines household food security and resilience, and enhancing social, financial, and institutional support is critical for effective adaptation and recovery.

Based on the findings and conclusions, the following recommendations are proposed:

1. Strengthen Financial Inclusion: Develop flood-resilient financial products such as microcredit, savings programs, and micro-insurance, alongside financial literacy training to improve household economic resilience.

2. Improve Early Warning and Preparedness: Establish effective multi-channel early warning systems and community disaster preparedness programs to enhance household readiness.
3. Promote Livelihood Diversification: Support households in adopting alternative income sources beyond farming and fishing through training, start-up capital, and market access.
4. Strengthen Infrastructure and Services: Invest in drainage, roads, housing, and flood defenses, as well as health, water, and sanitation facilities to reduce vulnerability.
5. Enhance Institutional Support: Improve awareness, targeting, and effectiveness of government and NGO programs for flood mitigation, food security, and livelihood support.
6. Encourage Community-Based Resilience: Promote social networks, mutual savings, community insurance, and local disaster plans to complement formal support and boost household adaptive capacity.

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