

**ECONOMIC ANALYSIS OF FLOOD-INDUCED
VULNERABILITY TO POVERTY AMONG
FARMERS IN NIGER STATE, NIGERIA**

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VULNERABILITY TO POVERTY AMONG
FARMERS IN NIGER STATE, NIGERIA**

by

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LIST OF ABBREVIATIONS

AFDB	African Development Bank
CBN	Central Bank of Nigeria
FaVI	Farmers' Vulnerability Index
FEMA	Federal Emergency Management Agency
FGN	Federal Government of Nigeria
IMF	International Monetary Fund
IPPC	Intergovernmental Panel on Climate Change
MCA	Multiple Correspondence Analysis
NBS	National Bureau of Statistics
NEMA	National Emergency Management Agency
NSBS	Niger State Bureau of Statistics
OCHA	Office for the Coordination of Humanitarian Affairs
PCA	Principal Correspondence Analysis
UNDP	United Nations Development Programme
WEF	World Economic Forum
WHO	World Health Organization

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**ANALISIS EKONOMI KERENTANAN AKIBAT BANJIR TERHADAP
KEMISKINAN DALAM KALANGAN PETANI DI NEGERI NIGER,
NIGERIA**

ABSTRAK

Kemiskinan dan banjir merupakan dua cabaran kritikal yang dihadapi oleh komuniti petani luar bandar di Nigeria. Kajian ini meneliti implikasi ekonomi kerentanan kemiskinan akibat banjir dalam kalangan petani di Negeri Niger, Nigeria. Secara khusus, kajian ini menilai tahap semasa kerentanan petani terhadap banjir, mengenal pasti status kemiskinan mereka, menganalisis kesan kerentanan terhadap dinamika kemiskinan, serta menilai strategi daya tindak yang digunakan untuk mengurangkan kesan banjir di tiga zon (A, B, dan C). Berdasarkan data daripada 356 orang petani, analisis ini menggunakan Indeks Kerentanan Petani (FaVI), Analisis Komponen Utama (PCA), Analisis Korespondensi Pelbagai (MCA), serta ukuran kemiskinan pelbagai dimensi yang menggabungkan pendapatan, aset, dan penunjuk penggunaan makanan. Hasil kajian menunjukkan variasi ketara antara zon. Di Zon A, sebanyak 72% petani tergolong dalam kategori sangat rentan. Kadar kemiskinan meningkat mendadak daripada 34.1% sebelum banjir kepada 81.7% semasa banjir, dan menurun sedikit kepada 70.6% selepas banjir. Tahap keselamatan makanan merosot apabila isi rumah bukan miskin menurun daripada 76.2% sebelum banjir kepada 18.3% semasa banjir, dengan pemulihan kepada 65.7% selepas banjir. Strategi daya tindak banyak bergantung pada rangkaian sosial (88.2%), diikuti dengan kiriman wang (62.5%), kepelbagaian mata pencarian (57.4%), akses kepada kredit (44.7%), dan bantuan luar (39.1%). Di Zon B, 55% petani tergolong sangat rentan. Kadar kemiskinan meningkat daripada 28.4% sebelum banjir kepada 69.5% semasa banjir,

sebelum menurun kepada 61.7% selepas banjir. Isi rumah bukan miskin berkurangan daripada 82.1% sebelum banjir kepada 29.4% semasa banjir, dan pulih kepada 71.8% selepas banjir. Strategi daya tindak lebih seimbang, dengan kepelbagaian mata pencarian (76.3%) dan akses kepada kredit (68.9%) memainkan peranan utama, diikuti oleh rangkaian sosial (72.1%), kiriman wang (54.6%), dan bantuan luar (47.5%). Zon B menunjukkan keupayaan daya tindak yang lebih baik hasil daripada sumber pendapatan yang pelbagai serta akses kewangan yang lebih baik. Di Zon C, 64% petani tergolong sangat rentan. Kadar kemiskinan meningkat daripada 31.8% sebelum banjir kepada 74.6% semasa banjir, sebelum menurun kepada 66.1% selepas banjir. Tahap keselamatan makanan menurun apabila isi rumah bukan miskin berkurangan daripada 77.6% sebelum banjir kepada 25.2% semasa banjir, kemudian pulih sebahagiannya kepada 67.7% selepas banjir. Strategi daya tindak didominasi oleh kiriman wang (71.4%), diikuti oleh rangkaian sosial (79.2%), kepelbagaian mata pencarian (62.9%), bantuan luar (51.3%), dan akses kredit (41.8%). Petani di Zon C lebih bergantung kepada aliran kewangan luar berbanding kredit atau bantuan lain. Keputusan regresi mengesahkan bahawa pendapatan, aset, dan penggunaan makanan memberi pengaruh ketara terhadap kerentanan, dengan kiriman wang, kepelbagaian mata pencarian, serta akses kredit terbukti sangat berkesan dalam mengurangkan kemiskinan akibat banjir. Kajian ini menyimpulkan bahawa kerentanan dan strategi daya tindak adalah berasaskan zon: petani di Zon A paling terdedah, Zon B menunjukkan kapasiti adaptif yang lebih kuat, manakala Zon C banyak mendapat manfaat daripada kiriman wang. Cadangan dasar termasuk pembangunan infrastruktur tahan banjir untuk Zon A, peluasan skim kredit untuk Zon B, serta kerangka kiriman wang dan koperasi berstruktur untuk Zon C. Kerjasama kukuh antara kerajaan, NGO, dan komuniti amat penting bagi mengurangkan kemiskinan akibat banjir di Negeri Niger.

ECONOMIC ANALYSIS OF FLOOD-INDUCED VULNERABILITY TO POVERTY AMONG FARMERS IN NIGER STATE, NIGERIA

ABSTRACT

Poverty and flooding are two critical challenges confronting rural farming communities in Nigeria. This study examined the economic implications of flood-induced vulnerability to poverty among farmers in Niger State, Nigeria. Specifically, it assessed the current level of farmers' vulnerability to flooding, identified their poverty status, analyzed the effect of vulnerability on poverty dynamics, and evaluated coping strategies used to mitigate flood impacts across three zones (A, B, and C). Using data from 356 farmers, the analysis employed the Farmers' Vulnerability Index (FaVI), Principal Component Analysis (PCA), Multiple Correspondence Analysis (MCA), and multidimensional poverty measurement combining income, asset, and food consumption indicators. Results showed marked variations across the zones. In Zone A, 72% of farmers were highly vulnerable. Poverty status rose sharply from 34.1% before flooding to 81.7% during flooding, easing slightly to 70.6% after. Food security deteriorated as non-poor households fell from 76.2% before flooding to 18.3% during flooding, with recovery to 65.7% post-flood. Coping relied heavily on social networks (88.2%), followed by remittances (62.5%), livelihood diversification (57.4%), access to credit (44.7%), and external aid (39.1%). In Zone B, 55% of farmers were highly vulnerable. Poverty increased from 28.4% before flooding to 69.5% during flooding, before improving to 61.7% afterward. Non-poor households dropped from 82.1% pre-flood to 29.4% during flooding, rebounding to 71.8% post-flood. Coping mechanisms were more balanced, with livelihood diversification (76.3%) and access to credit (68.9%) playing the largest roles, followed by social networks (72.1%),

remittances (54.6%), and external aid (47.5%). Zone B displayed stronger coping ability due to diversified income sources and relatively better financial access. In Zone C, 64% of farmers were highly vulnerable. Poverty levels rose from 31.8% before flooding to 74.6% during flooding, before recovering to 66.1%. Food security declined as non-poor households dropped from 77.6% pre-flood to 25.2% during flooding, then partially recovered to 67.7% post-flood. Coping was dominated by remittances (71.4%), followed by social networks (79.2%), livelihood diversification (62.9%), external aid (51.3%), and credit access (41.8%). Zone C farmers thus leaned more on external financial inflows than credit or aid. Regression results confirmed that income, assets, and food consumption significantly influenced vulnerability, with remittances, diversification, and credit access proving particularly effective in cushioning flood-induced poverty. The study concludes that vulnerability and coping strategies are zone-specific: Zone A farmers are most exposed, Zone B demonstrates stronger adaptive capacity, and Zone C benefits heavily from remittances. Policy recommendations include flood-resilient infrastructure for Zone A, expanded credit schemes for Zone B, and structured remittance and cooperative frameworks for Zone C. Strengthened partnerships among government, NGOs, and communities are essential for reducing flood-induced poverty in Niger State.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nigeria, Africa's most populous nation, faces persistent poverty that significantly undermines its socio-economic fabric. The National Bureau of Statistics (2023) reports that approximately 40% of Nigerians live below the national poverty line, with rural areas facing a disproportionate burden, where poverty rates often exceed 50%. This economic hardship is particularly acute in rural regions, where over 70% of the population depends on subsistence agriculture for their livelihoods (African Development Bank [AFDB], 2022). Poverty in Nigeria is driven by multiple factors, including low economic productivity, limited access to education and healthcare, gender disparities, inadequate infrastructure, and restricted access to markets and credit (FAO, 2024). Regional disparities worsen these challenges, with northern states like Niger State reporting poverty rates as high as 52.8% in 2018, compared to a national average of 40% (National Bureau of Statistics [NBS], 2020). These conditions create a cycle of deprivation, limiting opportunities for economic mobility and resilience against external shocks.

Among these shocks, flooding stands out as a critical environmental factor that deepens poverty, particularly for rural farmers. Climate change has intensified the frequency and severity of floods in Nigeria, with major flood events in 2010, 2012, 2020, and 2022 causing widespread devastation (National Emergency Management Agency [NEMA], 2022a). Floods destroy crops, livestock, and infrastructure, disrupt livelihoods, and exacerbate food insecurity, pushing already vulnerable populations further into poverty. In Niger State, where over 90% of the 4.2 million population relies on rain-fed agriculture, flooding poses a severe threat to economic stability

(Niger State Bureau of Statistics [NSBS], 2023). The state's poverty rate, coupled with its high exposure to flooding due to the presence of major rivers like the Niger and Kaduna, and hydrological dams such as Kainji, Jebba, and Shiroro, amplifies the vulnerability of its farming communities. However, not all farmers are equally vulnerable. Factors such as access to resources, education, income diversification, and proximity to flood-prone areas create disparities in vulnerability, with some farmers better equipped to cope due to stronger adaptive capacities, while others face significant risks due to limited resources and high exposure (Ibrahim et al., 2020).

1.2 Background to the study

Poverty remains a central challenge to Nigeria's development, with approximately 133 million people classified as multi-dimensionally poor, 72% of whom reside in rural areas (NBS, 2022). The Nigerian Living Standards Survey (2018/19) indicates that rural households reliant on agriculture earn an average annual income of ₦129,333 (\$163), significantly lower than urban households (NBS, 2021). In Niger State, the poverty rate rose from 50.1% in 2008 to 67.1% in 2013, before declining slightly to 52.8% in 2018, reflecting persistent economic challenges (NBS, 2020). Food insecurity, closely tied to poverty, affects 29.5% of Niger State's population, with rural farmers facing heightened risks due to their dependence on rain-fed agriculture (NSBS, 2023). These economic hardships are compounded by systemic issues such as limited access to financial services, poor infrastructure, and low levels of education, which restrict farmers' ability to break free from poverty cycles (FAO, 2024).

Flooding, a recurring environmental hazard in Nigeria, significantly aggravates these poverty dynamics. According to the World Economic Forum (2022), floods pose

a threat to 1.81 billion people globally, with developing nations like Nigeria bearing a disproportionate burden. The immediate impacts of flooding include substantial property damage and a significant risk to human life, especially for those living in flood-prone areas (Ahmad et al., 2023).

The Internal Displacement Monitoring Centre (IDMC) reported in 2021 that there were 27 million individuals displaced by disasters worldwide. As shown in Figure 1.1, weather-related disasters accounted for over 32 million of these internal displacements, which were caused by both floods and storms over a decade ago.

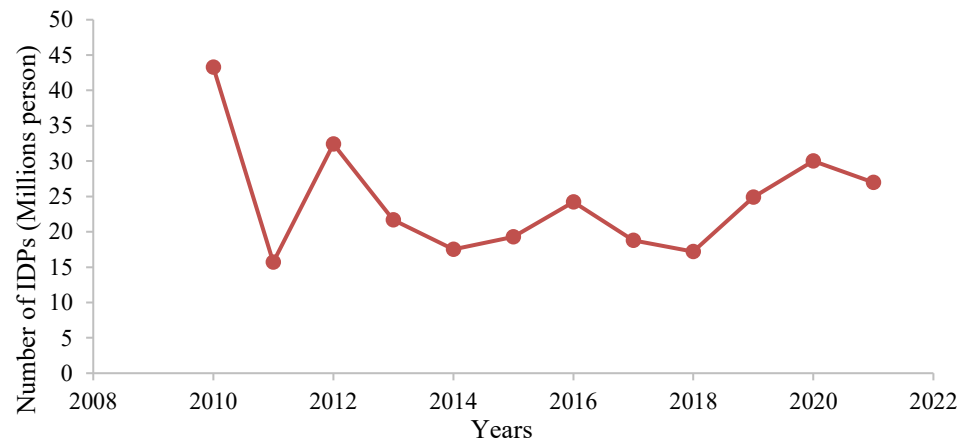


Figure 1.1 Internally displaced persons by weather-related disasters globally
Source: IDMC, 2022.

In Nigeria, the 2022 floods, the worst in a decade, affected over 4.4 million people, displaced 2.4 million, and caused damages estimated at \$6.7 billion (NBS et al., 2023). In Niger State as shown in Figure 1.2, flooding impacted 1,030,215 farmers and submerged 610,210 hectares of farmland in 2022 (NSBS, 2023). These events destroy crops, livestock, and infrastructure, leading to significant income losses and pushing farmers below the poverty line. For instance, the 2018 floods in Niger State resulted in agricultural losses estimated at ₦5 billion, highlighting the economic toll on rural communities (Laleye, 2018). Floods also worsen food insecurity, with the proportion of non-poor farmers in Niger State dropping from 78.58% before flooding

to 24.28% during flooding (study findings). Poor farmers, with limited savings and access to credit, are particularly vulnerable, as they lack the resources to recover quickly from such shocks. Conversely, farmers with diversified income sources, access to credit, or higher education levels are better positioned to mitigate flood impacts, demonstrating varying levels of vulnerability within the same region (Apuyor et al., 2023).

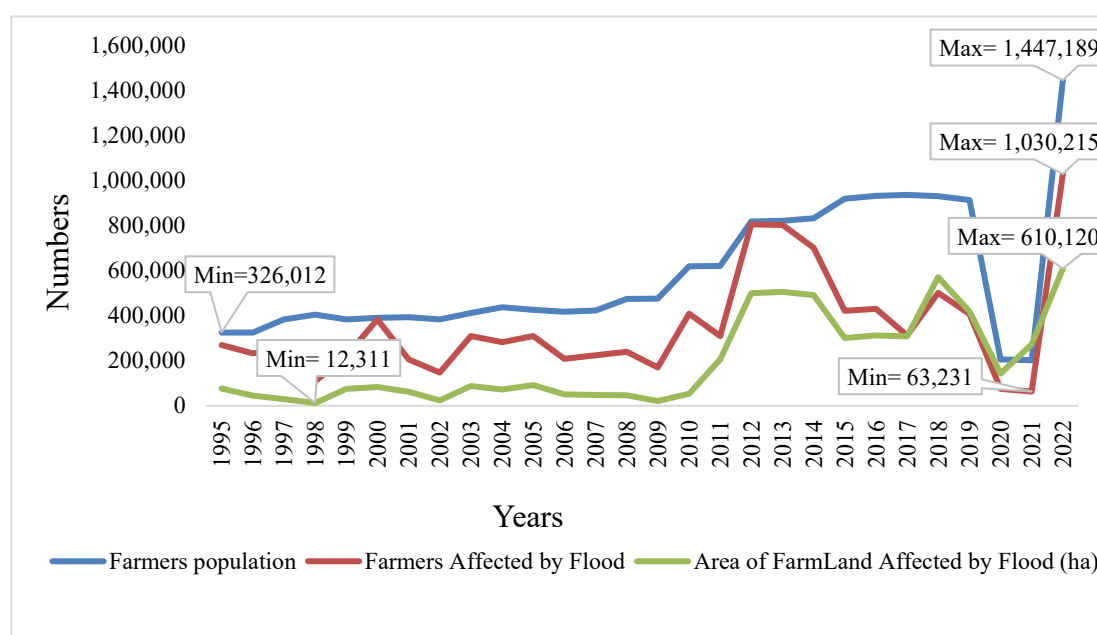


Figure 1.2 Flood events in Niger State from 1995 to 2022

Source: NSBS, 2023.

Table 1.1 Cost of Damage from Floods in Nigeria from 2010 to 2022

Year	Cost of damage (in Naira, ₦)
2010	5 billion
2011	10 billion
2012	4.1 trillion
2013	17.6 billion
2014	16.9 billion
2015	12 billion
2016	38 billion
2017	2 billion
2018	26 billion
2019	17 billion

2020	110 billion
2021	20.5 billion
2022	4.2 trillion

Source: NEMA, 2022b.

The absence of a comprehensive national flood policy further compounds these challenges. While initiatives like the Nigeria Erosion and Watershed Management Project (NEWMAP) and the Ecological Fund exist, their effectiveness is often undermined by mismanagement and inadequate implementation (Socio-Economic Rights and Accountability Project [SERAP], 2022). This leaves rural farmers, particularly in flood-prone areas like Niger State, exposed to recurring economic and environmental shocks. Addressing these issues requires a deeper understanding of how flooding interacts with poverty and the specific vulnerabilities faced by farmers.

1.3 Farmers’ Vulnerability

Vulnerability, as defined by Adger (2006), comprises three key components: exposure, sensitivity, and adaptive capacity. Exposure refers to the degree to which farmers are subject to flooding, influenced by geographical factors such as proximity to rivers or low-lying areas. In Niger State, farmers in riverine areas, particularly in Zone A, face high exposure due to the overflow of major rivers like the Niger and Kaduna, with 94.84% of farmers reporting annual flooding (Ibrahim et al., 2020). Sensitivity measures the extent to which farmers are affected by floods, determined by factors such as reliance on rain-fed agriculture, crop types, and asset ownership. In Niger State, 79.9% of rice farmers experienced flooding, leading to significant crop losses and reduced incomes averaging ₦509,296.58 annually (Apuyor et al., 2023). Adaptive capacity reflects farmers’ ability to cope with and recover from floods, shaped by socio-economic factors like income, education, access to credit, and social networks. Farmers with limited adaptive capacity, such as those with low incomes or

no formal education, are more vulnerable, while those with diversified livelihoods or access to financial resources exhibit greater resilience (Asfaw et al., 2018).

The causal factors of farmers' vulnerability in Niger State can be systematically categorized as follows:

- a. **Geographical and Environmental Factors:** Niger State's extensive riverine areas and the presence of three major hydrological dams (Kainji, Jebba, and Shiroro) increase flood exposure. The state's 86,000 km² land area, with rivers like the Niger, Kaduna, and Gurara, makes it highly susceptible to flooding, particularly during heavy rainfall seasons (NSBS, 2023). In 2022, 610,210 hectares of farmland were submerged, affecting 1,030,215 farmers (NSBS, 2023). Farmers in Zone A face the highest exposure due to their proximity to these rivers, while those in Zone B, with less flood-prone terrain, are less vulnerable.
- b. **Socio-Economic Factors:** Low-income levels, with rural farmers earning as little as ₦129,333 annually, limit their ability to invest in flood-resistant infrastructure or recover from losses (NBS, 2021). Limited access to credit and insurance restricts farmers' ability to adopt adaptive measures, such as flood-resistant crop varieties or irrigation systems. Education levels further influence vulnerability, with 59% of farmers having some formal education, enabling better adoption of coping strategies, while illiterate farmers face greater challenges (Apuyor et al., 2023).
- c. **Agricultural Dependence:** Over 90% of Niger State's population relies on rain-fed agriculture, making them highly sensitive to climate shocks like flooding (NSBS, 2023). Crops like rice, yam, and maize, which are staples in the region, are particularly susceptible to flood damage, leading to

significant yield losses. Farmers without diversified livelihoods are more vulnerable, as they lack alternative income sources to cushion flood impacts (Sallawu et al., 2016).

- d. Institutional and Policy Gaps: The absence of a comprehensive national flood policy limits proactive flood management. While interventions like NEWMAP and the Ecological Fund exist, mismanagement and inadequate funding hinder their effectiveness (SERAP, 2022). This leaves farmers reliant on reactive measures, such as emergency relief, which are insufficient to address long-term vulnerability.

Not all farmers are equally vulnerable. Farmers with higher incomes, access to credit, or diversified livelihoods (e.g., through petty trading or remittances) demonstrate greater adaptive capacity. For example, farmers employing early planting or climate-smart agricultural practices, such as flood-resistant crops, are less affected by floods (Ibrahim et al., 2020). Conversely, farmers in low-lying areas with limited resources and no access to social networks face heightened vulnerability, as they lack the means to recover from flood-induced losses. This variability stresses the need for targeted interventions that address the specific needs of the most vulnerable farmers while leveraging the strengths of those with greater coping ability.

1.4 An overview of the Nigerian Economy

Situated on Africa's western coast, Nigeria is the continent's most populous nation with over 230 million people, representing more than 2.85% of the global population (United Nations [UN], 2024). This diverse country covers various climatic zones from dry to tropical humid. Nigeria administratively consists of 36 states and the Federal Capital Territory, which houses the capital city (Britannica, 2024). Each

state comprises local government areas, with 774 local units nationwide (Association of Local Governments of Nigeria [ALGON], 2024).

Nigeria has Africa's largest economy with a GDP exceeding \$400 billion, fuelled primarily by oil exports that constitute more than 80% of export earnings and 50% of government revenues (World Bank, 2022b). However, heavy dependence on oil has constrained economic diversification and inclusive growth. Nigeria faces urgent development challenges including poverty, inequality, crumbling infrastructure, and environmental degradation. In 2023, almost 46% of Nigeria's population lives within the poverty threshold (International Monetary Fund [IMF], 2024).

Widespread poverty leaves many Nigerians vulnerable to economic and climatic shocks like flooding. Nigeria's economy is significantly dependent on rain-fed subsistence agriculture which employs 70% of the poor (African Development Bank [AFDB], 2022). Thus, flooding disrupts incomes and food security for millions of smallholder farmers. Floods also strain Nigeria's inadequate infrastructure, healthcare systems, and emergency response capacities, further impairing poor communities (Gimba, 2024). Existing wealth disparities amplify flood impacts as wealthier urban households can better protect assets and recover post-disaster (World Bank, 2020).

The Nigerian government aims to diversify the economy beyond oil dependence by boosting manufacturing, services, and agriculture (FGN, 2022). But this requires substantial investments in infrastructure, human capital development, governance reforms and supportive policies. Building climate resilience is necessary to safeguard lives and livelihoods amidst rising flood risks.

1.4.1 Niger State

Niger State is the largest of Nigeria's 36 states; it was established on February 3, 1976, in the former north-western state. The State is integral to the nation's agricultural sector, recognised for its cultivation of staple crops such as rice, yam, maize, and sorghum, alongside cash crops like cotton and shea nuts (Niger State Government [NSG], 2023). Agriculture hires a substantial segment of the state's labour force and significantly contributes to its GDP.

As shown in Figure 1.4, Niger State, located in the North Central Geopolitical Zone, is bordered by the Republic of Benin to the west, Zamfara State to the north, Kebbi to the northwest, Kogi to the south, Kwara to the southwest, Kaduna to the northeast, and the Federal Capital Territory (FCT) to the southeast. Also shown in Figure 1.3 and Figure 1.4, the state's 25 LGAs are categorised into three geopolitical zones: A, B, and C, each of which has eight, nine, and eight LGAs. The state has three major hydrological dams (Kainji Dam, Jebba Dam, and Shiroro Dam). The Niger State Government (2023) reports that the state account for around 9.3% of the country's total land area, totalling over 86,000 km² (or 8.6 million hectares). The primary rivers in the state are the Niger, Kaduna, Gbako, Eko, Gurara, Ebba, Ega, Mariga, together with its tributaries.

The census of 2006 recorded that the State had a population of 3,950,249, with 2,032,725 males and 1,917,524 females. Projections by the National Population Commission estimated the population would reach 5,556,200 by 2018, maintaining a similar gender split of 51.5% male and 48.5% females (NSG, 2023). Compared to the national average of 3.2%, Niger State's annual growth rate is higher at 3.4% (NSG, 2023). The immediately recognizable main ethnic groups are the Nupes, Hausa, Gbagyi, Kadara, Koro, Bassa, Kamuku, Ingwai, Fenty, Kambari, Dukkawa, Fulani,

Abewa, Bisan, Gungawa, Bauchi, Bariba, Urah, Boko, Bauchnu, Achifawa, Dakarkari, Kakanda, Ganagana, and Dibo. These three zones are considered for this due to the presence of hydroelectric dams in the state, thereby making it vulnerable to flooding as revealed in Fig 1.4.

In 2021, NBS reported that agricultural goods were the main export from Niger State. The state accounted for 18.77% of the country's total agricultural exports in the second quarter of 2021 (NBS, 2021). Other economic activities (albeit on a smaller scale) include banking, trading, transportation, and regional arts and crafts, with Bida, the Nupes' home territory, well known for its brass artisanship, along with performing public services, these activities provide the Niger State population with a means of subsistence (NSG, 2023).

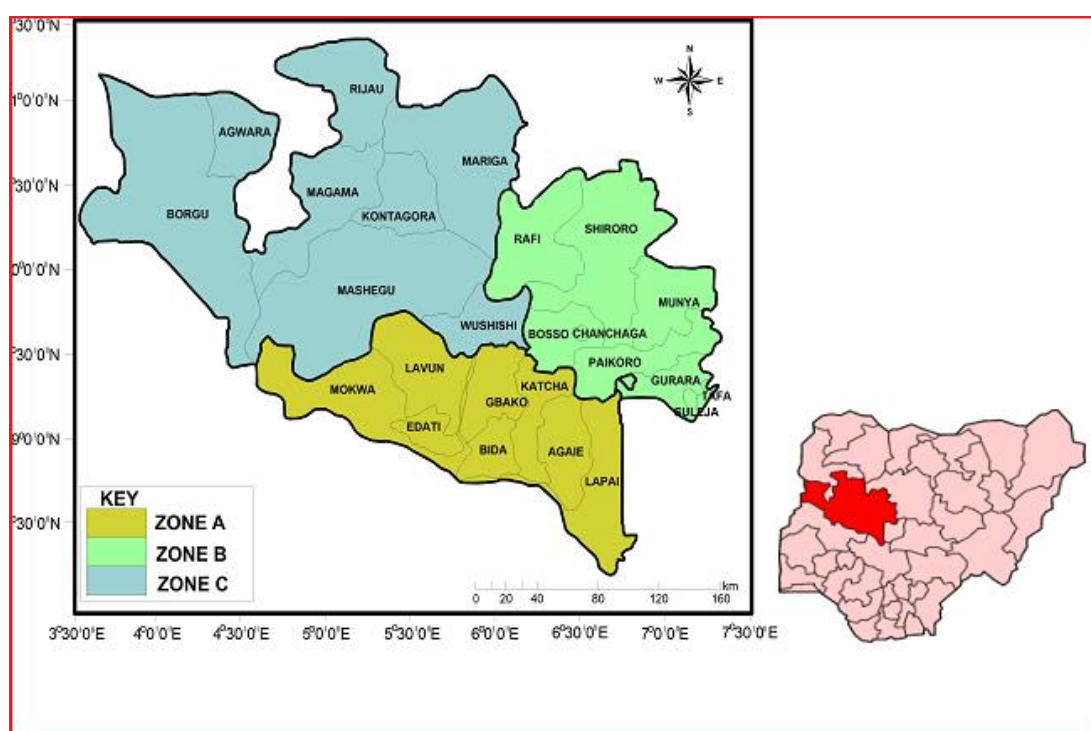


Figure 1.3 Map of Niger State showing its position (in red colour) on the Nigerian map.

Source: Author's generation using ArcGIS

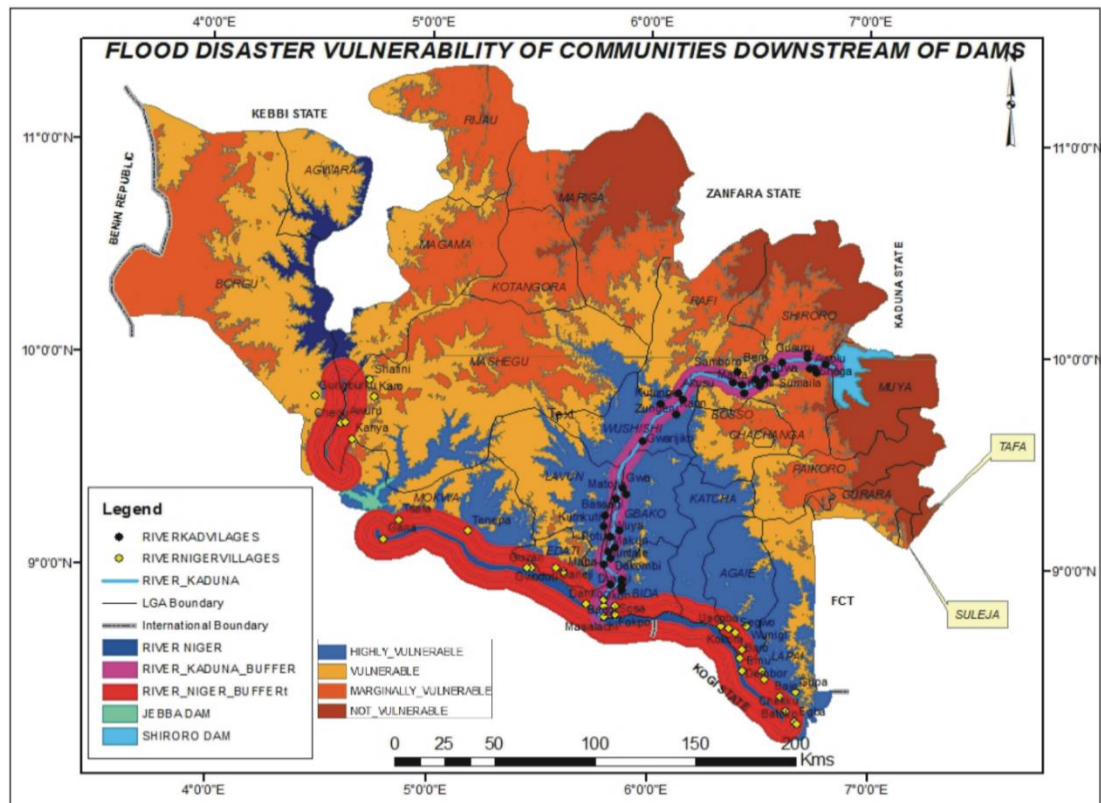


Figure 1.4 Flood Disaster Vulnerability of Communities in Niger State, Nigeria
Source: Ikusemoran *et al.*, 2014

1.5 Flooding in Nigeria

Flooding has become a recurring and increasingly severe issue in Nigeria, with major flood events in recent years causing significant loss of life, population displacement, and economic damage. Nigeria's climatic and geographical features have long made the country susceptible to frequent floods. In 1980, the Ogunpa flood disaster in Ibadan resulted in over 200 deaths and widespread destruction (Agbonkhese *et al.*, 2014). The 1988 flooding events impacted nine states across the nation (Agbonkhese *et al.*, 2014). As reported by the United Nations Department of Humanitarian Affairs (UN DHA, 1988), the disaster resulted in 23 fatalities and displaced approximately 200,000 individuals. The floods also caused extensive property damage, destroying 18,000 homes and obliterating 14,000 agricultural plots.

Severe flooding continued to trouble Nigeria over the following decades. In 2010, Nigeria experienced significant flooding, resulting in approximately 1,550 fatalities and the displacement of 258,000 individuals across 19 separate flood events. Niger State was particularly affected, with flooding along major rivers claiming 38 lives and displacing over 130,000 residents (Komolafe *et al.*, 2015). The southwestern states, including Ondo and Lagos, also suffered substantial losses due to these flood occurrences.

The 2012 Nigerian floods, deemed the most severe in four decades, had far-reaching consequences across 30 states, affecting over 7.7 million individuals. According to the National Emergency Management Agency, as reported by Kwari *et al.* (2015), the disaster caused almost two million individuals to be displaced, injuries to 5,800 individuals, and damage to nearly 600,000 homes. The floods claimed 363 lives and incurred approximately \$6.5 billion in damages (The Conversation, 2022).

In 2013, severe rainfall and subsequent flooding impacted over 81,500 individuals across Nigeria. The disaster resulted in nearly 8,000 people being displaced, over 6,500 homes damaged, and at least 19 fatalities. Also, a minimum of 2,217 farmlands were destroyed by the floods (OCHA, 2013a).

The year 2015 saw heavy rains and dam failures in several states, leading to flooding in 11 Nigerian states. The National Orientation Agency (NOA) stated that 53 people died and 100,420 were forced to leave their homes. The impacted states are Adamawa, Anambra, Benue, Delta, Kaduna, Kebbi, Niger, Ondo, Sokoto, Taraba, and Zamfara. The floods caused widespread destruction, sweeping away homes and buildings and inundating agricultural areas (OCHA, 2015).

In 2016, National Emergency Management Agency (NEMA) as reported by Premium Times (2016a), stated that floods displaced one million people and claimed

fewer than 100 lives. The disaster also devastated farmlands in 24 communities within Niger State (Premium Times, 2016b).

The flooding in 2018 had far-reaching consequences, affecting 1.9 million people, destroying 82,000 homes, displacing 210,000 individuals, and causing extensive damage to crop and livestock (OCHA, 2018). The International Federation of Red Cross and Red Crescent Societies reported that in Niger State, flood events affected approximately 300 individuals, forced 185 from their homes, led to 50 people requiring medical care, and resulted in eight fatalities (IFRC, 2018).

The 2020 floods as reported by NEMA, resulted in 68 fatalities, affected 320 Local Government Areas and over 129,000 individuals throughout 35 states including the Federal Capital Territory, and damaged 104,000 hectares of farmland (Premium Times, 2020).

In a recent event, in 2022, excessive rainfall and overflowing rivers led to Nigeria's worst flooding in a decade, killing at least 665, displacing 2.4 million and affecting over 4.4 million citizens and destroying over 676,945 hectares of farmland (NEMA, 2022a). In Niger State, 824 hectares of farmland were destroyed, over 12 deaths occurred, and 35,629 individuals were displaced (NEMA, 2022a). In the following year, a comprehensive joint assessment was conducted by Nigeria's primary statistical and disaster management agencies in collaboration with a prominent international development organization. This study evaluated the economic repercussions of the 2022 flooding, utilizing data collected through late November of that year. The assessment estimated that the financial impact on the national economy ranged from approximately \$3.8 billion to slightly over \$9 billion. The analysis proposed a median figure of \$6.7 billion as the most probable representation of the total damage incurred (NBS *et al.*, 2023).

The most recent event of 2023 left over 275,000 persons displaced, 642,000 affected, 9,210 hectares of farmland destroyed with 789 deaths (NEMA, 2023). Recurrent catastrophic flooding stresses Nigeria's urgent need for improved flood management and mitigation strategies.

1.5.1 Government Intervention on Flooding in Nigeria

Shortly after the 1980 Ogunpa flood disaster in Oyo State, the government initiated the Ogunpa River Channelization Project to improve drainage in Ibadan (Areola and Akintola, 1980). This marked the beginning of a series of interventions aimed at addressing flood-related challenges in the country.

The late 1980s saw further developments in disaster management. In response to the 1988 floods, the UN DHA (1988) reported that the Federal Government allocated \$1 million from the National Emergency Relief Fund and allocated grain valued at an additional \$1 million to affected individuals. UN DHA (1988) also noted that an estimated \$23.4 million in further funding was required for the rehabilitation of the collapsed Bagauda Dam, resettlement of flood victims, and procurement of 34,000 bags of grain. This period also saw the creation of the Ecological Fund in 1981, which has since undergone several modifications to its structure and allocation (NEITI, 2019).

According to NEITI (2019), the Ecological Fund received a total of ₦277 billion from December 2011 to November 2016, distributed among the three tiers of government. This substantial allocation stresses the government's financial commitment to addressing environmental challenges.

The 1990s and early 2000s brought about significant institutional changes, including the creation of NEMA, the Federal Ministry of Environment, NiMet, and NESREA (NEMA, 2013; FAO, 2013; NiMet, 2004; NESREA, 2008). These agencies

were created to address various aspects of environmental management and disaster response.

The devastating floods of 2012 led to increased government attention and funding for flood management. As reported by FGN (2013), President Jonathan declared the floods a national disaster and announced the allocation of ₦17.6 billion (about US\$110 million) as direct cash aid to the affected states. The Federal Ministry of Agriculture and Rural Development donated 40,000 metric tons of various food items to several states as part of the relief program. Also, the Nigeria Erosion and Watershed Management Project (NEWMAP) was initiated. According to NEWMAP (2020), the project's total expenditure amounted to US\$650 million, with the World Bank committing US\$500 million. This substantial investment demonstrates the scale of the response to flood and erosion challenges.

Recent years have seen consistent budgetary allocations for disaster management and humanitarian affairs. Vanguard (2022) reported that in 2018, 2.2% of the projected ₦9.120 trillion budget, equivalent to ₦198 billion, was allocated to the Ecological Fund and disaster management. Similar allocations were made in subsequent years.

The Budget Office of the Federation documents show increasing allocations to the Ministry of Humanitarian Affairs, Disaster Management and Social Development: ₦453 billion in 2020, ₦60 billion in 2021, ₦80 billion in 2022, and ₦382 billion in 2023 (Budget Office of the Federation, 2020; 2021; 2022; 2023). Also, Vanguard (2022) reported that ₦462 billion was set aside for the Ecological Fund and disaster management in 2023.

These interventions have faced various challenges. The Economic and Financial Crimes Commission (EFCC) reported that former Plateau State Governor

Joshua Dariye received a 14-year prison sentence in 2018 for misappropriating ₦1.162 billion in state ecological funds during his tenure from 1999 to 2007 (EFCC, 2018). In 2022, the Socio-Economic Rights and Accountability Project (SERAP) asked the president to investigate alleged corruption and mismanagement of the ₦1 trillion allocated for ecological and disaster management across the 2018, 2019, and 2023 fiscal years (SERAP, 2022)

1.6 Poverty in Nigeria

Nigeria, despite its status as one of Africa's largest economies, struggles with significant poverty-related challenges. The National Bureau of Statistics (2023) reports that an approximate 40% of the Nigerian population lives below the national poverty line, with rural areas, particularly those dependent on agriculture, experiencing higher poverty rates. Over the last 15 years, this trend has continued, with the national poverty rate fluctuating between 40-60% since 2008 (World Bank, 2022a). Rural poverty has consistently exceeded 50%, peaking at 66% in 2018 before a slight decline.

The severity of Nigeria's poverty situation is further emphasized by data from the Food and Agriculture Organization (FAO, 2018), which indicates that over 50% of the population falls below the international poverty threshold of \$1.90 per day, with a significant portion residing in rural areas. The Nigerian Living Standards Survey of 2018/19 reported that the average annual household income from crop farming and livestock rearing in rural areas was ₦129,333 (\$163), remarkably lower than urban households (NBS, 2021). A more recent survey conducted in 2021 among rural farming households in Oyo State found an average annual income of ₦191,122 (approximately \$250) per farmer (Otekunrin *et al.*, 2021).

Niger State serves as a miniature of the national poverty trends. The state's poverty rate, based on per capita expenditure, rose from 50.1% in 2008 to 67.1% in 2013, before decreasing to 52.8% in 2018 (NBS, 2020). Simultaneously, food insecurity in the state increased from 24.5% in 2014 to 29.5% in 2018. A study by Coster (2021) found that smallholder maize farmers in the same state realized ₦52,232.66 (\$68) per hectare per production cycle, highlighting significant low income in the agricultural sector.

The persistence poverty in Nigeria is attributable to various factors, including low economic productivity, inadequate education, gender inequality, climate vulnerability, and systemic issues such as insufficient infrastructure and restricted access to information, markets, and credit (FAO, 2024).

1.6.1 Government Intervention on Poverty in Nigeria

Nigeria's journey toward poverty reduction has been marked by numerous initiatives since the early 1970s. The country's first significant step came in 1972 with the National Accelerated Food Production Programme (NAFPP). According to Akinola (1986), this pioneering effort brought together federal and state governments to work with farmers, with a primary focus on developing improved crop varieties through research and field trials. Despite its innovative approach, the program struggled to meet its intended goals.

The mid-1970s saw Nigeria faced with food security challenges, worsened by the growing emphasis on petroleum and urban migration. Arua (1982) documents that in response, the military government launched Operation Feed the Nation (OFN) in 1976. While this initiative successfully sparked public interest in agriculture, its implementation fell short of achieving its core objectives of enhancing food production and rural living conditions.

When civilian rule returned under Shehu Shagari in 1980, the Green Revolution replaced OFN. Nzimiro (1985) notes that this new program, despite substantial financial backing, achieved limited success. Its emphasis on capital-intensive farming methods primarily benefited wealthy farmers, while smallholders were largely left behind. The program's effectiveness was further compromised by political interference.

Parallel to these initiatives, the Agricultural Development Projects (ADP) launched in 1972 received considerable international support, particularly from the World Bank (1993). The program targeted small-scale farmers, who were responsible for over 80% of the nation's food production. However, Hussaini and Abdullahi (2018) and Auta and Dafwang (2010) identify several challenges, including insufficient extension services and infrastructural deficiencies.

The 1990s saw the establishment of the National Agricultural Land Development Authority (NALDA) in 1992. Akinsola and Oladele (2004) report that after ceasing operations in 2000, it was revitalized through legislative amendment in 2016, as documented by Sani-Omolori (2016), with a renewed focus on farmer empowerment and food security enhancement.

The late 1980s and 1990s brought increased attention to gender-specific development programs. Bola (1995) describes how the Better Life Programme for Rural Women (BLPRW) was introduced in 1987, focusing on improving rural women's living standards and economic opportunities. This was followed by the Family Economic Advancement Programme (FEAP) in 1997, which Obinne (1999) notes attempted to address rural economic challenges.

The dawn of the new millennium ushered in several poverty alleviation initiatives. Taiwo and Agwu (2016) document that the Poverty Alleviation Programme

(PAP) began in 2000, offering monthly stipends to participants, though it faced challenges from political interference. Its successor, the National Poverty Eradication Programme (NAPEP), launched in 2001, which Oladimeji and Said (2012) describe as having a stronger focus on youth employment.

The government's approach became more comprehensive with the introduction of the National Economic Empowerment and Development Strategy (NEEDS) in 2003, as outlined by Soludo (2003), alongside the National Health Insurance Scheme (NHIS). The International Labour Organization (2004) notes that the Central Bank of Nigeria also played a crucial role through various financial initiatives, including the MSME Development Fund in 2013 (CBN, 2013) and the Anchor Borrowers Program in 2015, which according to Aghogho (2024), disbursed approximately ₦1.12 trillion before its recent discontinuation.

The National Social Investment Program (NSIP) emerged in 2015 as a basis of Nigeria's social welfare system during President Muhammadu Buhari's tenure (Adam, 2018). The objective NSIP was to ensure fair resource allocation to disadvantaged groups in Nigerian society, with a particular emphasis on supporting children, young people, and women. Financial data reveals a significant shift in funding, from an initial allocation of N400 billion in 2021 to ₦3.2 billion in 2023 (National Planning, 2021, 2023). The program's structure incorporates four distinct interventions: the N-Power initiative for youth employment and skills development, a Conditional Cash Transfer scheme for poverty alleviation, the Government Enterprise and Empowerment Program focusing on entrepreneurial development, and a School Feeding initiative to boost education access while supporting local agriculture (Adam, 2018). The program gained international recognition and support, evidenced by a World Bank contribution of \$500 million through its International Development Association, alongside the

Nigerian Government's investment of \$1.3 billion (Adam, 2018). While the program has reportedly benefited more than 4 million Nigerian citizens through various developmental initiatives, recent years have witnessed substantial budget reductions across all program components, with notable decreases in allocations between 2021 and 2023: N-Power's budget fell from ₦15 billion to ₦1 billion, CCT decreased from ₦475 million to ₦100 million, GEEP reduced from ₦26 billion to ₦600 million, and the school feeding program declined from ₦2.6 billion to ₦1 billion (Adam, 2018; National Planning, 2021, 2023).

Recent years have brought new strategic initiatives, including the Economic Recovery and Growth Plan (2017-2020) and the National Poverty Reduction with Growth Strategy (NPRGS) in 2021 (National Planning, 2021). Philip *et al.* (2021) note that the government has also addressed wage policies, implementing a minimum wage increase to ₦30,000 in 2019, though The Whistler (2024) reports implementation has been uneven across states.

Okidim *et al.* (2023) describe the most recent addition to the government initiative on poverty is the Livelihood Improvement Family Enterprises Project for the Niger Delta (LIFE-ND), a twelve-year program running from 2019 to 2030.

Poverty alleviation initiatives have demonstrated minimal to negligible impact on Nigeria's economic development (Adebajo *et al.*, 2024). The limited effectiveness of these programs can be attributed to their alignment with elite interests rather than addressing the fundamental needs of the general population (Adebajo *et al.*, 2024).

1.7 Problem Statement

Niger State's farmers face significant challenges due to widespread poverty and recurrent flooding, yet there is a gap regarding the level to which the farmers are currently vulnerable. The inadequacy of comprehensive data on exposure levels, sensitivity, and adaptive capacity hinders effective flood management. Recent years have witnessed increasingly severe flooding, with major events in 2010, 2012, 2020, and 2022 causing extensive damage to thousands of hectares of farmland, livestock losses, and rural infrastructure. Despite these recurring incidents, there is insufficient data on the current vulnerability of farmers, and component of vulnerability per geographical zones of impact.

The time-based changes of how flooding affects farmers' wealth and poverty status remain poorly understood. The Niger State government's 2018 estimate of ₦5 billion in agricultural losses highlights the severe economic impact, while the state's high multidimensional poverty index of 0.345 (ranking third in the North Central zone) stresses existing poverty challenges. Rural farmers' average annual incomes of ₦129,333 to ₦191,122 (\$163-\$250), translating to ₦10,000-₦16,000 monthly, significantly below the national minimum wage of ₦30,000, indicate high poverty rates among farming households. However, there is inadequacy of understanding of how these economic conditions fluctuate before, during, and after flood events, making it difficult to design appropriate interventions that address both immediate flood impacts and long-term poverty implications.

The causal relationship between level of vulnerability to flood and poverty status among Niger State farmers requires further investigation. While government interventions have been implemented, including NEWMAP channelization projects and NSEMA response coordination, their effectiveness has been compromised by

challenges such as fund mismanagement, exemplified by the misappropriation of ecological funds and alleged mismanagement of disaster management allocations. The specific mechanisms through which vulnerability to flood influences poverty status in Niger State is inadequately empirically documented, hindering the development of evidence-based policies aimed at breaking the poverty-vulnerability cycle.

There are insufficient documentation and evaluation of farmers' coping strategies for mitigating flood impacts on their poverty status. With minimal savings and limited access to credit, floods force many farmers into deeper poverty, yet their coping mechanisms remain poorly understood. While some researchers (Mahanta and Das, 2017; Salvucci and Santos, 2020) have studied flooding effects in Nigeria, focusing on health, environment, and food security, there is inadequate information specifically on flood-induced vulnerability to poverty and coping strategies in Niger State. This knowledge gap potentially leads to underutilization of local practices that could contribute to more effective flood resilience programs and prevents the development of targeted interventions to enhance farmers' ability to cope with flooding while working towards achieving Sustainable Development Goals 1 (poverty reduction), 2 (food security), 8 (economic growth), 10 (reduced inequality), and 13 (climate action).

1.8 Research Questions

This study aims to address the following research questions based on the issues discussed.

1.8.1 Research Question 1

To what level are the farmers currently vulnerable to flooding in Niger State?

1.8.2 Research Question 2

What is the poverty status of the farmers in Niger State?

1.8.3 Research Question 3

How does level of vulnerability to flooding affect poverty status of farmers in Niger State?

1.8.4 Research Question 4

What are coping strategies employed by the farmers in cushioning the effect of level of vulnerability to flooding on poverty status in Niger State?

1.9 Research Objectives

The broad objective of this study is to analyse farmers' vulnerability to flooding, poverty and coping strategies in Niger State, Nigeria. Specifically, the study seeks:

1.9.1 Objective 1

To measure the current level of vulnerability to flooding among farmers in Niger State.

1.9.2 Objective 2

To identify the poverty status of the farmers in Niger State.

1.9.3 Objective 3

To analyse the effect of vulnerability to flooding on the poverty status of farmers in Niger State.

1.9.4 Objective 4

To evaluate the coping strategies employed by the farmers in cushioning the effect of level of vulnerability to flooding on poverty status in Niger State.