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Economic and social costs of flood disasters in Nigeria: Implications for sustainable national development

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Abstract

Nigeria is susceptible to flood disasters, resulting in significant economic and social costs due to natural and human factors. This paper examines the implications of flood disasters on Nigeria's sustainable national development by identifying drivers, estimating costs, analyzing social dimensions, and discussing policy options. The methodology this paper adopted relied on a range of secondary sources such as government reports, academic studies, and media sources which were analyzed through qualitative methods of content and thematic analysis. The study revealed that flood disasters caused economic losses, including damage to infrastructure, loss of income, and reduced agricultural production, disproportionately affecting vulnerable populations. Effective disaster risk management requires an integrated approach, including investments in flood risk infrastructure, coordination among government levels, and engaging local communities to build disaster reduction capacity. The paper highlights the need for Nigeria to mainstream disaster risk reduction into national development planning for sustainable development.

Keywords: Flood Disasters; Economic Costs; Social Costs; Sustainable National Development; Disaster Risk Management; Vulnerable Populations; Policy Options

1. Introduction

Flooding has emerged as a recurrent and prevalent disaster in Nigeria. The 2012 flood disaster brought severe damage and losses, but the multidimensional scale of the 2022 floods proved to be more devastating (National Bureau of Statistics, National Emergency Management Agency, and United Nations Development Programme, 2023).

The term "flooding" encompasses the temporary inundation of land by water due to excessive rain, snowmelt, or other water sources (Walesh, 1991). This phenomenon occurs when the water volume in a river or body of water surpasses its capacity, or when water accumulates due to inadequate drainage or infrastructure (Ojo, 2007; Cirella & Iyalomhe, 2018).

Nigeria, positioned vulnerably due to its geographic location, topography, and climatic conditions, is highly susceptible to natural disasters, particularly floods. These disasters carry substantial economic and social costs in the form of loss of life, infrastructure damage, and diminished agricultural production (Iyiola, Asiedu, Oyewole & Akinrinade, 2022; Adedeji, Olusola, Babamaaji & Adelabu, 2021).

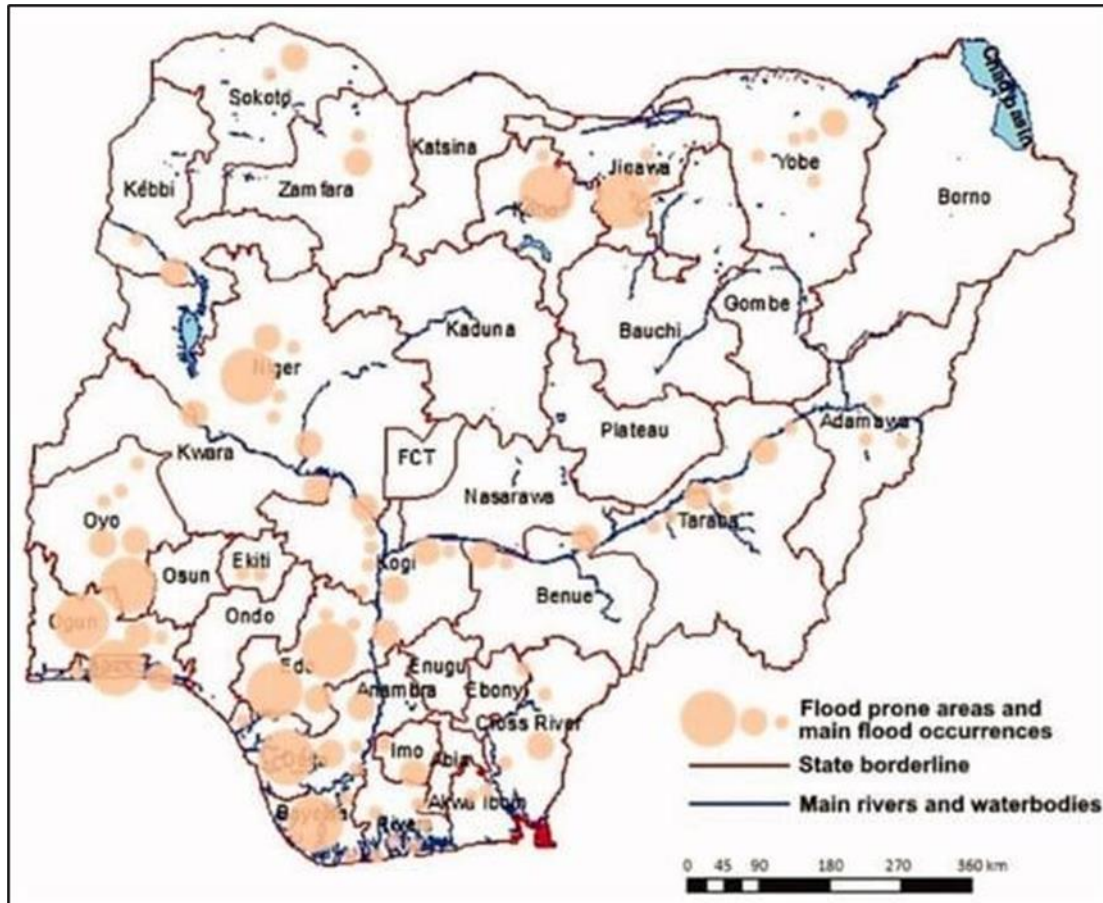
In 2012, Nigeria faced one of its most severe flooding disasters, resulting in significant loss of life and widespread displacement (Nkeki, Henah & Ojeh, 2013; OCHA, 2012; Toure, 2014). Impacting over 2.3 million people and affecting 16 million, the disaster garnered national and international attention due to its magnitude (Echendu, 2020; OCHA,

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2012). Although the flooding affected 32 out of Nigeria's 36 states, numerous communities grapple with localized perennial flooding during the rainy season between March and November (Echendu, 2022).

Amidst efforts to recover from the 2012 flooding, Nigeria faced the worst flooding in recent decades in 2022. The 2022 floods, characterized by their multidimensional scale, surpassed the intensity of the 2012 disaster, leading to unprecedented disruption and destruction.

A map of Nigeria displaying areas prone to flooding is shown in Figure 1.



(Source: Cirella and Iyalomhe 2018).

Figure 1 Flood Prone Areas in Nigeria

1.1. Problem Statement

The recurring occurrence of flood disasters in Nigeria has resulted in substantial economic and social repercussions. Although the government has undertaken efforts to alleviate the impact of these disasters, a more comprehensive and integrated approach is essential to tackle the root causes of flood disasters. Additionally, the social aspects of flood disasters are frequently neglected in policy development, resulting in uneven consequences, particularly for vulnerable communities. The absence of coordinated disaster risk management strategies further amplifies the adverse effects of flood disasters on sustainable national development. Consequently, there is a pressing need for a holistic and inclusive approach that addresses both the underlying drivers and social dimensions of flood disasters, while fostering effective disaster risk management for long-term resilience and development in Nigeria.

Aim and Objectives

The aim of this paper is to examine the economic and social costs of flood disasters in Nigeria and their implications for sustainable national development. The objectives of this study are as follows:

- To identify the drivers of flood disasters in Nigeria
- To estimate the economic and social costs of flood disasters in Nigeria

- To analyze how flood disasters affect vulnerable populations in Nigeria
- To highlight the implications of flood disasters for sustainable national development in Nigeria
- To discuss policy options for effective disaster risk management in Nigeria
- To provide recommendations for improving disaster risk management and promoting sustainable national development in the face of flood disasters in Nigeria.

2. Theoretical and Conceptual Framework

2.1. Theoretical Framework

The theoretical underpin for this paper titled 'Economic and Social Costs of Flood Disasters in Nigeria: Implications for Sustainable National Development' cuts across several theories such as the Sustainable Development Theory as put forward by Brundtland (1987), Sachs (2007), and Elkington (1994); the Disaster Risk Reduction Theory of Birkmann (2006), Wisner et al. (2012), and UNDRR (2015); Political Ecology Theory of Robbins (2004), Peet and Watts (1996), and Zimmerer and Bassett (2003); Environmental Justice Theory of Bullard (1990), Pellow and Brulle (2005), and Schlosberg (2007), and the Systems Theory of Checkland and Scholes (1999), Meadows (2008), and Bertalanffy (1968). For clarity, the system theory will be discussed in this section of the paper.

Systems theory is a framework that emphasizes the importance of understanding the interconnections between different components of a system and how they influence the behavior and outcomes of the system. This theory has been developed by several authors, including Checkland and Scholes (1999), Meadows (2008), and Bertalanffy (1968).

Checkland and Scholes (1999) in their book 'Soft Systems Methodology in Action' argue that systems theory provides a way to understand complex systems and their behavior. They emphasize the importance of identifying different stakeholders and their perspectives and using this information to design interventions that address the needs and goals of the system. The authors also highlight the role of systems thinking in promoting learning and innovation. Meadows (2008) in her book 'Thinking in Systems: A Primer' provides an introduction to systems thinking, emphasizing the importance of understanding the feedback loops and interconnections that shape the behavior of a system. She argues that systems' thinking provides a way to address complex problems by identifying the underlying structures and patterns that influence the behavior of the system. Meadows also highlight the importance of understanding the unintended consequences of interventions and the need to design interventions that promote long-term sustainability.

Bertalanffy (1968) in his book 'General System Theory: Foundations, Development, Applications' provides a comprehensive overview of systems theory, emphasizing the importance of understanding the interconnections between different components of a system and how they influence the behavior of the system. He argues that systems theory provides a way to understand the behavior of complex systems in different fields, such as biology, psychology, and sociology. Bertalanffy also highlights the importance of interdisciplinary approaches that draw on multiple disciplines to understand complex systems.

In the context of the economic and social costs of flood disasters in Nigeria and its implications for sustainable national development, systems theory provides a relevant framework for analysis. The theory emphasizes the importance of understanding the interconnections between different components of the system, such as the environment, the economy, and social structures, and how they influence the behavior and outcomes of the system. By using this framework, the paper analyzed the economic and social costs of flood disasters in Nigeria and explores how different components of the system interact to produce these costs. Additionally, the theory was used to identify potential solutions that promote sustainable national development by addressing the underlying structures and patterns that produce the economic and social costs of flood disasters in Nigeria.

2.2. The Conceptual Review

The conceptual review for this paper is based on the systems theory approach proposed by Bertalanffy (1968), which considers the interactions between the different components of the system that produce the economic and social costs of flood disasters in Nigeria. The components of the review are as follows:

Environmental factors: This component includes natural factors that contribute to flood disasters such as rainfall, land-use patterns, topography, and drainage systems (Kalejaiye, Fatile & Ojelabi, 2016).

Socio-economic factors: This component includes human activities and factors that contribute to flood disasters such as rapid urbanization, inadequate housing, poor waste management, and lack of disaster preparedness (Adedeji, Afolabi & Adeniyi, 2018).

Economic costs: This component includes the direct and indirect costs of flood disasters, such as loss of property, loss of infrastructure, loss of crops, and loss of life (Ibe, Asogwa & Ozor, 2018).

Social costs: This component includes the non-monetary costs of flood disasters, such as displacement, psychological trauma, and social disruption (Ologunorisa, Adagunodo & Akinola, 2017).

Sustainable national development: This component represents the desired outcome of the conceptual review, which is to promote sustainable national development in Nigeria. This includes measures to reduce the economic and social costs of flood disasters and build resilience to future disasters (Ologunorisa et al., 2017).

The conceptual review of related literatures proposes that the interactions between the environmental and socio-economic factors lead to flood disasters in Nigeria, which in turn produce economic and social costs. These costs impede sustainable national development by reducing productivity, increasing poverty, and reducing the well-being of the affected population.

3. Methodology

This study relied on secondary data sources, including government reports, academic studies, and media sources. The data were analyzed using qualitative methods, including content and thematic analysis. The analysis focused on identifying the drivers of flood disasters in Nigeria, estimating the economic and social costs of flood disasters, analyzing the social dimensions, and discussing policy options for effective disaster risk management.

3.1. The Drivers of Flood Disasters in Nigeria

Nigeria is a country that is particularly vulnerable to flood disasters due to its geographic location, topography, and climatic conditions. Flood disasters have become a recurrent event in Nigeria, causing significant economic and social costs. Various studies have identified both natural and human factors as drivers of flood disasters in Nigeria.

3.1.1. Natural Factors

One of the main natural factors contributing to flood disasters in Nigeria is heavy rainfall. According to Onuoha and Uzodinma (2017), Nigeria experiences two distinct rainy seasons, which occur between April and July and from September to November. During these periods, the volume of rainfall significantly increases, leading to the overflowing of rivers and flooding of low-lying areas.

Riverine and coastal flooding are also major natural factors that contribute to flood disasters in Nigeria. Adelekan (2010) notes that the country has numerous rivers and is located near the coast, making it susceptible to flooding from the sea.

Climate change is another natural factor that exacerbates flood disasters in Nigeria. The Intergovernmental Panel on Climate Change (IPCC) predicts that global warming will lead to an increase in the frequency and severity of extreme weather events, including floods. In Nigeria, climate change has been linked to the depletion of the country's vegetation cover, leading to soil erosion and reduced groundwater recharge, which makes the country more susceptible to flooding (Nwilo & Badejo, 2016).

3.1.2. Human Factors

In addition to natural factors, human activities also contribute to flood disasters in Nigeria. One of the main human factors is the inadequate drainage system. Oyinloye and Ojeh (2013) noted that most of Nigeria's cities lack proper drainage systems, leading to the accumulation of water during heavy rainfall.

Urbanization is another human factor contributing to flood disasters in Nigeria. According to Balogun, Ogedengbe and Adeleke (2019), rapid urbanization has led to the conversion of wetlands and other natural water retention areas into concrete structures, reducing the ability of the land to absorb water and increasing the volume of runoff during heavy rainfall.

Deforestation is another human factor contributing to flood disasters in Nigeria. The country's forest cover has significantly reduced over the years due to logging, agricultural activities, and urbanization. Deforestation leads to soil erosion, reduced groundwater recharge, and reduced vegetation cover, making the country more susceptible to flooding (Onuoha and Uzodinma, 2017).

Another human factor contributing to flood disasters in Nigeria is the construction of buildings in flood-prone areas. A study by Oyinloye and Ojeh (2013) notes that most of Nigeria's buildings are constructed in areas that are prone to flooding, increasing the risk of damage and loss of life during flood events.

Poor waste management practices also contribute to flood disasters in Nigeria. A study by Odofin and Ojo (2019) notes that improper waste disposal leads to the clogging of drainage systems, reducing their capacity to channel water during heavy rainfall and increasing the risk of flooding.

The lack of effective flood forecasting and early warning systems is another human factor contributing to flood disasters in Nigeria. A study by Adelekan (2010) notes that the absence of reliable flood forecasting and early warning systems makes it difficult to adequately prepare for flood events, increasing the risk of damage and loss of life.

Poor governance and institutional arrangements also contribute to flood disasters in Nigeria. Adelekan (2010) notes that weak governance and institutional arrangements have led to poor flood management strategies, inadequate investment in flood risk infrastructure, and inadequate disaster risk reduction capacity at the local level.

3.2. The Economic and Social Costs of Flood Disasters in Nigeria

3.2.1. The Economic Costs of Flood Disasters in Nigeria

The economic costs of flood disasters in Nigeria are significant. Flood disasters have direct and indirect economic impacts, including damage to infrastructure, loss of income, and reduced agricultural production.

Awosika and Kehinde's 2015 study calculated the economic toll of flood disasters in Nigeria from 1965 to 2012, surpassing 1 trillion Naira (about \$6.4 billion USD). The annual average loss stood at 48 billion Naira (\$307 million USD). The study emphasized the profound impacts of floods on agriculture, industry, transportation, and housing, resulting in property loss, infrastructure damage, and income reduction.

According to a joint declaration from the National Bureau of Statistics, National Emergency Management Agency, and the United Nations Development Programme in 2023, the 2022 flood disaster in Nigeria was unprecedented. The devastating floods claimed over 600 lives and affected 3.2 million people across 34 states and the Federal Capital Territory. The 2022 floods surpassed the intensity of the 2012 floods, causing unparalleled disruption, with approximately 3 million families experiencing damaged or destroyed homes.

As of November 1, 2022, 1,302,789 people had been directly impacted, and the risk of water- and vector-borne diseases, such as malaria, cholera, and typhoid, loomed large. States like Anambra, Bayelsa, Cross River, Delta, Rivers, and the Federal Capital Territory were severely affected, with Bayelsa reporting the highest displacement of approximately 700,000 people by October 18, 2022. By November 2022, Anambra, Kogi, Bayelsa, Jigawa, Delta, and Nasarawa were identified as the most affected states, collectively representing more than half of those affected.

The Federal Government, in collaboration with the World Bank, conducted a preliminary assessment of the damages, estimating direct economic losses ranging from \$3.79 billion to \$9.12 billion as of November 25, 2022, with a median estimate of \$6.68 billion. This encompassed damages to both residential and non-residential structures, infrastructure, productive sectors, and agriculture.

In contrast to the earlier national study that utilized satellite images for a macro-level assessment, the current study focused on the micro-level effects on households, employing household surveys. It concentrated on six severely affected states, providing a detailed analysis of the economic losses caused by the floods (National Bureau of Statistics (NBS), National Emergency Management Agency (NEMA), and United Nations Development Programme UNDP, 2023).

In the agricultural sector, flood disasters lead to crop losses and damage to farmland, affecting food security and livelihoods of farmers. Oyinloye, Adedeji and Ogunjuyigbe (2017) noted that flood disasters have significant impacts on agricultural productivity, particularly in low-lying areas where flooding is more frequent.

In the transportation sector, flood disasters often lead to damage to roads and bridges, disrupting transportation and increasing transportation costs. A study by Ogbuabor and Nwachukwu (2015) notes that flood disasters lead to increased transportation costs and disruptions in supply chains, affecting the overall economy.

In the housing sector, flood disasters lead to the loss of property and damage to housing infrastructure, affecting the housing stock and leading to increased housing costs. A study by Olujimi and Adedokun (2016) noted that flood disasters lead to the loss of property, displacement of populations, and increased demand for temporary housing, affecting the overall housing market.

In addition to the direct economic costs, flood disasters in Nigeria also have indirect economic costs, including the impact on businesses, employment, and government finances. A study by Ologunorisa and Akinnubi (2017) noted that flood disasters lead to the closure of businesses, loss of employment, and reduced economic activity, affecting the overall economy. Furthermore, flood disasters in Nigeria also affect the government's finances, leading to increased spending on disaster relief and recovery efforts. A study by Odjugo and Ismaila (2015) notes that flood disasters lead to increased government spending on disaster relief and recovery efforts, affecting the government's budget and fiscal stability.

The economic costs of flood disasters in Nigeria are also closely linked to poverty and inequality. Abaje and Ogbodo (2019) stated that flood disasters have significant impacts on poverty, particularly in low-income communities, where households have limited resources to cope with the economic impacts of flood disasters. Moreover, flood disasters exacerbate social inequalities in Nigeria by disproportionately affecting vulnerable populations. A study by Ademiluyi and Adeyinka (2015) notes that flood disasters lead to increased vulnerability and marginalization of women, children, and people with disabilities, who often have limited access to resources and support during and after the disasters.

3.2.2. The Social Costs of Flood Disasters in Nigeria

Social costs of flood disasters in Nigeria refer to the negative impacts that such disasters have on people's lives, wellbeing, and social structures. These costs can be both short-term and long-term and affect different aspects of society, including health, education, employment, and social cohesion (Akpan and Udoh 2015; Ibeabuchi and Okeke 2016).

One of the most significant social costs of flood disasters in Nigeria is the loss of lives and displacement of people. Flood disasters causes direct deaths, injuries, and illnesses due to exposure to contaminated water and inadequate sanitation (Akpan and Udoh 2015; Eze and Nzeadibe 2017). Flood disaster also lead to the displacement of people from their homes, resulting in social dislocation, loss of livelihoods, and increased poverty (Ibeabuchi and Okeke 2016; Nwankwoala and Udo 2018). Enete and Emodi (2019) stated that flood disasters lead to the displacement of communities, disrupting social networks and causing psychological distress. The displacement also exposes people to health risks, such as waterborne diseases, and reduces access to essential services like healthcare and education.

Flood disasters in Nigeria also have significant social costs on education. Displaced people may be unable to attend school, leading to a disruption of education and decreased learning outcomes (Akpan & Udoh, 2015; Eze & Nzeadibe, 2017). Furthermore, schools may be damaged or destroyed, leading to a loss of infrastructure and resources (Nwankwoala & Udo, 2018).

Ologunorisa and Akinnubi (2017) stated that flood disasters lead to the closure of schools, causing disruptions to children's education and affecting their long-term development. This disruption can exacerbate inequalities in education and affect the country's human capital development.

Moreover, flood disasters in Nigeria have significant social impacts on women and girls. A study by Ademiluyi and Adeyinka (2015) stated that women and girls are particularly vulnerable to the social impacts of flood disasters, including loss of income, increased workload and increased risk of violence and exploitation. These impacts can further marginalize women and girls, affecting their social and economic development.

Furthermore, flood disasters in Nigeria also affect social cohesion and community resilience. Displaced people may be forced to live in crowded and unsanitary conditions, leading to tensions and conflicts (Akpan & Udoh, 2015). Furthermore, the loss of community infrastructure and resources can lead to a breakdown of social networks and support systems (Eze & Nzeadibe, 2017; Nwankwoala & Udo, 2018). A study by Onuoha, Onu & Onuoha (2019) notes that flood disasters lead to social conflicts, particularly in areas where resources are scarce. These conflicts do weaken social networks and community resilience, making it harder for communities to recover from disasters.

Another social cost of flood disasters in Nigeria is the impact on food security. Floods do cause significant damage to crops and farmlands, leading to a reduction in agricultural production and food shortages. A study by Akeredolu, Ologunorisa & Agboola (2018) notes that flood disasters lead to a decline in food availability and access, particularly in vulnerable populations. This can lead to malnutrition, particularly in children and pregnant women, further exacerbating the impact of flood disasters on social development.

Furthermore, flood disasters in Nigeria do also lead to increased vulnerability to communicable diseases. A study by Nkwocha, Njoku & Agwu (2020) notes that flood disasters increases the risk of waterborne diseases like cholera and typhoid fever, particularly in areas with poor sanitation and hygiene. This can lead to increased mortality and morbidity, particularly in vulnerable populations like children and the elderly.

Moreover, flood disasters in Nigeria have lead to the loss of cultural heritage and social identity. A study by Okpala and Fubara-Manuel (2018) notes that flood disasters lead to the loss of cultural artifacts, buildings, and monuments, eroding the cultural heritage of affected communities. This loss can also affect the social identity of communities, particularly indigenous peoples, affecting their social cohesion and sense of belonging.

3.3. Highlights of the Costs of Flood Disasters in Nigeria

Flood disasters in Nigeria have significant economic and social costs. Awosika and Kehinde (2015) estimated the economic cost of flood disasters in Nigeria between 1965 and 2012 to be over 1 trillion Naira, with an average annual loss of 48 billion Naira and the Federal Government, in collaboration with the World Bank, conducted a preliminary assessment of the damages, estimating direct economic losses ranging from \$3.79 billion to \$9.12 billion in 2023 . Flood disasters have significant impacts on agriculture, industry, transportation, housing sectors, and vulnerable populations such as women, children, and the elderly, leading to displacement, loss of life, and increased risk of disease outbreak. Moreover, flood disasters affect environmental sustainability in Nigeria by causing soil erosion, loss of biodiversity, and contamination of water sources, contributing to environmental degradation. Salient impacts as sieved from recent literatures:

- **Impact on Infrastructure:** Flood disasters have a significant impact on the infrastructure in Nigeria, particularly on transportation systems, energy, and communication networks. Floods damage roads, bridges, and other transportation systems, leading to disruptions in the movement of goods and people. In addition, floods damage power and communication networks, leading to power outages and communication breakdowns (NBS, NEMA & UNDP, 2023; UNDP Nigeria, 2018; World Bank, 2012).
- **Impact on Agriculture:** Nigeria's agricultural sector is particularly vulnerable to flood disasters, with many farmers experiencing significant crop losses and damage to infrastructure (Olaleye & Akinbobola, 2018; Nwachukwu, 2020). Floods also causes soil erosion and waterlogging, leading to reduced productivity and increased food insecurity. This has implications for sustainable development, as Nigeria's agriculture sector is critical for achieving food security and reducing poverty (NBS, NEMA & UNDP, 2023; UNDP Nigeria, 2018; Nwachukwu, 2020).
- **Impact on Health:** Flood disasters have significant health implications, particularly in terms of waterborne diseases. Floods can contaminate water sources, leading to the spread of waterborne diseases such as cholera and typhoid. In addition, floods can damage health facilities and disrupt health services, leading to reduced access to healthcare (Olaleye & Akinbobola, 2018; UNDP Nigeria, 2018).
- **Impact on Livelihoods:** Flood disasters have significant implications for livelihoods in Nigeria, particularly for those who rely on agriculture and informal sector jobs. Floods result in job losses, income reduction, and displacement, leading to increased poverty and inequality (UNDP Nigeria, 2018; World Bank, 2012).
- **Impact on Environment:** Flood disasters have significant environmental implications, particularly in terms of soil erosion, deforestation, and biodiversity loss. Floods wash away topsoil and damage ecosystems, leading to long-term environmental degradation (Nwachukwu, 2020; World Bank, 2012).

Flood disasters are also closely related to climate change, exacerbating existing social inequalities, and leading to psychological distress among affected individuals and communities.

3.4. How Flood Disasters Affect Vulnerable Populations in Nigeria

Vulnerable populations are groups of people who are at higher risk of harm or disadvantage during and after disasters, emergencies, or crises. These populations may include, but are not limited to:

Children and youth, elderly persons, pregnant and lactating women, people with disabilities, people living in poverty or low-income households, ethnic and religious minorities, women and girls, displaced persons and refugees, rural and

remote populations, homeless individuals, small-scale farmers and rural communities, indigenous peoples, people living in informal settlements or slums; and people with chronic illnesses or health conditions. Flood disasters disproportionately affect these vulnerable populations in Nigeria as they often have limited access to resources, services, and information, which can exacerbate the impacts of floods when they occur.

One of the ways flood disasters affect vulnerable populations in Nigeria is through the loss of homes and displacement. A study by Ologunorisa and Oghenekohwo (2018) notes that floods lead to the displacement of vulnerable populations, including those living in informal settlements, who often lack access to adequate housing and basic services. Displacement can lead to a loss of livelihoods and increased vulnerability to exploitation and violence.

Flood disasters in Nigeria also affect vulnerable populations through the loss of assets and income. A study by Okorie et al. (2019) notes that floods lead to the destruction of assets, including crops, livestock, and property, leading to a decline in income and increased poverty. This loss of income can affect vulnerable populations more significantly, particularly those who rely on agriculture for their livelihoods.

In another vein, flood disasters in Nigeria also affect vulnerable populations through the increased risk of communicable diseases. A study by Adelekan et al. (2015) notes that floods increase the risk of waterborne diseases like cholera, particularly in vulnerable populations living in areas with poor sanitation and hygiene. This can lead to increased mortality and morbidity among vulnerable populations, particularly children and the elderly.

Flood disasters in Nigeria also affect vulnerable populations through psychological impacts. A study by Eze, Eseadi, Nwosu, Eze, Ugwoke & Ezenwaka (2019) found that floods lead to psychological distress, including anxiety, depression, and post-traumatic stress disorder, particularly in vulnerable populations who have experienced trauma, including displacement and loss of loved ones.

Moreover, floods also lead to increased gender-based violence (GBV) in vulnerable populations. A study by Oluwole, Oyedepo & Omisore (2019) noted that GBV increases during and after floods, with women and children being the most affected. Women and girls are more vulnerable to sexual violence, exploitation, and abuse during floods, particularly in crowded evacuation centers or temporary shelters where they lack privacy and security.

Flood disasters in Nigeria also affect vulnerable populations through the disruption of education. Children living in vulnerable communities often have limited access to quality education, and floods can exacerbate this problem by damaging school buildings, disrupting the academic calendar, and causing children to drop out of school. A study by Ameh, Omotayo & Usman, (2020) found that floods lead to school closures, loss of educational materials, and decreased academic performance, particularly in vulnerable populations living in rural areas.

3.5. Implications for Sustainable National Development

The economic and social costs of flood disasters in Nigeria have significant implications for sustainable national development (NBS, NEMA & UNDP, 2023; UNDP Nigeria, 2018; Olaleye & Akinbobola, 2018; Nwachukwu, 2020; World Bank, 2012). Some of these implications are as follows:

Impact on Economic Development: Flood disasters have a significant impact on economic development in Nigeria (Adelekan, 2010). The cost of repairing damaged infrastructure, homes, and businesses is enormous and does impede economic growth and development in affected areas. Additionally, agricultural losses resulting from floods can lead to food insecurity, which can further exacerbate economic challenges (UNDP Nigeria, 2018; Nwachukwu, 2020).

Impact on Social Development: Flood disasters usually lead to displacement of people, loss of lives, and deterioration of public health due to the outbreak of waterborne diseases (Ibe & Ajaero, 2015). Communities affected by floods may also experience social dislocation, leading to issues such as increased poverty, social conflict, and reduced access to education and healthcare (Olaleye & Akinbobola, 2018; Nwachukwu, 2020).

Impact on Environmental Sustainability: Flood disasters cause significant environmental damage, including erosion, soil degradation, and water pollution. These environmental consequences have long-term impacts on the sustainability of natural resources in affected areas, which may impact agricultural productivity, water availability, and biodiversity (Nwachukwu, 2020; World Bank, 2012; Ogbonna & Obasi, 2018)

Impact on National Budget: Flood disasters require significant financial resources to manage and address the damages caused. This can put pressure on national budgets and divert resources away from other development priorities (UNDP Nigeria, 2018; World Bank, 2012).

3.6. Policy Options Available For Effective Disaster Risk Management in Nigeria

There are various policy options available for effective disaster risk management in Nigeria. These include:

- Investing in flood risk infrastructure: This involves the construction of dams, levees, and drainage systems to control the flow of water during floods. This can significantly reduce the economic and social costs of flood disasters. (Ogbonna and Okeke, 2019)
- Coordination among government levels: Effective disaster risk management requires cooperation and coordination among different levels of government, including national, state, and local levels. This can improve the effectiveness and efficiency of disaster response and recovery efforts. (Okorie and Agwu, 2018)
- Engaging local communities: Local communities are often the first responders during disasters, and their participation in disaster risk reduction can improve the effectiveness of disaster response and recovery efforts. This can be achieved through community-based disaster risk reduction programs and the involvement of community leaders in decision-making processes. (Oyedepo and Okwuashi, 2019)
- Mainstreaming disaster risk reduction into national development planning: Disaster risk reduction should be integrated into national development planning to ensure that development activities do not increase disaster risk. This can be achieved through the inclusion of disaster risk reduction measures in national development policies and plans. (Dabara and Adeniji, 2019)
- Early warning systems: Early warning systems can provide advance notice of impending disasters, allowing for timely evacuation and disaster response efforts. This can significantly reduce the social and economic costs of flood disasters. (Nwozor and Egbule, 2018)

Recommendations

Based on the findings of this study, the following are the recommendations for improving disaster risk management and promoting sustainable national development in the face of flood disasters in Nigeria:

- Nigeria should prioritize disaster risk reduction by mainstreaming it into national development planning.
- There is a need for adequate funding of disaster risk reduction measures by the government and private sector.
- Government should invest in flood risk infrastructure, such as drainage systems, dams, and early warning systems, to mitigate flood disasters.
- There is a need for capacity building of local communities in disaster reduction measures, including early warning systems and disaster response mechanisms.
- The government should prioritize the protection of vulnerable populations, especially women, children, the elderly, and people living in informal settlements.
- Effective disaster risk reduction requires collaboration and coordination among government agencies and levels, including the private sector and civil society organizations.
- There is a need for effective land use planning and management to prevent flood disasters caused by human factors such as poor land use practices and urbanization.
- There is a need for enhanced research on flood disasters in Nigeria to provide policymakers with up-to-date information and data for effective policy formulation and implementation.
- There is a need for increased public awareness and education on disaster risk reduction measures, including early warning systems and disaster response mechanisms.
- The private sector should be encouraged to participate in disaster risk reduction measures and be incentivized to invest in flood risk infrastructure.

4. Conclusion

Flood disasters have severe implications for Nigeria's sustainable national development, affecting both the economy and social aspects of life, especially for vulnerable populations. This study has revealed that the drivers of flood disasters in Nigeria include natural factors like climate change, urbanization, and poor land use practices, and human factors like inadequate infrastructure, lack of early warning systems, and inadequate disaster response mechanisms. The economic costs of flood disasters in Nigeria are enormous, including damage to infrastructure, loss of income, and reduced agricultural production, while the social costs include displacement, health hazards, and loss of life.

Effective disaster risk management requires an integrated approach that involves investment in flood risk infrastructure, coordination among government levels, and engaging local communities to build disaster reduction capacity. Therefore, Nigeria needs to mainstream disaster risk reduction into national development planning to achieve sustainable development. It is also important to note that disaster risk reduction is not a one-time effort but a continuous process that requires sustained commitment from the government and other stakeholders. Therefore, it is necessary to establish a long-term strategy for disaster risk reduction in Nigeria. This could involve the establishment of a national disaster risk reduction agency or the incorporation of disaster risk reduction into the existing national emergency management agency. Generally, the effective management of flood disasters in Nigeria requires the collaboration and commitment of all stakeholders, including the government, private sector, civil society organizations, and local communities. By implementing the recommendations of this study, Nigeria can minimize the economic and social costs of flood disasters and achieve sustainable national development.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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