Incidents of Flood Disaster in Kaduna: Preventive and Mitigating Measures

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Abstract

This study examines the causes, impacts, and management of flood disasters in Kaduna, Nigeria, with a focus on preventive and mitigating measures. The research addresses the persistent challenge of flooding in the region, particularly the non-compliance of residents with early warnings to relocate. The study aimed to identify the primary causes and patterns of flooding, pinpoint the most affected areas, and evaluate the effectiveness of current preventive and mitigation strategies. The methodology involved collecting primary data through questionnaires from 50 residents in four flood-prone communities in Chikun and Kaduna North Local Government Areas. Secondary data was gathered from sources such as the IOM. Key findings show that the main causes of flooding are blocked drainage (38%), poor waste disposal (26%), and heavy rainfall (20%). The most severe impacts reported were property damage (31.5%) and temporary relocation (25.2%). The study also revealed a disparity in the perceived effectiveness of response agencies. The Nigerian Red Cross and NiMET were rated as highly effective, while the National Emergency Management Agency (NEMA) and the Kaduna State Emergency Management Agency (SEMA) were seen as having a limited or moderate impact. Community-level strategies primarily involved regular drain cleaning (30.6%) and community sensitization (25.5%). The study contributes to existing knowledge by providing a localized, evidence-based assessment of flood dynamics in Kaduna. It highlights the gaps between official strategies and the on-ground realities faced by affected communities. The recommendations are intended to guide improved flood disaster management, planning, and policy decisions.

Keywords: Flood disaster, Kaduna, preventive measures, mitigation strategies, disaster management, community response.

1.0 Introduction

Flooding is excess water flowing onto land that is usually dry [1], e.g., when rainfall exceeds the absorption capacity of the soil, which in turn causes significant environmental consequences [2]. The number of people exposed to floods globally has also steadily risen from 28.1 million in 1970 to 35.1 million in 2020, an increase of 24.9%. Most flood-related deaths and economic losses are recorded in Asia [3]. Flooding is one of the severe disasters occurring globally, and it's even projected to be on the steady increase by 2050.

Widespread flooding in West and Central Africa has affected more than 4 million people, caused extensive damage to homes, schools, health facilities and swaths of farmland, heightening the risk of water-borne diseases, food insecurity and malnutrition [4] The floods – the most devastating in recent years with unprecedented scale and severity – have mainly affected Cameroon, Chad, Guinea, Mali, Niger and Nigeria, and displaced more than 500 000 people, destroyed over 300 000 houses and claimed over a thousand lives [4]. Flooding affects efforts by African governments to attain SDG 11, the attainment of safe, inclusive, resilient, and sustainable human settlements by 2030 [5,6].

According to UNICEF's Children's Climate Risk Index (CCRI), Nigeria is considered at 'extremely high risk' of the impacts of climate change, ranking second out of 163 countries [7]. Starting in April 2025,[8] Nigeria experienced a series of flooding events that caused property damage, fatalities, injuries, and displacement. The deadliest flood so far was the 2025 Mokwa flood in May that killed at least 500 people.[9]. At least 15 million Nigerians are at high risk of flooding, and the federal government warned that flooding is expected to hit 30 of its 36 states, putting more than 1,200 communities at high risk [10, 11]

This research focuses on Incidences of Flood Disaster in Kaduna: Preventive and Mitigating Measures. Between 1 and 6 December 2024, the Displacement Tracking Matrix (DTM), in collaboration with the National Emergency Management Agency (NEMA), the Kaduna State Emergency Management Agency (SEMA), and the Nigerian Red Cross Society (NRCS) identified 22 locations in Kaduna State that were impacted by floods or received internally displaced persons (IDPs) due to the flooding [12]. Despite early warning systems from the Nigerian Meteorological Agency to sensitive communities, residents refused to relocate. Most residents don't comply with instructions as they claim they can't leave their indigenous community. Kaduna State Impact Assessment Committee on Flood has identified the erection of buildings without approvals and dumping of refuse on waterways as one of the major causes of recurrent flooding and other environmental disasters in the State [14]. There are obstacles hindering flood management in Kaduna State. A study by [13] revealed a high level

of financial constraints, inaccessibility to numerous livelihood sources, services, infrastructure, and lack of government support were identified as the major factors influencing household flood resilience strategies in Kaduna Metropolis.

Preventive measures are actions or remedies taken by residents or the government before or after the incidence of flooding. A study by Ijigah & Akinyemi [15] revealed that Preventive measures for flooding in Kaduna were proper dumping of refuse, awareness of the public on the need to adhere to environmental rules, empowerment of government agencies to monitor residential building construction, and implementation of government policies on flood and sanitation by town/city planners.

Even though flood disasters frequently occur in Kaduna, there is a need for a thorough investigation that focuses on the region because so few studies have looked at the particular local and national responses and preventive measures within the city. The study aims to achieve the following; to examine the major causes and patterns of flood disaster in Kaduna, to identify areas in Kaduna most affected by recurring flood incidents, to assess the preventive measures currently in place to address flood risks, to evaluate the effectiveness of mitigation strategies adopted by local authorities and communities, to recommend practical approaches for improving flood disaster management and resilience in Kaduna.

The study's potential is to help Kaduna manage floods better by offering evidence-based recommendations that can direct planning, policy choices, and community-level readiness.

Previous studies have discussed the causes, impacts, and mitigation of flooding, but few studies have focused on Kaduna's flood experiences. This section reviews literature related to the study, thereby identifying gaps and highlighting how the study will fill them.

Flooding has different causative factors and trends globally, nationally, and locally. A study by Abegaz *et al.*, [16] asserted that the U.S. has witnessed significant damages caused by flooding, contributing approximately 7.4% of the total economic losses attributed to natural disasters. Causes triggering floods in the U.S. are scrutinized, emphasizing the influence of weather events such as heavy rainfall, snowmelt, and storms, which are connected with climate change, alongside the impact of anthropogenic factors like urbanization, deforestation, and inadequate infrastructure.

Glazkova [17] explained the causes of floods in East Africa and Kenya. The rainy season is a seasonal pattern. In Kenya and several other eastern parts of the continent, the "long rains" season runs from March to May, while the "short rains" season runs from October to December. Most of the average yearly rainfall in the nation is attributed to the "long rains" season. Often, it is marked by intense downpours that might last into June. Glazkova also identified the Indian Ocean Dipole as another cause. These natural cycles are, in turn, influenced by other larger patterns. In Kenya's case, it's the Indian Ocean Dipole, which is a shifting of sea surface temperatures that causes the western Indian Ocean to be warmer than normal and then colder than average than the eastern Indian Ocean. There are also stages to it — positive, neutral, and negative. During the positive phase, there is a significant increase in rainfall in regions located to the west of the Indian Ocean, including Kenya. So, it is quite likely that the positive Indian Ocean Dipole, combined with climate change, is to blame for Kenya's continuous flood-causing rainfall, the media reported, citing Joyce Kimutai, a research associate at Imperial College London. Flooding in Nigeria results from both natural and human-driven factors. Natural causes include heavy rainfall, soil characteristics, and terrain, while human activities such as poor planning, construction in flood-prone zones, deforestation, blocked drainage from unregulated development, improper waste disposal, weak policy enforcement, and government inaction also contribute [18].

Ibrahim & Zubair [19] reported that floods in Kaduna Metropolis occur mostly at the event of rainfall intensity, especially at the peak of the rainy season (September 2015). And it takes 3-5days for the flood water to recede, depending on the magnitude of the event and receding factors in different areas. Factors other than rainfall identified to substantially influence flooding in the study area are: Lack of and poor drainage networks, dumping of wastes/refuse in drainage and water channels, topographic characteristics, overflowing of river banks, low infiltration due to high water table, degree of built-up areas leading to increased runoffs, and climate change. A study by Jeb & Aggarwal [46] identified that areas most affected by the flood were Malali, Barnawa, and Angwan Rimi.

Flooding has a direct, indirect, and cumulative impact, which depends on location and severity. Also, the impact of flooding varies; it can be negative or positive. Deaths and destruction of houses and other structures, such as bridges, sewage systems, roads, and canals, are the main consequences of flooding. Flooding can have detrimental effects on the economy [20]. Flooding costs nations billions of dollars annually and jeopardises people's ability to make a living [21]. For instance, in 2007, over a million homes were destroyed by flooding in Bangladesh. Additionally, flooding costs the US economy more than $7 billion every year [22]. Communicable diseases are increasing due to many pathogens and bacteria that are being transported by water. There are many waterborne diseases, such as cholera, hepatitis A, hepatitis E, and diarrheal diseases, to mention a few. Gastrointestinal disease and diarrheal diseases are very common due to a lack of clean water during a flood. Clean water supplies are often contaminated when flooding occurs. Hepatitis A and E are common due to the lack of

sanitation in water and living quarters, depending on the location of the flood and the community's preparedness for it [23].

One cannot overlook the advantages of flooding. In arid and semi-arid areas where precipitation is highly irregularly distributed throughout the year, floodwaters offer much-needed water supplies and help eradicate pests from agricultural land. For instance, freshwater floods are crucial for preserving river corridor ecosystems and are a major contributor to the biodiversity of floodplains [24].

In a report by IOM [12], the seven local governments were assessed in Kaduna State. the joint assessment team identified 9,616 individuals in 1,668 households affected by the floods. These individuals included 8,956 non-displaced individuals impacted by the floods but remained in their communities. The affected population included 515 displaced individuals. Fifteen per cent (15%) of the affected houses were habitable but needed repair, sixteen per cent of the houses were partially damaged, and ten per cent were destroyed. In all of the locations assessed, crop/vegetable farming was among the primary sources of income. Adedapo *et al* [25] study also shows that above 50% of respondents in Chikun Local Government, Kaduna were affected by loss of soil nutrients; erosion, damage to roads and other infrastructures, food insecurity, and poverty.

The flooding experience differs among locations depending on the sensitivity of the area to flooding. Some experience flooding multiple times, while others experience it more frequently. Gwamna *et al.*, [37] study in Kaduna South showed that 34.36% of the residents have experienced flood at least 3 times in a single rainy season, while 11.04% and 2.76% of the residents have experienced flood at least 6 and 9 times, respectively, in a single season. Hazard proximity reveals that 19.94% of residential buildings are located within 0.1-0.5 km, and 13.49% are located within 0.5-1.0 km away from the flood source. Consequently, the river overflowed with a severity index of 0.31.

There are two types of preventive measures: structural and non-structural methods. Since ancient times, some flood control techniques have been used [27]. Structural techniques include creating floodways (man-made channels to divert floodwater), terracing hillsides to delay flow downstream, and planting vegetation to store excess water [27]. Other methods include building reservoirs, lakes, dams, levees, and retention ponds to store excess water in case of flooding [27]. Strategies for flood risk management include a variety of non-structural flood management techniques. These may include land zoning laws that limit the amount of urban buildings constructed in floodplains or other flood-prone locations [26, 28]. This lessens the amount of mitigation required to shield buildings and people from flooding incidents. In a similar vein, flood warning systems are crucial for lowering dangers [26]. Plans for flood risk management might incorporate additional measures, such as insurance and reconstruction plans, after flooding events have occurred [26]. Diversification of flood risk management solutions is necessary to guarantee best practices and coverage of multiple scenarios [29].

In Nigeria, the works of Douglas *et al.*, [30], Odemerho [31], Adelekan [32] and Okunola [33] identified bailing water out of the house with buckets, building walls or embankments to keep flood water out, building temporary plank bridges between houses across the wetlands to be able to move about during flooding as well as use of mechanical water pumps to remove water from their homes as household major coping strategies to flood. A study by Adedapo *et al.*, [25] on Adaptive measures among smallholder farmers adaptation measures revealed that 96% of the respondents agreed that planting of vegetation, proper drainage, prevention of soil erosion, and building dams, waterways, and canals were adopted by the smallholder farmers as adaptation and control measures.

The process of implementing plans that guarantee a timely and efficient reaction and recovery during calamities like floods is known as disaster preparedness. It comprises putting in place the required safeguards to enable prompt and well-coordinated response in the event of an emergency. The primary goal is to ensure that sufficient resources and processes are available to support impacted persons and allow them to actively participate in their own healing [38]. Being prepared means having the necessary resources and tools ready to assist affected individuals and enable them to help themselves. Preparedness is viewed as a medium-term approach that focuses on creating and putting into practice disaster management plans. It includes setting up early warning systems, keeping resource inventories, stockpiling supplies, coordinating relevant agencies, and ensuring that evacuation procedures are effective [39]. Preparedness is understood as a means of strengthening coordination and building capacity to prevent, protect against, respond to, recover from, and lessen the impact of both natural and human-induced disasters [38]. Joshua *et al.,* [40] assessed and compared the level of community flood disaster preparedness in flood-prone rural and urban communities in Kaduna State. The qualitative data were analyzed using content analysis. The majority of both the rural (99.0%) and urban (86.1%) communities were not prepared for flood disaster; 34% and 10% of the rural and urban communities, respectively, had flood disaster plans. Only 19.3% in the urban communities compared with 1% of the rural communities had early warning systems. There was a statistically significant difference in community flood disaster preparedness between the urban and rural communities (p =0.001). Overall, the flood preparedness in both rural and urban communities was very poor, though slightly better in the urban communities.

There are different regulatory and research bodies in charge of Flood Mitigation, response, and early warning. The National Emergency Management Agency is an agency in Nigeria [34]. The agency focuses on disaster

management in all parts of the country [34]. One of the key strategies that NEMA employs in its proactive approach to flood disaster management is the establishment of early warning systems. These systems are designed to provide timely information to vulnerable communities, allowing them to prepare and evacuate before the floodwaters arrive. NEMA collaborates with the Nigerian Meteorological Agency (NIMET) and the Nigerian Hydrological Services Agency (NIHSA) to monitor weather patterns and water levels, respectively. This collaboration ensures that accurate data is collected and disseminated to the public, thereby reducing the potential for loss of life and property [35]. Most recently, NEMA has launched its 2025 National Disaster Preparedness and Response Campaign in Oke Isagun, Lagos, aligning the effort with the Seasonal Climate Prediction from NiMet and the NHSA flood outlook. According to the agency, the campaign aims to prepare at-risk communities for floods and to promote shared responsibility in disaster reduction [36]. A study by Dauda *et al.*, [41] critically assessed the efficacy of the National Emergency Management Agency's (NEMA) flood mitigation strategies, addressing identified gaps in community preparedness and response. The analysis utilized descriptive statistics, revealing a general dissatisfaction with NEMA's interventions, particularly concerning early warning systems and community engagement. The findings demonstrate a significant disconnect between NEMA's operational strategies and the realities faced by vulnerable populations, underscoring the need for enhanced disaster preparedness initiatives.

Technological developments like Geographic Information Systems, remote sensing and photogrammetry, hydrologic models, and appropriate Early Warning Systems are used to address the problem of inadequate preparedness and agency inefficiencies. The Flood Decision Support System (FDSS) is a context-specific interactive computing environment that includes databases, graphical user interfaces, interconnected models and analytical tools, and other technologies. Through enhanced data gathering and quick distribution of flood information to impacted areas, the FDSSs have the potential to enhance flood disaster assessment and mitigation, according to [42]. The science of gathering data about things, regions, or occurrences from a distance is known as remote sensing [43]. Usually, sensors installed on satellites or aeroplanes are used to gather this data. Remote sensing can be used in flood catastrophe management to map and track things like coastal changes, river volume changes, flood-prone areas, and inundation limits. A system for collecting, organising, and interpreting location-based data is known as a Geographic Information System (GIS). Several different layers of location-based data are analysed and arranged using this framework to create succinct maps and 3D scenarios. In the end, GISs offer strong features that provide greater understanding of data, perhaps revealing links and patterns for more intelligent decision-making [44]. In order to manage floods, GIS techniques and remotely sensed data are used to create accurate flood maps. Using sensors like Light Detection and Ranging (LiDAR) sensors, GIS tools can prepare Digital Elevation Models (DEMs) for high-level hydrological modelling. Patel and Patel [45] define the IoT as "a type of network to connect anything with the internet based on stipulated protocols through information sensing equipment to conduct information exchange and communications to achieve smart recognitions, positioning, tracing, monitoring, and administration." The Internet of Things has three tiers. People-to-people interconnectedness comes first, followed by people-to-machine and machine-to-machine or things-to-things interconnectedness. [45] In all interconnectivity of things and people, the internet remains the main driver. The rapid transfer of meteorological, hydrological, and geological data about flood episodes is made possible by the interconnectedness of things.

This literature review explored the causes and impact of flooding occurrence at the global, regional, national, and local contexts. It also entailed local and sustainable flood management practices, experiences of flooding, disaster preparedness, and advanced technological methods for flood predictions. However, there are few studies that took into consideration the level of involvement of agencies and areas with the highest experience of Reoccurring flooding. This study aims to fill those research gaps by reviewing intensely areas with recurring flood incidents over the last five years, and also the communities and agencies' response.

2.0 Materials and Methods
Research Design

The study utilised primary and secondary data. Primary data was gathered through the use of questionnaires given to residents in the selected area. The tool gathers their experience with flooding, how they adapted and the support they received, and its effectiveness. The questionnaire was administered using KoboToolbox for ease in collection and accessibility. Secondary data information was obtained from relevant sources online, such as IOM Migration data, NEMA, and the Nigerian Meteorological Agency (NIMET).

A total of 50 questionnaires were distributed to the residents. Purposive sampling technique was used to select communities that often experience flooding in Chikun Local Government (Romi, Angwan Maigero) and Kaduna North (Kabila Doki and Kigo Road). The data from the questionnaires were analyzed and presented in the form of a table and charts.

Study Area

Kaduna State is a state in the northwest geopolitical zone of Nigeria. The state capital is its namesake, the city of Kaduna, which was the 8th largest city in the country as of 2006. Created in 1967 as North-Central State, which also encompassed the modern Katsina State, Kaduna State achieved its current borders in 1987. Kaduna State is the fourth largest and third most populous state in the country. Kaduna State is nicknamed the Centre of Learning, owing to the presence of numerous educational institutions of importance within the state, such as Ahmadu Bello University [47]. Kaduna has a population of 6,113,503 [48].

The state is bordered by seven states: Zamfara for 117 km (73 miles) and Katsina for 161 km (100 miles) to the north, Kano to the north-east for 255 km, Bauchi and Plateau to the east, Nasarawa and Abuja Federal Capital Territory (for 45 km) to the south, and Niger to the west.[49] The Kaduna state is located between latitudes 10°38'58" N and 10°25'36" N and longitudes 7°22'14" E and 7°32'00" E [50]. The Kaduna River, a tributary of the Niger River, flows through the state. There are rocky stones in Zaria and Kogoro Hill. Many communities are prone to seasonal flooding during the rainy season.[51] The rainy season in Kaduna is hot, humid, and cloudy, while the dry season is hot and partly cloudy. Throughout the year, the temperature rarely falls below 50 °F or rises above 102 °F, usually ranging between 55 °F and 95 °F [52].
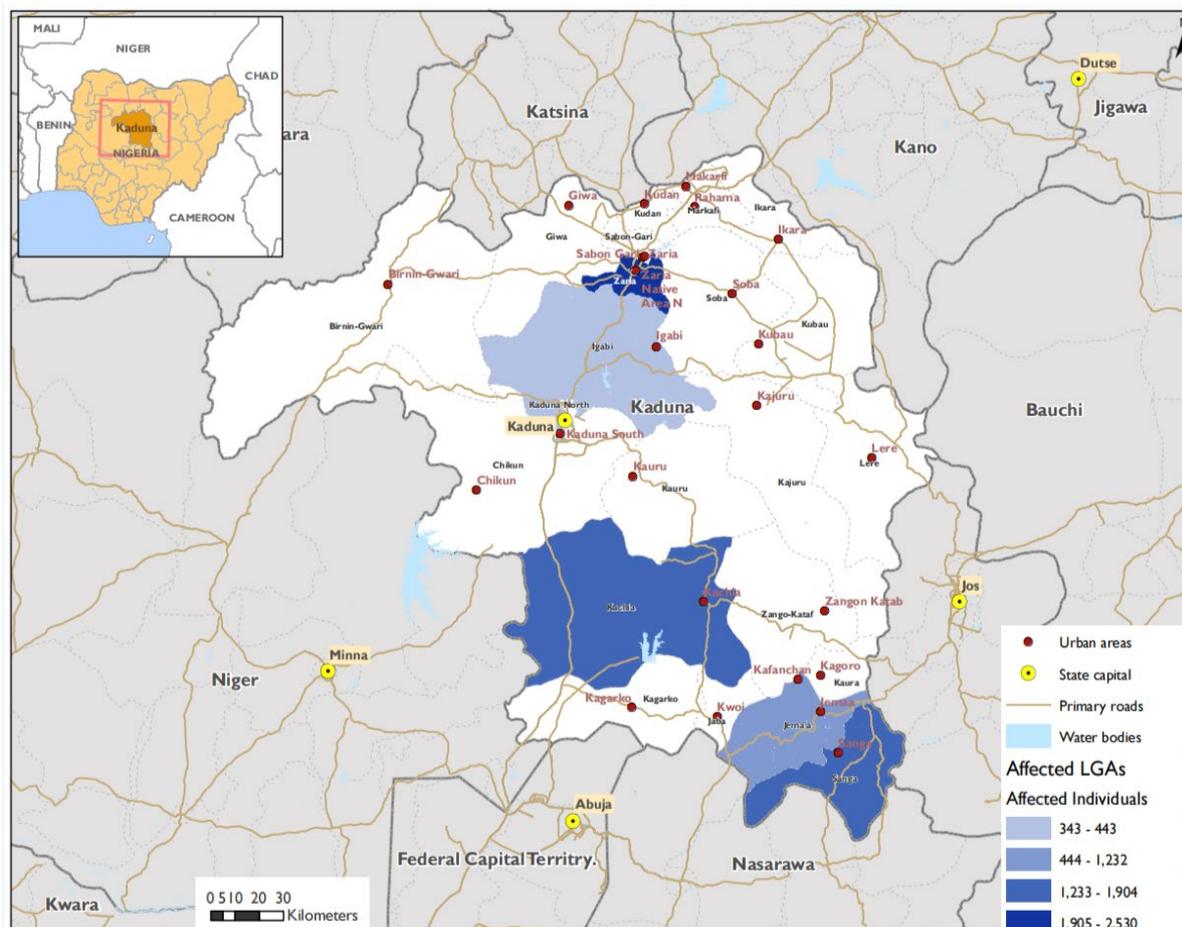

Figure 1: Map of Kaduna State showing areas affected by floods
Adapted from IOM (2024)

3.0 Results and Discussion

I   Demographic information of Respondents

The majority of the respondents were female (29), which was closely followed by male (21). From the Figure below, 40% of the residents have been staying in the study area for 4-7years, meaning they have a wide experience in the occurrence of flooding. 30% have been in the area for 1-3 years. 10% of the respondents have lived in the study area for less than 1 year, which entails they have minimal or no experience of flooding in the community.

Table 1: Number of years lived in the community

Number of years	Frequency	Percentage
Less than one year	5	10%
1-3 years	15	30%

Number of years	Frequency	Percentage
4-7 years	20	40%
More than 8 years	10	20%

Source: (Edoka, 2025)

II   Experience with flooding

98% revealed they've experienced flooding. These might be the respondents who have lived in the community for more than 1 year. While the rest claimed not to have experienced flooding.

From the chart below, most areas experience flooding 5 or more times (50%), followed by 3-4 times (38%), and 1-2 times. This tallies with the article by Alabi & Ali [53] on Daily trust revealed that "Flood has become a recurring decimal in Kaduna State during decimal in Kaduna State during rainy season, especially along long waterways. Houses, shops, and even schools along waterways, including Kigo extension, Romi, Down Quarters, and the shooting range in Kabala, among others, were hit most by the flood.
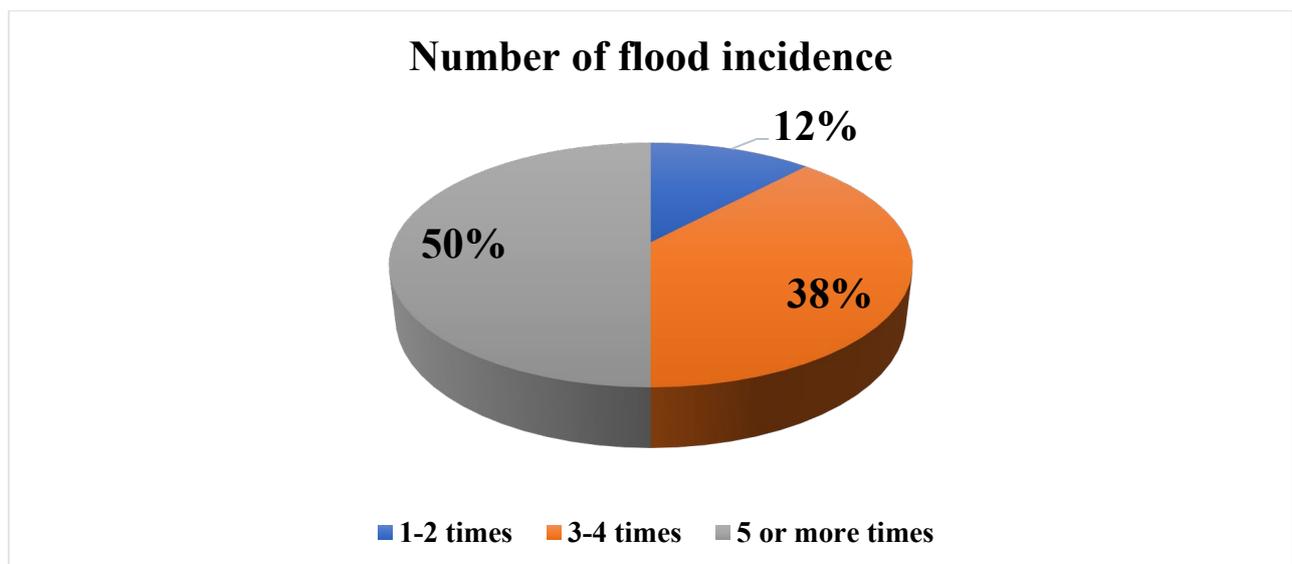

Figure 2: Total occurrence of flood incidents
Source: (Edoka, 2025)

Causes of flooding

Blocked drainages (38%) were the major causes of floods. Blocked drainage leads to overflow of water. Nwigwe and Embergo [54] examined the causes and impacts of flooding in Nigeria, highlighting factors such as illegal buildings on drainage paths, land reclamation and encroachment, weak urban planning, and insufficient drainage systems.

Poor waste disposal accounted for 26%. There are no proper or sustainable methods of dumping waste which in turn makes the land vulnerable to flooding. While some infrastructure improvements have been made, one of the officials admitted that existing drainage systems deteriorated due to improper waste management, and illegal waste dumps are insufficient to handle heavy rainfall, leading to recurrent flooding [55]. Heavy rainfall accounted for 20%. Heavy downpours due to climate change cause flooding. While unplanned settlements accounted for 16%. People stay on land that is not habitable or land that is sensitive. Despite warnings from the Government, they have refused to evacuate.
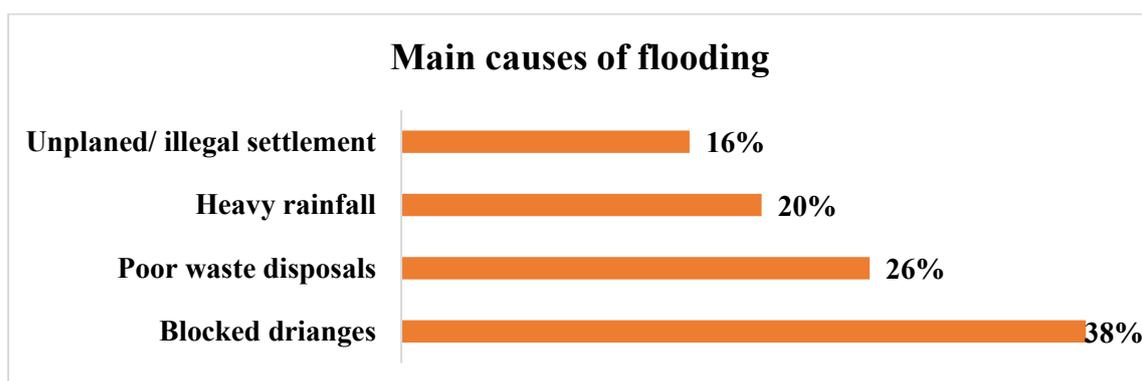
Figure 3: Main causes of flooding
Source: (Edoka, 2025)

Impact of flooding

Property damage (31.5%) has the most severe impact, which is followed by temporary relocation (25.2%), loss of income (17.3%), health-related problems (14.2%), and others (11.8%). Floods cause damage to land and thereby often prevent property owners from using their property in the way they intend [56].
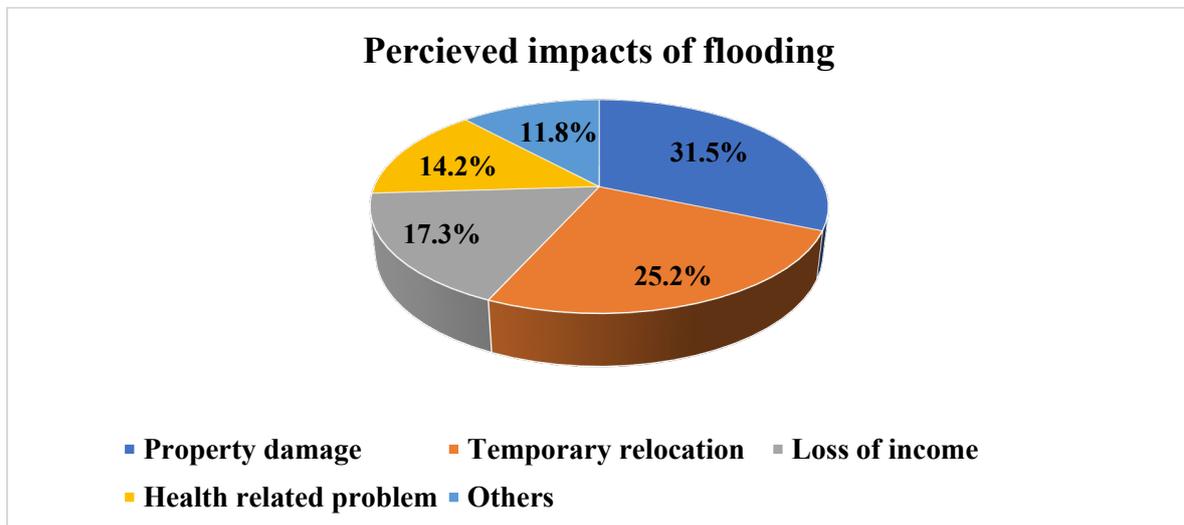

Figure 4: Residents' perceived impacts of flooding
Source: (Edoka, 2025)

III   Response and Assistance

The residents rated the response from the agencies as moderate, highly effective, and limited. Nema was rated moderate/limited by the majority of the respondents. This aligns with Dauda *et al.,* [41], which revealed a general dissatisfaction with NEMA's interventions, particularly concerning early warning systems and community engagement.

The federal government was rated moderate by the majority of the residents. Kaduna State Emergency Management was perceived to have limited performance. Nigerian Meteorological Agency (NIMET) efforts were rated highly effective. This is because NIMET provides seasonal weather forecasting and predicts places where floods are likely to happen. The Red Cross was rated very effective. This aligns with Gimba's statement on IFRC [57]:

"I am happy for what the Red Cross is doing here because I have never experienced it before," he says. It would have been very difficult for me to build another house, but the assistance given by the Red Cross has brought me great relief."

Table 2: Agencies and the level of effectiveness of their support

Agencies / NGOs	Effectiveness of Response
NEMA	Moderate / Limited
Red cross	Highly effective
Kaduna State Emergency Management	Limited
Nigerian Meteorological Agency (NIMET)	Highly effective
Federal / State Government	Moderate

Source: (Edoka, 2025)

Forms of support

31.5% receive relief materials in terms of support and rescue operations (25.2%), which was followed by temporary shelter (17.3%), no support (14.2%), and medical assistance (11.8%). A study revealed that these supports for flood victims are inadequate. The coping strategy of victims in Patigi, Kwara, includes living in camps in sub-standard houses and on grossly inadequate relief materials from the government and agencies [58].
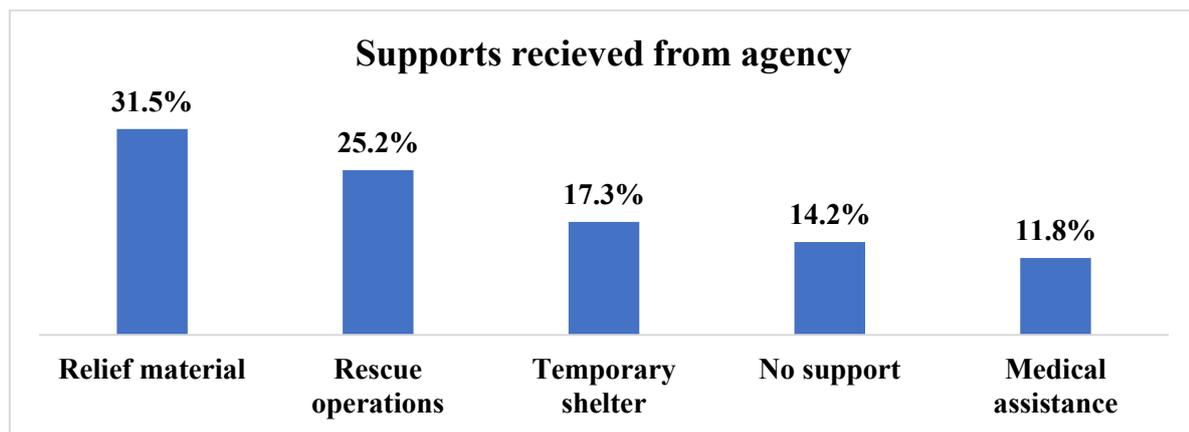
Supports recieved from agency

Figure 5: Different supports received from Agencies
Source: (Edoka, 2025)

IV   Community-based Enforcement Measures

Regular cleaning of drains (30.6%) and community sensitisation(25.5%) are the most mitigation strategies employed by communities and the Government. This aligns with the Ilwandri & Sijabat research [59], "The research results show that community empowerment in drainage management has had a positive impact in reducing the risk of flooding. Community groups involved in this program actively maintain the cleanliness and function of drainage in their environment. Apart from that, education about climate change and rain patterns also helps people to be better prepared to face extreme conditions. Other strategies include sandbagging during heavy rain (18.4%) and others, which include the planting of trees.

Flood prevention leadership.

The residents believed that all stakeholders (80%) should take the lead in flood prevention, meaning everyone has a role to play. Flood Risk Management is only effective if all stakeholders contribute their resources under a common goal of increasing capacity and reducing vulnerability. Each stakeholder has a part to play, but this cannot be done in isolation from the others [60].

Analysis from Existing Literature and Data
I   Recurring Events of flooding

Table 3: Occurrence of flooding in Kaduna State (2022)

Date of occurrence	LGA	Location of the disaster	Cause of the disaster	Number of People Affected	Properties affected
23rd August 2003	Kaduna North/South LGA, Chikun LGA, jaba, soba jemaá kudan, Zaria LGA	Malali, Barnawa, A/Rimi, Kujama road	Heavy downpour of rain caused the Kaduna River to overflow its banks.	5000	30,000 houses damaged
12th September 2012	Kaduna North	Rafin Guza	Heavy downpour is causing the Kaduna River to overflow its banks	40	40 houses
12th September 2012	Kaduna North	Haliru Dantoro close	Heavy downpour is causing the Kaduna River to overflow its banks	12	12 houses
12th September 2012	Kaduna South	Bashama road	Protracted downpour and overflow of river banks	22	22 houses
12th September 2012	Kaduna South	Barnawa Road, Kaduna Garden	Heavy downpour is causing the river to overflow	72 persons	72 farmlands
17th September 2012	Chikun LGA	Romi village, Television district, Chikun LGA	Heavy downpour	107	107 houses

Date of occurrence	LGA	Location of the disaster	Cause of the disaster	Number of People Affected	Properties affected
17th September 2012	Chikun LGA	Nassarawa	Heavy downpour	147	81 houses, 66 farms

Source: (Kaduna State Emergency Management Agency, 2012 & National Emergency Management Agency, 2012).

Table 4: Displaced and Affected Persons by Floods in Kaduna State (Selected LGAs)

LGA	Location	Displaced Persons	Affected Persons
Chikun	Angwan Danladi	482	586
	Angwan majero	438	577
	Goni gora	1842	3786
	Romi	1142	5166
	Total (Chikun)	**3904**	**10115**
Kaduna North	Kabala Costain	126	1284
	Kabala Doki	97	4433
	Kigo road	50	4202
	Ungwan Yama	–	1256
	Ungwan Yero Junction	139	71
	Total (Kaduna North)	**412**	**7236**
Kaduna South	Amingo	–	88
	Down Quarters	–	483
	Kontagora estate	–	104
	Ungwan Kafin Zagbzagi	170	167
	Total (Kaduna South)	**170**	**842**

Source: IOM Dataset (2024)

Evident from the table, Chikun Local Government keeps having recurring floods, which is due to heavy rainfall. In 2012, it affected 254 people (as seen in Table 3). Places like Romi, Television, and Nassarawa were Affected. It has been happening consecutively.

After 10 years (2022), as evident from the table, Chikun LGA was affected by flooding, where 3904 people were displaced and 10115 were affected. Romi was also affected in 2022.

II   Causes and Impact of flooding from existing literature

A study by UNICEF, IFRC, Nigerian Red Cross, and Climate Centre [61]. In Kaduna State, flooding is mainly linked to prolonged rainfall, waste disposal in water channels, inadequate drainage systems, terrain, and urban land characteristics. The areas most affected lie along the Kaduna River, including Kaduna, Chikun, Zaria, Igabi, Bunungwari, Kauru, and Sanga [61].

Between April 2021 – September 2021, the state recorded 26 deaths, 2,026 houses destroyed, and property worth as much as N1.5 billion (3.5 million USD) lost due to flooding. Some notable cascading impacts include damage to public infrastructure, such as roads being submerged, markets and schools flooded, disruption of socioeconomic activities, as well as loss of agricultural land. The affected population often ends up being displaced with no means of livelihood [61]. This aligns with the study findings, where property damage is the most severe impact of flooding.

III   Responses from External bodies

Early action intervention mitigated the impact of river flooding by providing households (HH) in highly flood-prone regions with Early Warning, Early Action messaging accompanied by multipurpose cash to support anticipation and their preparation to save lives, prevent loss of and preserve livelihoods and minimize negative coping strategies in advance of the peak of flood inundation in Kaduna State [61]. The pilot project had pre-selected three Local Government Areas (LGAs) in Kaduna State, namely Chikun, Kaduna North, and Kaduna South. Within these LGAs, the six communities of Romi, Narayi, Nasarawa, Kigo Road, Kabala West, and Bachama were targeted [61].

The following criteria have been used to select beneficiaries for the pilot: Vulnerability-based (to climate/floods)

- Poverty (assets, income, land, housing type)
- Child-sensitive (children under 0 - 5 years, children in household headed)
- Gender sensitive (pregnant and breastfeeding women, women-headed households)
- Disability (household with people with disability) [61].

The beneficiaries were selected with the help of Red Cross Volunteers, who went to the 6 communities and registered 5,000 households that met at least one or more of the criteria listed above [61].

Prioritized early actions were taken, such as

- Communication materials printed and distributed at the community level
- Kaduna Social Investment Office, State Emergency Management Agency (SEMA), State Cash Transfer Unit, and the State Operations Coordinating Unit (SOCU) informed and monitored the exercise
- Early warning for forecasted floods and cash distribution locations communicated via messages, community, religious leaders, and community resilience committee members
- UBA Staff, UNICEF, and NRCS staff and Volunteers positioned for cash distribution [61]

4.0 Conclusion and Recommendations

4.1 Conclusion

The research shows that floods in Kaduna are a really complicated issue, caused by more than just one thing. The main problems are blocked drainage, poor waste disposal, and the sheer amount of heavy rainfall. All of this leads to serious consequences for people, like having their property destroyed and being forced to leave their homes. Not all the agencies involved are doing an equal job. While the Nigerian Red Cross and NiMET are seen as quite effective, residents feel that NEMA and SEMA aren't doing enough. Local communities are trying to help themselves by cleaning drains and holding awareness campaigns, but their efforts can only go so far against such a big problem. Ultimately, Kaduna needs a much better, more unified plan for dealing with floods. Everyone— from government officials to the people living in these neighborhoods—has to work together. This means not only enforcing the rules about waste and building but also creating a stronger disaster plan that combines official strategies with the on-the-ground efforts of the community.

4.2 Recommendations

The following recommendations are made:

- KAPSUDA and the State Government should transform Kaduna State into a smart urban city. Smart city planning should be carried out, whereby advanced technology will be used to manage and plan Kaduna
- Compensation should be given to residents whose areas have been marked flood flood-sensitive. This will motivate them to relocate, and in turn, their lives and properties will be secured.
- Fines should be imposed on illegal settlers
- Most residents revealed they have not received any external flood-related training. NIMET, NEMA, and SEMA should organise outreach where the dangers and precautionary measures for flooding will be taught.

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