



Recurrent Flooding and Nigeria's Climate Frontline Communities

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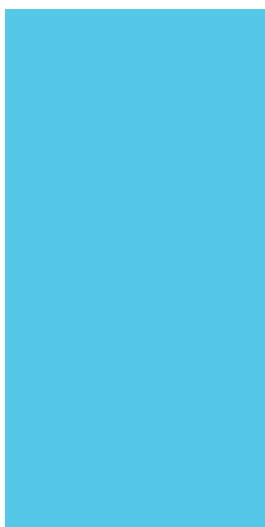
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<i>Dedication</i>	
<i>Acknowledgement</i>	
<i>Foreword</i>	
<i>Introduction</i>	
FLOOD AUDIT REPORT	7
• Flooding Events, Awareness and Preparation	8
• Assessing Losses Encountered by Respondents and The Kinds of Losses Incurred	9
• Ascertaining Flood Warning Awareness	10
• Assessing Flood Risk Perception	15
• Assessing Resilience	17
• Assessing Community Engagement	
• Recommendation	
ASSESSING THE COST OF THE 2022 FLOODING AND SOCIAL IMPLICATIONS OF INADEQUATE ACCESS TO CLIMATE INFORMATION SERVICES ON RURAL COMMUNITIES IN NIGERIA	23
• Abstract	23
• Introduction	24
• Background on Climate Change and Its Impacts	25
• Overview of the 2022 Flooding in Nigeria	25
• Importance of Assessing Economic Costs and Social	26

S
T
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Implications	
• The 2022 Flooding in Nigeria	26
• Extent and Severity of the Flooding	27
• Factors Contributing to the Flooding	30
• Economic Costs of the Flooding	32
• References	36
FLOODING CRISES AND RURAL WOMEN IN NIGERIA	38
• Introduction	38
• A Tale of Flooding Crisis and Causes in Nigeria	39
• Literature Review on the Socioeconomic Implications of Flooding in Nigeria	40
• Social and Economic Vulnerabilities of women in Rural Nigeria	40
• Recommendations	41
• Conclusion	42
• References	43

DEDICATION



“We dedicate this report, *Recurrent Flooding and Nigeria's Climate Frontline Communities*, to the memory of Abdulghaniyu Olanrewaju Fasasi, fondly known as Sound Sultan. As a Food and Climate Justice Ambassador for Oxfam and Good Governance Ambassador for HEDA Resource Centre, Sound Sultan was a champion for the environment and a tireless advocate for smallholder farmers.

With his talent and social capital, he campaigned for food security and a better deal for farmers, inspiring countless others to join the cause. Through his collaborations with HEDA and Oxfam, he mobilized fellow artists to host concerts and shows supporting smallholder farmers, and actively participated in youth and policy dialogues on climate change and food security.

Sound Sultan's passion and commitment to creating a more just and sustainable world will never be forgotten. This report, which sheds light on the struggles of climate frontline communities in Nigeria, is a testament to his legacy. May his memory continue to inspire us to fight for a world where everyone has access to sustainable livelihoods, nutritious food, and a safe environment.”

ACKNOWLEDGEMENT

We express our sincere gratitude to the numerous individuals and organizations that contributed to this publication, part of the Power of Voices Project - Africa Activists for Climate Justice.

We thank Oxfam in Nigeria and the Netherlands Ministry of Foreign Affairs for their generous support through a 5-year grant, now in its 4th year.

Arigbabu Sulaimon and the late Dr. Nabeel Adeyemi designed the concept and survey instrument, laying the foundation for this work. The team of Sulaimon Arigbabu, Dr. Nabeel Adeyemi (late), Abdulazeez Salawu, Barakah Danmole, Ismail Tijani, and Salako Nurudeen conducted the fieldwork with dedication. Abdulkareem Mojeed, a journalist, provided valuable support.

Our partners in various states facilitated access to frontline communities, and Dataphyte Foundation analyzed the fieldwork report. We appreciate the Director General of NIHSA for writing the foreword

to the Report.

Additional desktop clean-up work was done by Mayowa Shobo and Ismail Tijani. We thank the following persons for their scholarly inputs; Professor James Olumuyiwa Jayeoba and Professor (Mrs) Jamilat Yaqub.

This publication was edited by Arigbabu Sulaimon and Dr. Akintunde Akanni.

This publication is a testament to collective effort and collaboration. We acknowledge and appreciate the contributions of all individuals and organizations involved.

Foreword

Climate change is undoubtedly aggravating flooding in most parts of the world leading to increasing risk of damaging flood incidences. Floods are the result of hydro-meteorological processes and are thus natural events. Massive damage is caused where humans increase the risk of flooding through inappropriate land use in high flood risk areas or through serious interference with the natural anthropogenic processes.

Flood management has been a top priority of the Federal Government since the devastating 2012 flood disaster. The 2022 flood disaster in the country accounted for a total direct economic damage estimated to be in the range of US \$3.79 billion to US \$9.12 billion with the best average of US \$6.68 billion. This is about 5 trillion Naira and equivalent to 25% of the 2023 National Budget. Towards finding a lasting solution to flood disasters in Nigeria, His Excellency, President Bola Ahmed Tinubu, GCFR, took proactive measures at ensuring that devastation occasioned by floods on the citizens is brought to barest minimum through several laudable intervention programmes including the recent Report of the National Economic Council (NEC) Committee on Flood and Other Nature-Induced Disasters (Mitigation, Adaptation, Preparedness and Response). The Report elaborates the holistic interventions for mitigating flood, erosion, desertification and drought in Nigeria.

On her part, the Nigeria Hydrological Services Agency (NIHSA) has been on the forefront of flood prediction, preparedness and mitigation in the country through the publication of Annual Flood Outlook (AFO). The AFO, being produced since 2013, is a yearly publication that summarises the expected flood forecasts and scenarios in Nigeria. In making the document available to all and sundry, NIHSA partners with both the government and non-governmental

organizations (local and international) with primary interest in water sector and environmental protection, in dissemination of flood outlook information, sensitization and creating awareness on impacts of floods and engaging in anticipatory actions for flood reductions; one of such is the Human and Environmental Development Agenda (HEDA).

The Floods of Fury by HEDA x-rayed the impacts of 2022 flood disasters at specific locations in Nigeria and presented key findings and recommendations for flood risk management cycle: i.e. mitigation, adaptation, preparedness and response system that is based on sustainable flood management taking into account the required response for emergency livelihood support to persons at risk of flood disaster. The report is aimed to provide guide for long term and sustainable approach for managing flood risks to protect human life and property, while encouraging conservation and improvement of water related ecosystems to safeguard the nation from the destructive nature of flooding.

I congratulated HEDA and her production team for coming up with this report which provided not only useful insights into 2022 flood disasters but will also serve as a useful handbook for all the stakeholders in the water, environment and disaster risk reduction sector for planning early response and early action to mitigating flood disasters.

Arc. Umar Ibrahim Mohammed
Director General/CEO
Nigeria Hydrological Services Agency
Abuja, Nigeria, June, 2024.



Introduction

Incidents of flooding have become a commonplace phenomenon in the recent time. It gained an unprecedented, global notoriety with the recent deluge in Dubai which defied varieties of scientific explanation. Nigeria however has had experiences almost as frightening as what was recorded in Dubai with communities submerged yet with no commensurate relief from neither the national nor the international authorities. The farthest Nigeria has probably gone is attempting to forecast possibilities and warning likely victims leaving them, the invisible grassroots to their tragic fate that may recur interminably.

This report by the Human and Environmental Development Agenda, HEDA, is as diagnostic as it is prescriptive ensuring adequate coverage of the devastating effect of flooding on the rather susceptible grassroots and especially their women folks.

According to the nationwide Flood Audit of HEDA conducted... factors that may contribute to the heightened risk of flooding in Nigeria may be primarily due to the country's geographical location, characterized by a network of rivers and tributaries,

including the Niger and Benue rivers, which are prone to seasonal overflow. “Additionally, rapid urbanization and inadequate urban planning have led to the blocking of drainage systems, exacerbating the problem. Deforestation, improper waste disposal, and climate change further intensify the susceptibility of Nigeria to floods”. This therefore calls for awareness about flooding in Nigeria as a crucial step toward minimizing its impact and building resilience within communities. Education on the causes, risks, and preventive measures can empower individuals to take proactive steps to protect themselves and their communities. A most outstanding feature of this report lies in its being reflective of wide consultations enabling explicit visual representations.

The second part, no less expository, provides background information on climate change and its impacts, emphasizing the importance of climate information services in rural areas. Next, it presents an overview of the 2022 flooding in Nigeria, including its causes, impacts, and geographical distribution. It then discusses the significance of assessing the economic costs and social implications of flooding, highlighting

the need for proactive measures to enhance resilience in rural communities. The paper subsequently explores the economic costs of the flooding, followed by an examination of the social implications resulting from inadequate access to climate information services. Finally, the paper concludes with policy recommendations and calls for action to strengthen resilience in rural communities. It emphasizes the importance of integrating climate information services into rural development policies and empowering local communities to adapt to the impacts of climate change

More specifically, the third part of this report notes that the flood crisis exhibits a chain reaction effect on food security because it erodes the vast Nigerian arable lands and disrupts seasonal plantation planning, thus leading to shortages in food production and supply. On women in particular, the report goes on to establish that the 2022 flooding statistics revealed that female deaths occurred three times more than male deaths during the crisis. Also, 120% of injured casualties were recorded in females than males. This implied that flood occurrences limit women's economic opportunities.

But it is not all woes as the report also details recommendations that could be applied to address the assorted challenges across the urban and grassroots levels.

It is only hope that the authorities will be willing to advance necessary support when needed.

Editors.

FLOOD AUDIT REPORT



Fig 1: Map of Surveyed States Vs States not surveyed

Nigeria, a country endowed with diverse landscapes and rich natural resources, faces a recurrent and escalating challenge—flooding. As the most populous country in Africa, with a rapidly growing population, Nigeria is particularly vulnerable to the impacts of flooding, which can result in devastating consequences for communities, infrastructure, and the economy.

Causes of Flooding in Nigeria

Several factors contribute to the heightened risk of flooding in Nigeria. One primary cause is the country’s geographical location, characterized by a network of rivers and tributaries, including the Niger and Benue rivers, which are prone to seasonal overflow. Additionally, rapid urbanization and inadequate urban planning have led to the blocking of drainage systems, exacerbating the problem. Deforestation, improper waste disposal, and climate change further intensify the susceptibility of Nigeria to floods.

Social and Economic Impacts

The consequences of flooding are far-reaching, affecting both urban and rural areas. Lives are lost, homes are destroyed, and essential infrastructure, such as roads and bridges, is damaged. The economic toll is substantial, with disruptions to agriculture, trade, and transportation. Small businesses suffer, and communities are often left struggling to recover,

perpetuating a cycle of poverty.

The Need for Flood Awareness

Raising awareness about flooding in Nigeria is a crucial step toward minimizing its impact and building resilience within communities. Education on the causes, risks, and preventive measures can empower individuals to take proactive steps to protect themselves and their communities.

As part of efforts to improve the delivery of climate information services to communities by NiMET, the PVP_AACI project from HEDA Resource center team carried out a survey across select states largely affected by climate change in the federation.

548 respondents from 32 communities across 17 states of the federation were surveyed for their perspectives on flooding preparation, awareness and relief Fig 1. Majority of the respondents have lived in these communities for over 35years and they shared their perspectives and perceptions on flooding preparedness, awareness and events. Though a few other communities considered some other climate conditions more extreme. The gender distribution of the respondents provides in-depth knowledge into the disparity in access to information especially in underserved regions. With 58% of male respondents and 42% female respondents, this reflects the survey participants’ demographic composition in the context of climate change awareness. Fig 2

Inclusive messaging is key to breaking down barriers and encouraging diverse gender groups to actively engage in climate conversations. Recognizing that gender roles and preferences may influence engagement, there is a need for varied approaches to inclusion. Tailoring communication strategies to resonate with both males and females can contribute to a more inclusive and effective awareness campaign. This could involve using diverse communication channels, considering different learning styles, and addressing specific concerns or interests of both genders.

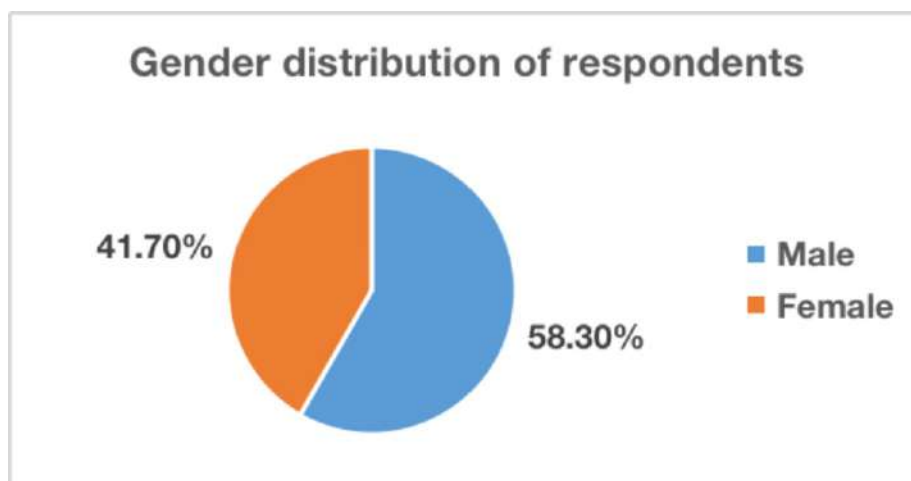


Fig 2: Gender distribution of respondents

FLOODING EVENTS, AWARENESS AND PREPARATION

The respondents were surveyed on their awareness about the risks and potential impacts of flooding in their community. The data reveals gender disparities in flood risk awareness, with males generally exhibiting higher levels of both high and low awareness compared to females. Fig 3 Males show a higher percentage (23.16%) of being highly aware of the risks and potential impacts of flooding compared to females (16.73%). **The percentages of individuals stating they are “Not aware” are relatively low for both genders, with females at 2.94% and males at 2.39%. This suggests that a small portion of the surveyed population, regardless of gender, lacks awareness of flood risks.**

However, there is still room for improvement, as more males also have shown a higher percentage (18.75%) of having little awareness compared to females (12.68%). This highlights the need for targeted awareness campaigns to bridge this knowledge gap. There is a comparable level of uncertainty amongst both genders. This uncertainty may stem from a lack of access to reliable information or inadequate communication about flood-related risks. Addressing this uncertainty is crucial, and efforts should be made to provide accessible and accurate information to those who are unsure.

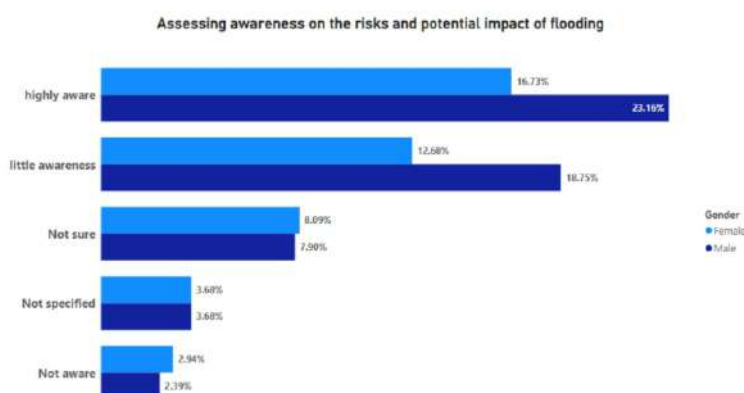


Fig 3: Assessing awareness on the risks and potential impact of flooding

More insights were needed on the flooding events in the respondents' communities in 2022. A significant proportion of males (48.90%) and females (34.74%) report that their communities have witnessed or experienced flooding in 2022. This indicates a noteworthy occurrence of flood events during the specified period. The data shows that a higher percentage of males (48.90%) have reported experiencing flooding compared to females (34.74%). This suggests a potential gender disparity in the impact or perception of flooding events, with more males reporting such incidents. Fig 4

The percentages of "Not sure" responses are low for both males (0.74%) and females (0.92%).

The high incidence of flooding in 2022 highlights the urgency of community preparedness and resilience-building measures. Local authorities and community leaders need to prioritize initiatives aimed at mitigating the impact of flooding and improving disaster response capabilities.

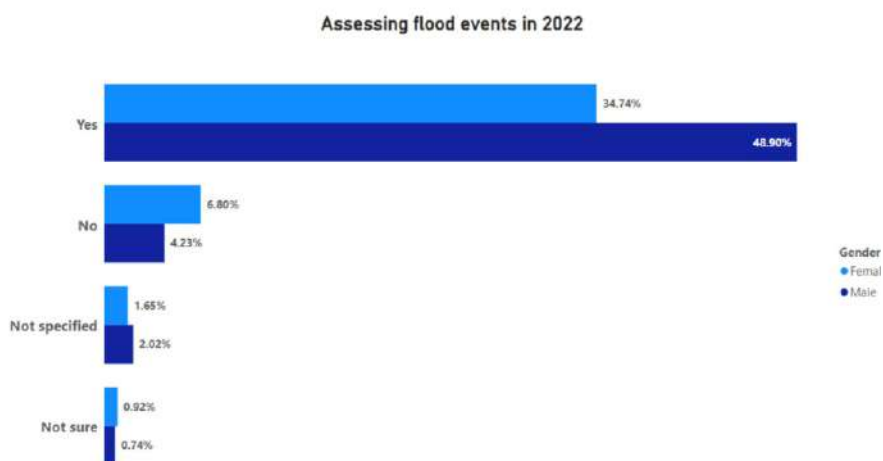


Fig 4: Assessing flooding events in communities in 2022

ASSESSING LOSSES ENCOUNTERED BY RESPONDENTS AND THE KINDS OF LOSSES INCURRED

A significant majority, comprising 42% of respondents, stated that they did not incur losses due to flooding. Fig 5 This suggests a degree of resilience within the community or effective mitigation measures that prevented widespread personal losses. **However, 30%, reported incurring losses due to flooding events and when further questioned on the kind of losses incurred, of the 30% that experienced losses, 17% lost relatives, 14% lost properties, 9% lost their jobs, 40% lost farms, and 20% lost animals.** Fig 6

The varied nature of losses underscores the complexity of recovery efforts. A comprehensive approach to community recovery would address the diverse needs arising from agricultural, economic, social, and infrastructure-related losses. Using a multi-sectorial intervention approach, tailoring interventions to address specific types of losses is crucial. This may involve agricultural support programs, livestock recovery initiatives, mental health services for those who lost relatives, and infrastructure development projects to mitigate property damage.

Addressing the types of losses incurred should go hand in hand with long-term resilience-building measures. This includes community education, early warning systems, and sustainable land-use planning to minimize the impact of future flooding events.

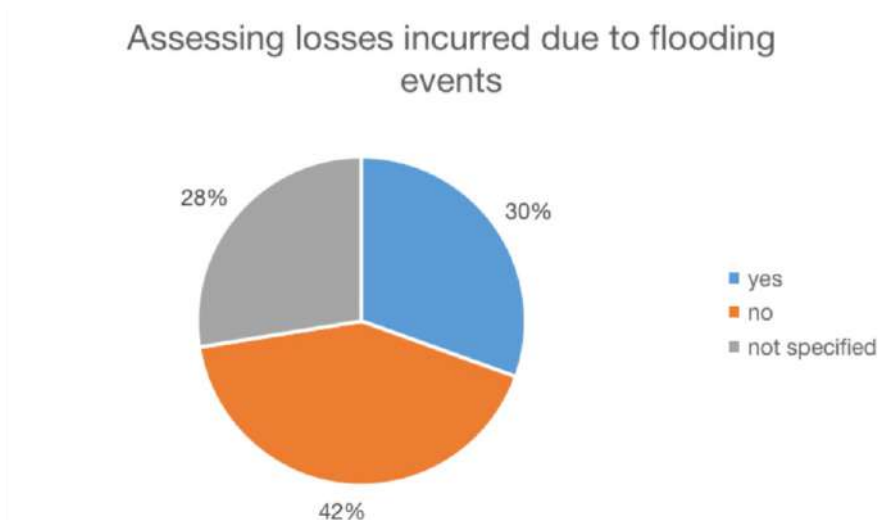


Fig 4: Assessing flooding events in communities in 2022

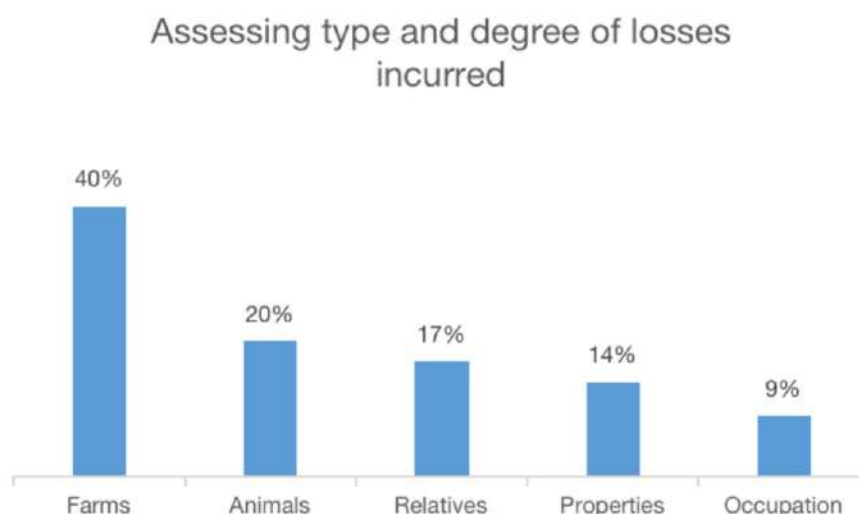


Fig 4: Assessing flooding events in communities in 2022

ASCERTAINING FLOOD WARNING AWARENESS

When asked if they received warnings about an impending flood, a higher percentage of males (33.91%) report receiving a warning about flooding before the event compared to females (18.77%). Fig 7 While a notable percentage of females (18.77%) received warnings, the data shows that a higher proportion of females (20.69%) did not receive warnings compared to males (17.82%).

- Investigating the reasons behind the observed gender-based disparities in warning awareness may help improve the effectiveness of communication strategies for flood warnings.
- Enhancing outreach and communication efforts, especially to those who did not receive warnings, could contribute to a more resilient and informed community.

A proportion of respondents, comprising 13%, did not specify whether they received flood warnings. This lack of specificity may be attributed to various factors, including the recall of events, the perceived importance of the information, or emotional distress related to the flooding event.

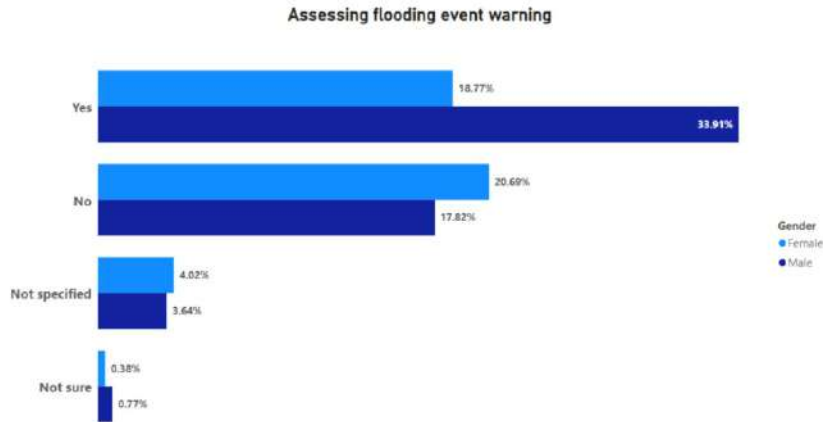


Fig 7: Assessing access to flood warning

A considerable percentage of both males (19.54%) and females (21.84%) did not specify the source of the flood warning they received. Understanding the reasons behind this lack of specificity is crucial for improving information dissemination and community awareness, this could mean there are other sources through which information was shared such as word of mouth, association meetings etc which weren't captured in the survey. Fig 8

Media, including both traditional and digital sources, played a notable role in providing flood warnings, with 13.79% of males and 6.90% of females citing it as their source. This highlights the importance of media channels in disseminating timely information.

Local government and community leaders were identified as sources of flood warnings, with 7.47% of males and 5.75% of females mentioning the local government, and 5.56% of males and 4.41% of females mentioning community leaders. This underscores the role of local authorities and community figures in warning dissemination.

Some respondents reported receiving flood warnings from NGOs, with 4.60% of males and 2.87% of females citing NGOs as their source. This indicates the involvement of non-governmental entities in community awareness and preparedness initiatives.

A smaller percentage of males (2.11%) mentioned social media as a source of flood warnings, while 1.34% of females reported the same. State government and place of worship were mentioned by a few respondents, indicating a diverse range of sources.

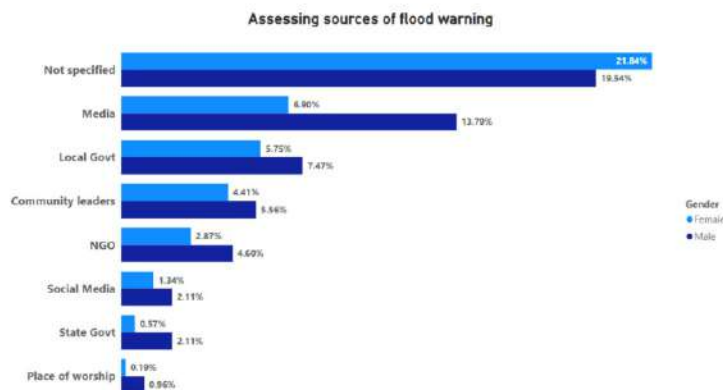


Fig 8: Assessing sources of flood warning

Assessing awareness of flood response/evacuation plans, the data reveals that awareness of flooding response or evacuation plans is notably lower in the older age group (above 55) compared to the younger age groups (18 to 35 and 36 to 55). This suggests a potential need to improve communication and awareness strategies for older demographics. Fig 9

A significant percentage of respondents across age groups report not being aware of any flooding response or evacuation plan, with 28.27% in the 36 to 55 age group, 26.73% in the 18 to 35 age group, and 16.35% in the above 55 age group indicating lack of awareness. Notably, there are instances of respondents not specifying whether they are aware of flooding response or evacuation plans, with 5.19% in the 36 to 55 age group, 3.85% in the 18 to 35 age group, and 2.31% in the above 55 age group.

The same can also be seen about awareness of evacuation routes. The data reveals that awareness of evacuation routes is notably lower in the above 55 age group compared to the younger age group. Fig 10

In the below 18 age group, 1.73% report not being aware of evacuation routes, while 0.19% indicate awareness. The limited responses in this age group suggest a need for targeted educational efforts to enhance awareness. The 36 to 55 age group shows mixed awareness, with 3.85% aware of evacuation routes and 3.46% not specified. In the 18 to 35 age group, 3.46% are aware, while 0.38% did not specify.

This can also be seen by the responses received when asked about awareness of evacuation shelters Fig 11.

Collaboration between local government authorities, emergency services, and community organizations is vital for developing, communicating, and maintaining effective evacuation routes. Regular updates and feedback mechanisms can contribute to ongoing improvements. Leveraging technology, such as mobile applications or online platforms, as well as SMS, can enhance the accessibility of information about evacuation routes. Providing real-time updates and interactive maps can be particularly useful in emergency situations.

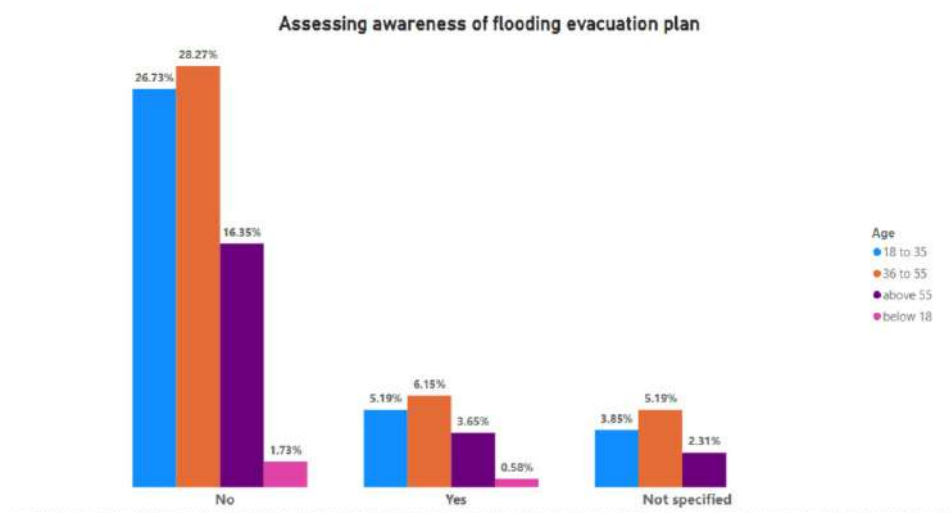


Fig 9: Assessing awareness on flooding evacuation plan

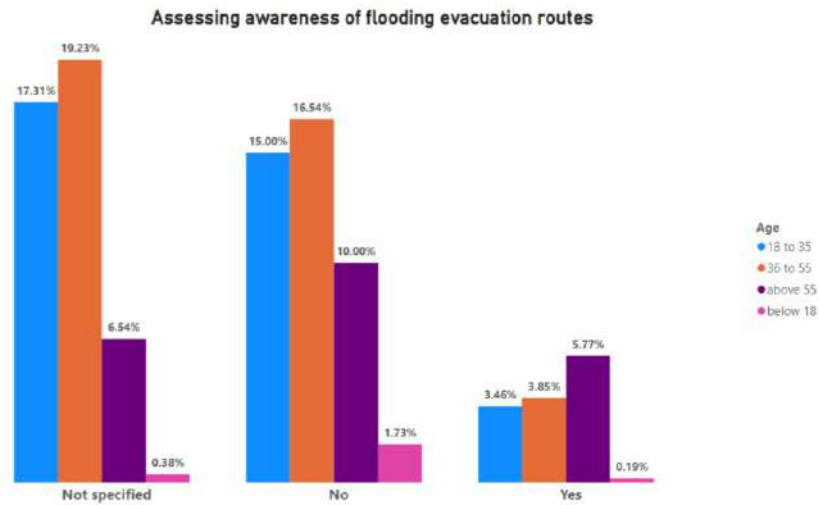


Fig 10: Assessing awareness on flooding evacuation routes

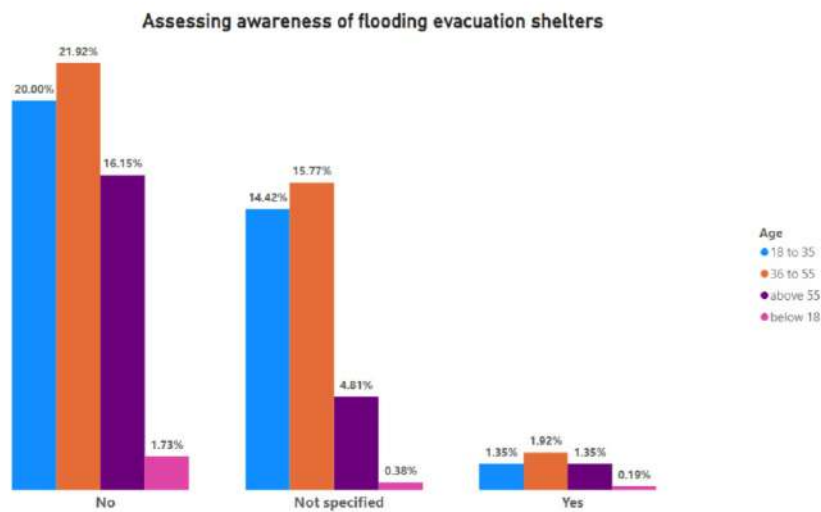


Fig 11: Assessing awareness of evacuation shelters

The low percentage of respondents, 7.88% of males and 5.58% of females reporting that they received such instructions underscores the importance of clear and timely communication during emergency events, while a significant majority, both males (46.35%) and females (36.73%), reported not receiving any evacuation instructions or information before or during the event. This suggests a potential gap in the dissemination of crucial information during flooding events. Fig 12

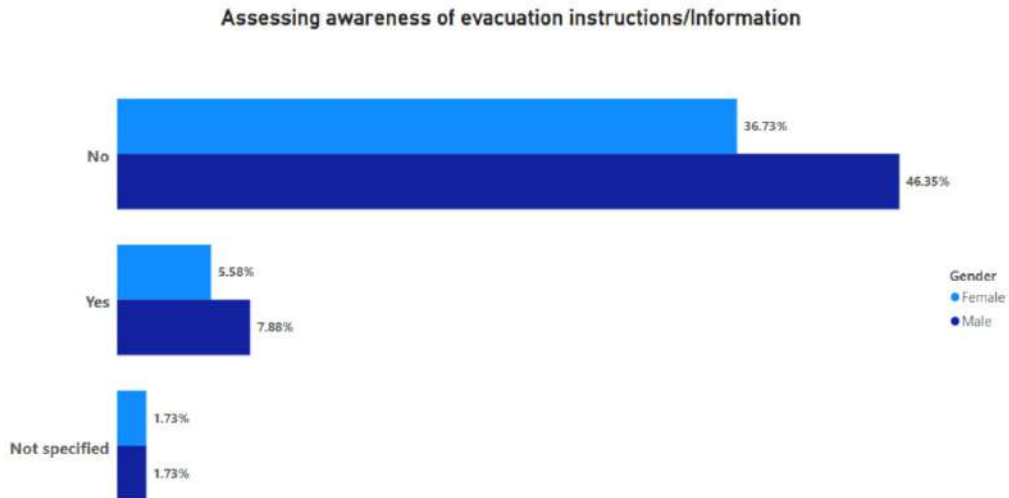


Fig 12: Assessing awareness of evacuation instructions/information

The data suggests limited participation in flooding preparedness or evacuation drills, with only 3.08% of individuals in the 36 to 55 age group and 2.50% in the 18 to 35 age group indicating that they have participated. Fig 13

A significant percentage of respondents across age groups reported not participating in any flooding preparedness or evacuation drills, with 32.69% in the 36 to 55 age group, 30.38% in the 18 to 35 age group, and 19.81% in the above 55 age group indicating no participation. There is a need for increased efforts to encourage community participation in flooding preparedness or evacuation drills, particularly among individuals in the 36 to 55 and 18 to 35 age groups. Tailored awareness campaigns may be necessary to address the overall low participation rates, considering that a significant percentage of respondents have not specified their participation status.

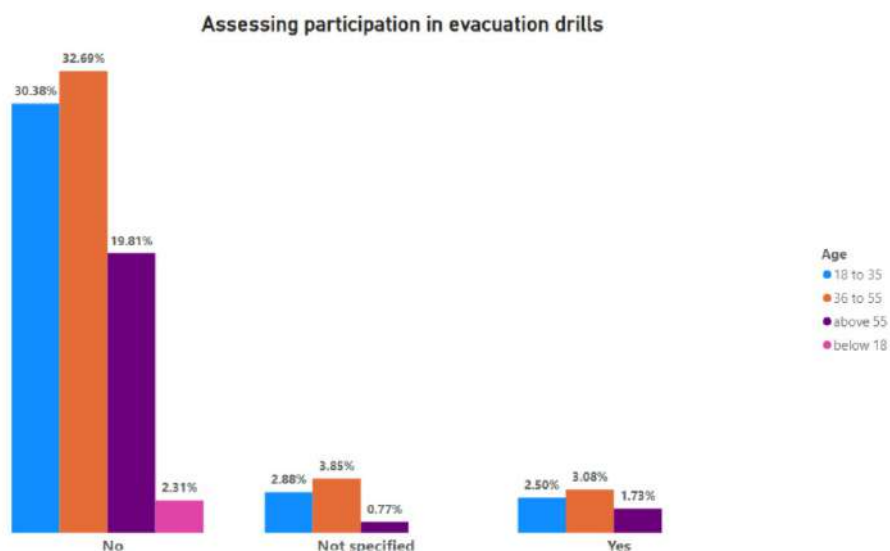


Fig 13: Assessing participation in evacuation drills

ASSESSING FLOOD RISK PERCEPTION

Assessing flood risk perception is a critical component of understanding how communities perceive and respond to the potential threats of flooding. Perception plays a key role in determining individual and community behaviors related to preparedness, response, and recovery.

Fig 14 provides valuable insights into the perceived causes of flooding in the community, highlighting the importance of addressing poor drainage systems, proximity to water bodies, climate change, and other factors in comprehensive flood mitigation strategies.

The data indicates that poor drainage systems are perceived as the primary cause of flooding in the community, with 23.65% of females and 21.73% of males identifying this factor. This suggests a widespread concern about the inadequacy of drainage infrastructure. Nearness to bodies of water, such as rivers and lakes, is identified as a significant cause of flooding, with 14.04% of males and 6.15% of females attributing flooding to this factor. Proximity to water bodies can increase the vulnerability of communities to flooding.

Climate change and extreme weather events are acknowledged as contributors to flooding, with 12.69% of males and 9.62% of females highlighting this factor. This indicates an awareness of the broader environmental context influencing flooding incidents.

Buildings blocking waterways are recognized as a contributing factor, with 3.27% of males and 2.50% of females mentioning this issue. This suggests an understanding of how urban development can impact drainage patterns. A small percentage of respondents did not specify the causes of flooding, with 2.88% of males and 1.73% of females not providing detailed information. However, some respondents mentioned other causes, with 1.35% of males and 0.38% of females specifying factors not covered in the provided options. Exploring these specific causes further could provide valuable insights.

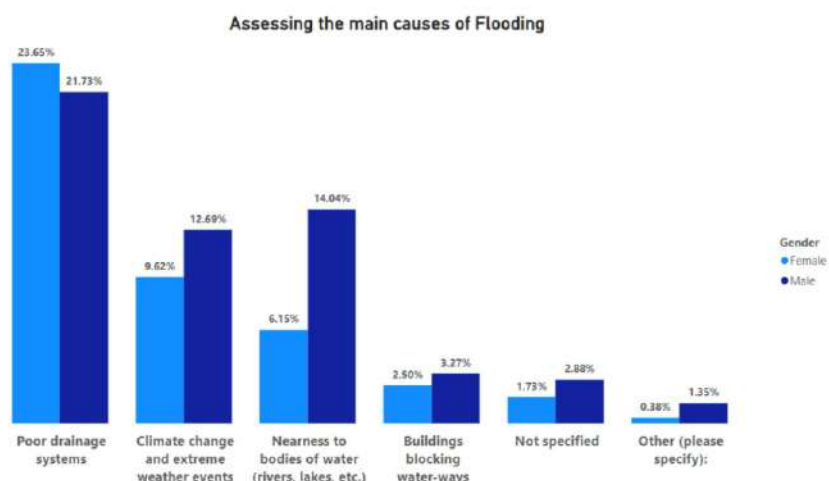


Fig 14: Assessing respondents' perception on the main causes of flooding

Assessing community members awareness on flooding support revealed, a notable percentage of respondents, both male (20.19%) and female (13.27%), reported that they observed no intervention from any source before, during, or after the flooding events. This suggests a perceived lack of support or assistance. Fig 15

A relatively low percentage (8.04% of males and 3.74% of females) identified the federal government as a source of support during the flooding events. This indicates that, while some respondents acknowledged federal assistance, it is not the most prominent source. The state government and local government were also mentioned as sources of support by 5.79% and 4.86% of males, respectively. Females also acknowledged state government (4.30%) and local government (3.74%) support, albeit at lower percentages. This suggests a role for both levels of government in helping.

Non-Governmental Organizations (NGOs) were identified as sources of support by 3.74% of males and 3.55% of females. Community-led initiatives were mentioned by 2.99% of males and 0.93% of females. These findings highlight the potential impact of grassroots and community-driven efforts. Religious institutions were recognized by 2.06% of females and 1.50% of males as sources of support. While this percentage is relatively low, it suggests a role for faith-based organizations in aiding during flooding events.

Some respondents did not specify the source of support, with 4.86% of females and 3.93% of males providing responses without detailed information.

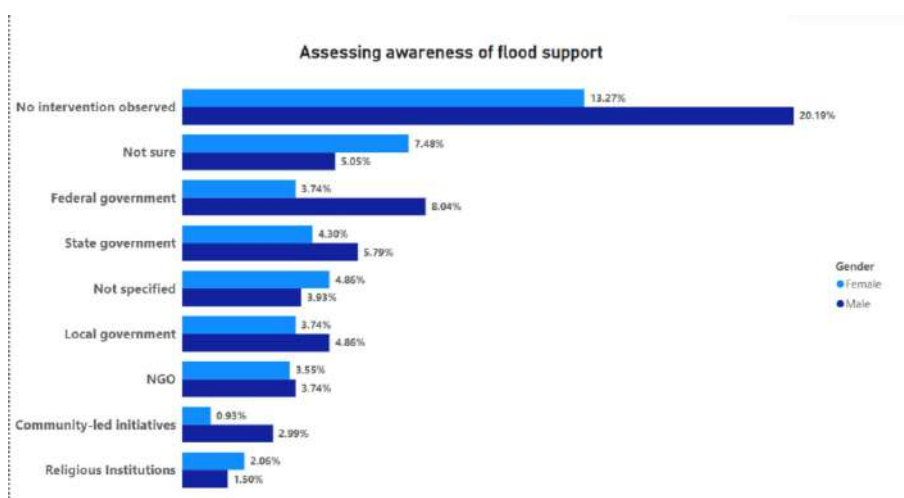


Fig 15: Assessing awareness of flood support

Following respondents' awareness of flooding support, the team enquired about the kinds of support required by the community members. A notable percentage, 22%, did not specify the most important support required by the community. This lack of specificity may indicate varied priorities within the community or challenges in articulating specific needs. Fig 16

Approximately 6% of respondents emphasised the importance of proper drainage. This aligns with the earlier data indicating poor drainage systems as a perceived cause of flooding. Improving drainage infrastructure is crucial for flood mitigation.

Approximately 4% of respondents identified financial support as the most important requirement for the community. Financial assistance can be crucial for recovery, rebuilding, and implementing long-term resilience measures, while a small percentage, 3%, highlighted the need for resettlement. This suggests that some community members may perceive relocation to safer areas as a critical intervention to address the risk of flooding. 3% also expressed the need for support in climate predictions. This reflects a desire for advanced information to aid in preparedness and planning for potential flooding events.

3%, mentioned the community's initiative of environmental sanitation every last Saturday of the month. This community-led effort reflects a commitment to maintaining a clean environment, which can contribute to flood prevention.

A minority, 2%, identified river dredging as a critical requirement. Dredging rivers can enhance water flow and reduce the risk of flooding, aligning with the perceived causes related to bodies of water. 2% of respondents also emphasized the need for periodic trainings and awareness on climate change. This reflects a recognition of the broader environmental context and the importance of community education and suggests a desire for increased information dissemination about flood risks, preparedness measures, and available support services.

Another 2% highlighted the creation of irrigation systems as a priority. This may indicate a recognition of the potential benefits of irrigation in managing water flow and mitigating flood risk.

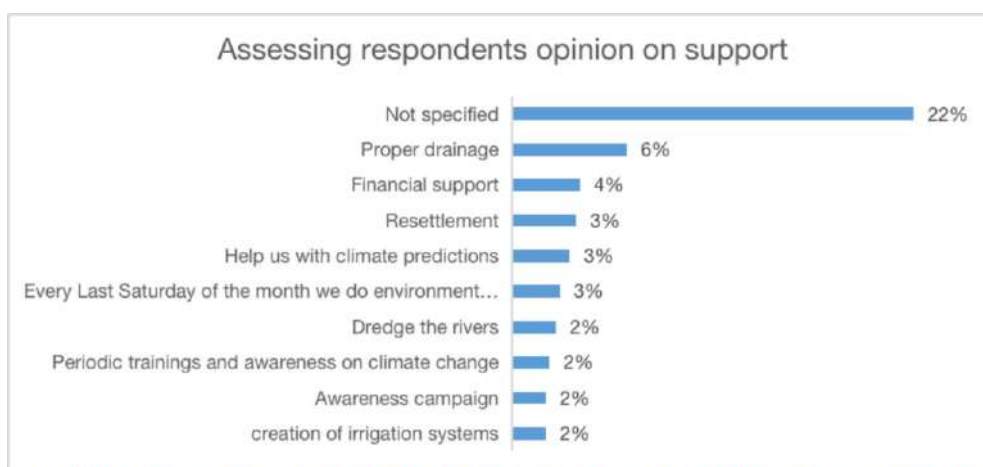


Fig 16: Assessing respondents' opinion on support

ASSESSING RESILIENCE

Assessing resilience in flooding involves evaluating a community's capacity to anticipate, prepare for, respond to, recover from, and adapt to the impacts of flooding. There is a relatively low percentage, 24%, of respondents who have taken measures to make their farms, communities, and homes more flood-resistant. This suggests that most of the community may not have implemented specific resilience measures. 15% did not specify whether they had taken measures to enhance flood resistance. This lack of specificity may be attributed to challenges in recalling specific actions taken or needing more apparent survey questions related to resilience measures. However, the majority of respondents, 61%, reported that they had not taken measures to make their farms, communities, and homes more flood-resistant. Fig 17 This indicates a potential gap in community-wide adoption of flood resilience strategies.

Exploring the reasons behind the decision not to implement flood-resistant measures can provide valuable insights. Common barriers may include financial constraints, lack of information, or a perception that flooding is unlikely. Government and non-governmental organisations can be crucial in supporting communities in implementing flood-resistant measures. This may include providing financial assistance, technical guidance, and educational resources. Emphasizing sustainable land-use practices, such as preserving natural buffers, adopting climate-smart agriculture, and implementing eco-friendly construction methods, can also contribute to

overall flood resilience.

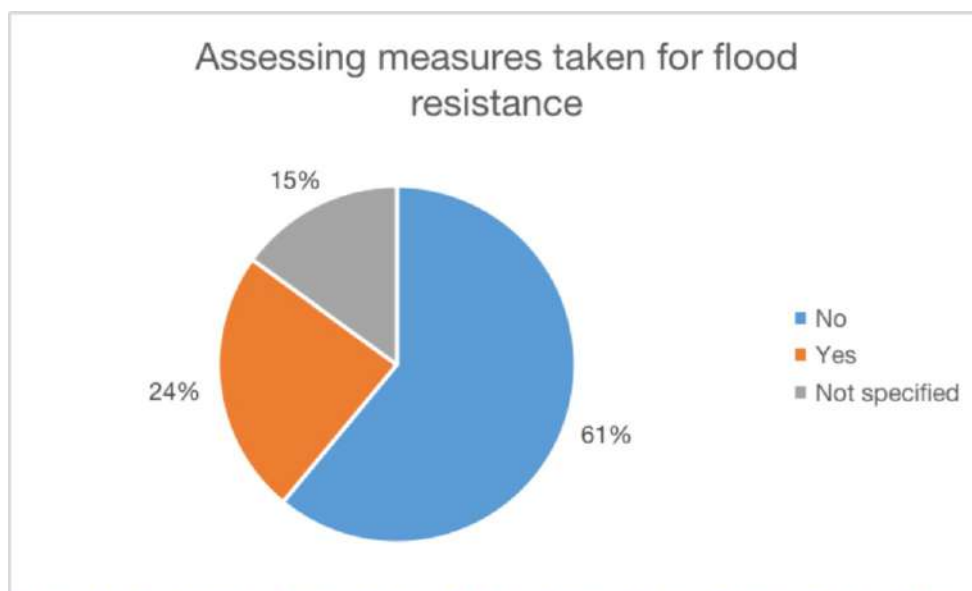


Fig 17: Assessing measures taken for flood resistance

Respondents were questioned about the availability of interventions in their community before and after the flooding event. Data generated indicates a low overall perception of interventions during and after the flooding in 2022, with only 5% of respondents acknowledging that there was an intervention. This suggests a potential gap in community awareness or a limited scale of intervention efforts. 15% reported the distribution of relief materials as part of the intervention. Relief materials commonly include items such as food, water, clothing, and shelter provisions to support affected individuals. 5% specified the distribution of food items as part of the intervention. Providing food items is a common response to address immediate needs during and after flooding events. While 6% mentioned that the community took proactive measures by providing drainage and local bridges to cushion the climate change effect. This community-led initiative reflects a self-help approach to resilience building.

A significant percentage, 34%, did not specify the nature of interventions in their community during and after the flooding. This lack of specificity may be attributed to challenges in recalling details or a need for clearer survey questions related to intervention measures.

The largest portion of respondents, 35%, reported that there was no intervention in their community during and after the flooding. This indicates a substantial segment of the community perceiving a lack of external support or assistance. Fig 18

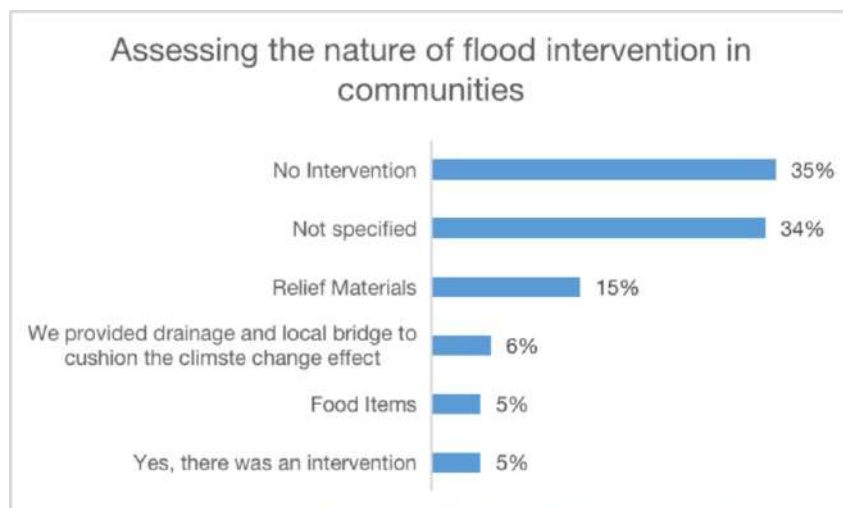


Fig 18: Assessing the nature of flood interventions in communities

Due to the devastating nature of the 2022 flooding, respondents were asked if there were available measures for livelihood recovery, data generated indicates that a majority of respondents, both male (30.88%) and female (26.10%), indicated that there were no efforts towards livelihood recovery after the 2022 flooding event. This suggests a potential gap or perceived inadequacy in post-flood recovery initiatives. Understanding why a majority perceived no efforts towards livelihood recovery is essential for addressing potential gaps in recovery initiatives. Feedback from the community can guide policymakers in refining and improving post-flood recovery strategies.

13.60% of females and 12.87% of males provided responses without specific details regarding livelihood recovery efforts. This lack of specificity may be attributed to challenges in recalling details or a need for clearer survey questions related to recovery measures. However, a minority, 1.40% of males and 4.04% of females reported efforts towards livelihood recovery. This indicates that a segment of the community perceived active measures aimed at restoring economic activities. Fig 19

The importance of community awareness and communication regarding post-flood recovery efforts cannot be overemphasized. Policymakers should assess the roles of government agencies and non-governmental organizations in post-flood recovery. Evaluating the effectiveness of existing recovery programs and exploring ways to enhance support mechanisms is crucial.

Ensuring that affected individuals are informed about available support for livelihood recovery is crucial for a comprehensive recovery strategy. Involving the community in the planning and implementation of livelihood recovery initiatives can enhance their effectiveness. Community input ensures that recovery efforts align with local needs and aspirations.

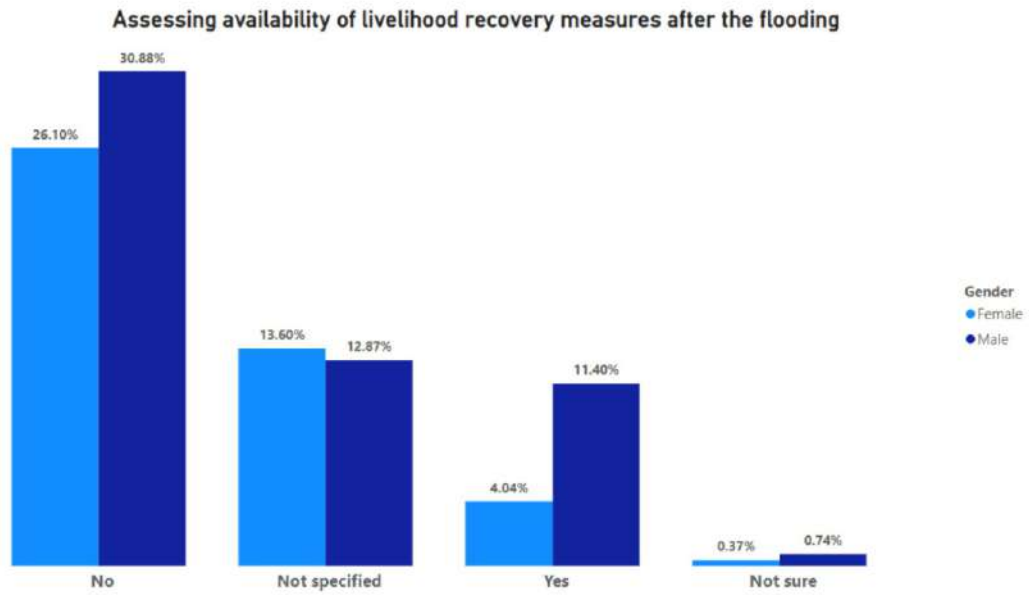


Fig 19: Assessing availability of livelihood recovery measures after the flooding

With the high prevalence of a negative response on the availability of livelihood recovery measures, respondents were asked about the knowledge of other promises, and a substantial portion of respondents, 19.47% female and 24.54% male, reported that there were no promises made to their community, while 11.36% female and 17.65% male, acknowledged that promises were made to their community. Albeit, 12.78% female and 14.20% male, did not specify whether there were promises made to the community. This lack of specificity may be attributed to challenges in recalling details or a need for clearer survey questions related to promises or commitments. Fig 20

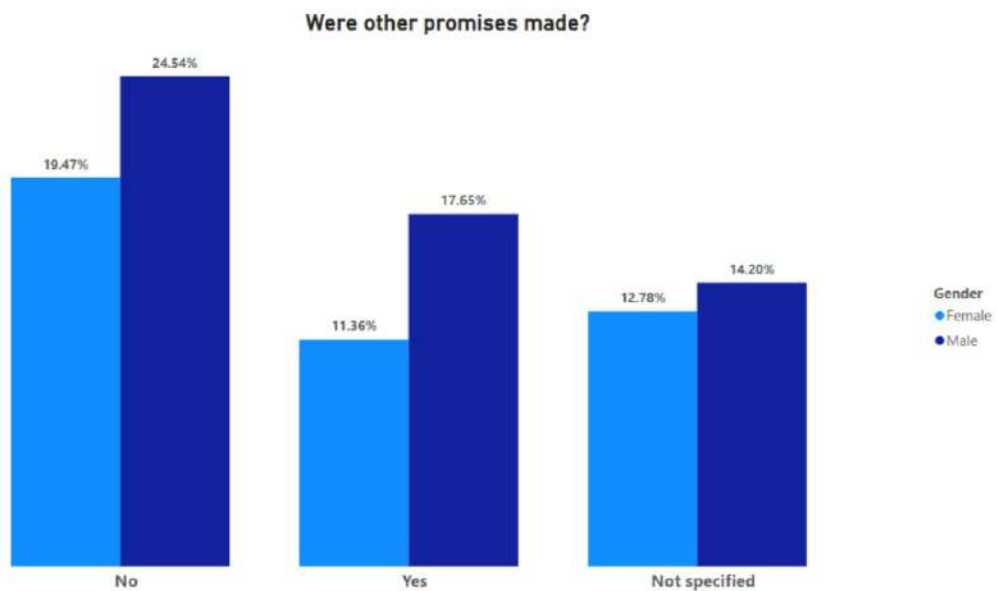


Fig 20: Assessing knowledge of other promises made

ASSESSING COMMUNITY ENGAGEMENT

Community engagement plays a pivotal role in enhancing resilience and mitigating the impact of natural disasters, particularly in the context of flooding. Floods, being recurrent and often devastating events, necessitate a collaborative approach that involves active participation from community members, local authorities, and various stakeholders.

43.41% male and 35.29% female respondents reported that there are no community-based initiatives or organizations involved in community preparedness in their area. 5.68% female and 5.07% male, did not specify whether there are community-based initiatives or organizations involved in community preparedness, while 2.64% female and 7.91% male, acknowledged the presence of community-based initiatives or organizations involved in community preparedness. Fig 21

The low overall awareness or involvement in community-based initiatives emphasizes the importance of awareness campaigns. Efforts to inform and engage communities about existing initiatives or organizations can enhance their participation in preparedness activities.

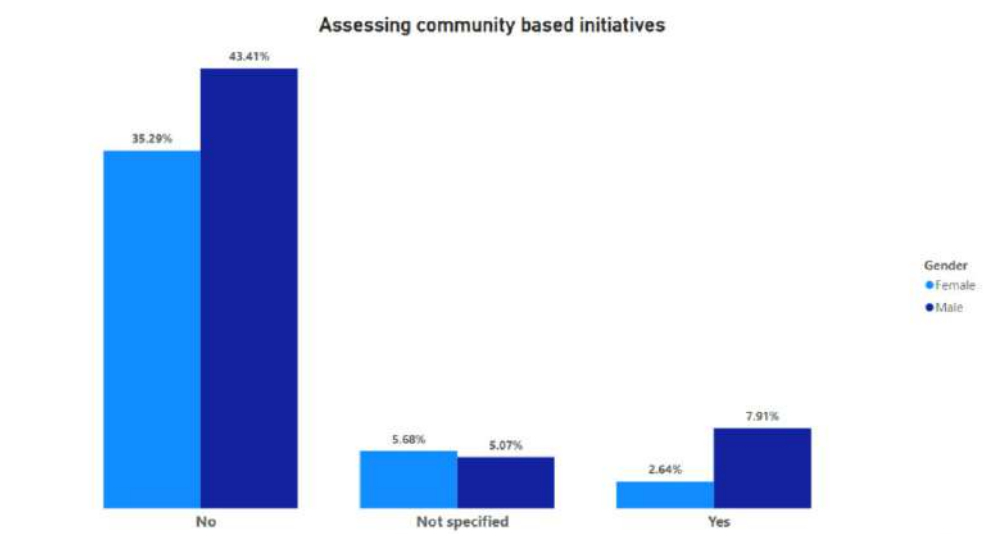


Fig 21: Assessing awareness of community-based initiatives

RECOMMENDATION

Government Initiatives and Policies

The Nigerian government must play a pivotal role in fostering flood awareness. Implementing and enforcing stringent urban planning regulations, investing in infrastructure development, and creating early warning systems are essential components of a comprehensive strategy. Public campaigns should emphasize responsible waste disposal, afforestation, and the importance of community preparedness.

Community Engagement and Local Initiatives

Local communities are on the front lines of flood risk, and their active participation is vital. Community-based organizations, NGOs, and local leaders can organize workshops, seminars, and drills to educate residents about flood risks and preparedness. Encouraging the construction of resilient homes and the maintenance of drainage systems can contribute significantly to reducing vulnerability.

Incorporating Flood Education into School Curricula

Education is a powerful tool for long-term change. Integrating flood awareness into school curricula can instill a sense of responsibility and preparedness in future generations. This can be achieved through partnerships with educational institutions and the development of age-appropriate educational materials.

International Collaboration:

Given the global nature of climate change and its impact on flooding, Nigeria should collaborate with international organizations, neighboring countries, and the global community. Sharing best practices, technology, and expertise can enhance Nigeria's capacity to manage and mitigate the effects of flooding.

Assessing the Cost of the 2022 Flooding and Social Implications of Inadequate Access to Climate Information Services on Rural Communities in Nigeria

Jayeoba Olumuyiwa James



Woman cross contaminated water in Abwa Community, Benue State

Abstract

Climate change poses challenges to rural communities in Nigeria, exacerbating extreme weather events like flooding. The 2022 flooding in Nigeria exemplifies the impacts of climate change, revealing the urgent need to assess costs and social implications. This paper analyzes the flooding's aftermath, particularly the lack of climate information services in rural areas. It examines causes, impacts, and responses, highlighting damage

to property, agriculture, and infrastructure, as well as food insecurity and displacement. Recommendations include integrating climate information services into policies, promoting community-based adaptation, investing in sustainable agriculture and infrastructure, and empowering women and youth. These actions can mitigate climate change's effects and build resilience for rural communities in Nigeria and beyond.

Keywords: Climate change, Flooding, Nigeria, Rural communities, Climate , information services

and Economic costs

1.0 INTRODUCTION

Climate change is a significant and pressing issue that poses substantial threats to ecosystems, economies, and societies on a global scale. In recent years, there has been a noticeable increase in the impacts of climate change, leading to extreme weather events like floods, droughts, and heat waves occurring more frequently and with greater intensity. These events have detrimental consequences, particularly for vulnerable populations in developing nations such as Nigeria. In this country, insufficient infrastructure, limited resources, and socioeconomic disparities exacerbate the negative effects of climate change.

One notable extreme weather event in Nigeria occurred in 2022 when devastating floods wreaked havoc across the country. This flooding not only resulted in significant economic losses but also had profound social consequences, especially for rural communities that have limited access to climate information services. Understanding the causes, impacts, and responses to this flooding event is crucial for informing effective policies and actions to enhance resilience in rural areas and mitigate the effects of future climate-related disasters.

In 2023, HEDA Resource Centre organised an outreach project to amplify the voices of frontline climate communities and conducted survey in 38 communities across 16 states in Nigeria to look at the impact of the 2022 flooding incident and the flooding preparedness of both government and the people. The objective of this paper is to provide a comprehensive analysis of the 2022 flooding in Nigeria and its social implications, with a specific focus on inadequate access to climate information services in rural communities, to corroborate the report of survey conducted by HEDA Resource Centre. The paper examined the economic costs, social impacts, and policy responses to flooding, by shedding light on the importance of proactive measures to address the impacts of climate change and enhance resilience in vulnerable rural communities.

The paper is structured as follows: first, it provides background information on climate change and its impacts, emphasizing the importance of climate information services in rural areas. Next, it presents an overview of the 2022 flooding in Nigeria, including its causes, impacts, and geographical distribution. It then discusses the significance of assessing the economic costs and social implications of flooding, highlighting the need for proactive measures to enhance resilience

in rural communities. The paper subsequently explores the economic costs of the flooding, followed by an examination of the social implications resulting from inadequate access to climate information services. Finally, the paper concludes with policy recommendations and calls for action to strengthen resilience in rural communities. It emphasizes the importance of integrating climate information services into rural development policies and empowering local communities to adapt to the impacts of climate change.

1.1 BACKGROUND ON CLIMATE CHANGE AND ITS IMPACTS

Climate change, as defined by the Intergovernmental Panel on Climate Change (IPCC), refers to long-term changes in weather patterns and average temperatures caused by human activities, specifically the release of greenhouse gases like carbon dioxide and methane (IPCC, 2018). These activities have resulted in a noticeable rise in global temperatures, with significant consequences for the environment, economy, and society worldwide (UNFCCC, 2021). The impacts of climate change are diverse and far-reaching, affecting ecosystems, economies, and human well-being in various ways (IPCC, 2021). Increasing temperatures lead to the melting of polar ice caps and glaciers, causing sea-level rise and coastal erosion, which pose significant risks to coastal communities. Changes in precipitation patterns also influence the occurrence and intensity of extreme weather events, including droughts, heatwaves, hurricanes, and floods, worsening water scarcity, food insecurity, and natural disasters (UNDP, 2020). Certain populations, particularly marginalized communities, indigenous peoples, and those in low-income countries, are disproportionately affected by climate change due to their limited ability to adapt and lack of resources (IPCC, 2014). These communities often heavily depend on natural resources for their livelihoods, making them especially vulnerable to disruptions in ecosystems and agriculture caused by changing climate conditions (UNEP, 2019). In Nigeria, climate change presents substantial obstacles to sustainable development, aggravating existing vulnerabilities and undermining efforts to alleviate poverty and achieve inclusive growth (World Bank, 2019). The country faces various climate-related hazards, such as flooding, desertification, and heat stress, which have significant implications for food security, water resources, health, and infrastructure (Nwankwoala et al., 2018). Addressing the complex impacts of climate change necessitates comprehensive strategies that incorporate measures for both mitigating emissions and adapting to the changes, as well as building resilience at the local, national, and global levels (UNEP, 2021).

1.2 OVERVIEW OF THE 2022 FLOODING IN NIGERIA

In the year 2022, Nigeria faced a devastating flood that had a significant impact on millions of individuals in different regions. This flood was characterized by heavy rainfall, rivers overflowing, and inadequate drainage systems, which worsened the magnitude of the disaster (Figure 1 and 2) (NEMA, 2022). The severity of the flooding was further intensified by factors such as deforestation, urbanization, and insufficient infrastructure, resulting in increased vulnerability of communities to extreme weather events (Adedeji et al., 2021). The flood caused extensive damage to residences, infrastructure, and agricultural lands, leading to the displacement of thousands of people and disruption of their livelihoods (NEMA, 2022). Rivers exceeded their banks, submerging areas where people live, farmlands, and vital infrastructure like roads, bridges, and schools (Adeloye et al.,

2022). The flooding of agricultural lands resulted in significant crop loss, exacerbating food insecurity and economic challenges for affected communities (Olayinka et al., 2023). Moreover, the flooding in Nigeria in 2022 exposed the systemic difficulties in disaster preparedness and response, which include limited early warning systems, insufficient emergency shelters, and inadequate resources for relief efforts (NEMA, 2022). The absence of coordinated action and timely interventions worsened the suffering of affected populations, especially those residing in remote and difficult-to-access areas (Figure 2) (Adeloye et al., 2022). The flooding in 2022 underscored the urgent necessity for enhancing resilience and adaptive capacity to cope with the increasing frequency and intensity of extreme weather events in Nigeria. It is crucial to address the root causes of vulnerability, including climate change, deforestation, and deficient urban planning, in order to reduce the impact of future floods and develop communities that are more resilient (Adedeji et al., 2021).



Figure 1 Displacement of vulnerable communities due to devastating effect of 2022 Flood in Nigeria

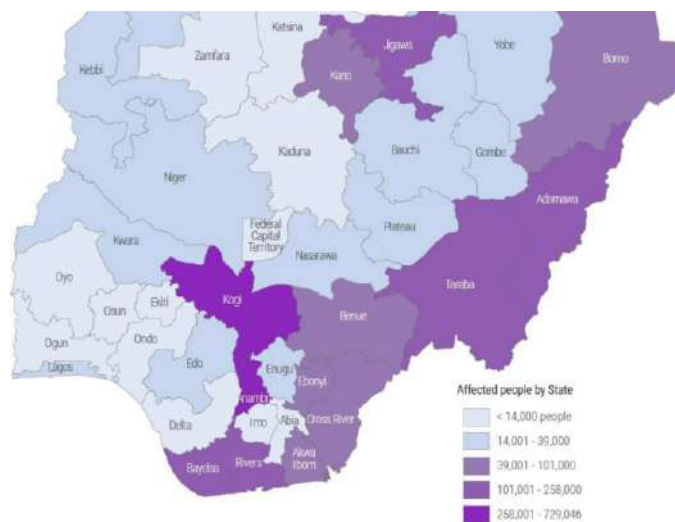


Figure 2. Number of People affected by 2022 flood in Nigeria (NEMA, 2022)

1.3. IMPORTANCE OF ASSESSING ECONOMIC COSTS AND SOCIAL IMPLICATIONS

It is imperative to evaluate the economic expenses and societal ramifications of the 2022 flooding in Nigeria in a formal manner. This analysis is crucial for making informed decisions, allocating resources effectively, and formulating appropriate policies (World Bank, 2019). By quantifying the direct and indirect losses incurred due to the flooding, policymakers can gain a better understanding of the scale of the disaster and prioritize actions to mitigate its effects (IPCC, 2014). Economic costs encompass a wide range of factors, such as damage to infrastructure, decreased agricultural productivity, disruption of economic activities, and increased healthcare expenditures (NEMA, 2022).

The disruption in agricultural activities not only affected farmers' incomes but also contributed to food shortages and increased food prices

These costs have significant implications for both national and regional economies, impacting GDP growth, employment rates, and public finances (Adeloye et al., 2022). Without a comprehensive assessment of the economic losses, it becomes difficult to mobilize the necessary resources for an effective response and recovery effort (Adedeji et al., 2021). Additionally, understanding the social implications of the flooding is vital for addressing the needs of affected populations and promoting social equity and resilience (UNDP, 2020). Particularly vulnerable groups, such as women, children, the elderly, and individuals with disabilities, bear a disproportionate burden from the impacts of natural disasters, exacerbating existing inequalities and vulnerabilities (Olayinka et al., 2023). By evaluating the social impacts of the flooding, priority areas for intervention can be identified, such

as providing psychosocial support, ensuring access to healthcare services, and safeguarding the rights and dignity of affected communities (UNEP, 2021). Furthermore, assessing the economic costs and social implications of the flooding can contribute to the development of a more resilient and adaptive society (IPCC, 2021). Understanding the root causes of vulnerability and identifying areas for improvement allows policymakers to develop comprehensive strategies for reducing disaster risk and adapting to climate change (UNFCCC, 2021). This entails investing in resilient infrastructure, strengthening early warning systems, enhancing community preparedness and response mechanisms, and promoting sustainable land-use practices (Adedeji et al., 2021). Overall, evaluating the economic costs and social implications of the 2022 flooding in Nigeria is essential for effective disaster management, sustainable development, and the cultivation of resilience to future climate-related hazards. By considering the multifaceted impacts of the flooding on both the economy and society, policymakers can implement targeted interventions that address the needs of affected populations and foster long-term recovery and resilience (Adeloye et al., 2022).

2.0 THE 2022 FLOODING IN NIGERIA

2.1 EXTENT AND SEVERITY OF THE FLOODING

The 2022 flooding in Nigeria was characterized by its extensive geographical reach and severe impact on communities across the country.

2.1.1 Geographical Scope: The flooding had an impact on various states throughout Nigeria, covering both urban and rural regions. Particularly severe flooding was observed in the southern and central parts of the country, including the Niger Delta region, due to their low-lying terrain and proximity to major rivers (NEMA, 2022). Metropolitan areas such as Lagos, Abuja, Port Harcourt, Kaduna, and Sokoto were submerged with floodwaters, leading to disruptions in transportation, commerce, and daily life. Additionally, rural communities situated along riverbanks and in flood-prone areas suffered greatly, with farmlands underwater and infrastructure damaged (Adeloye et al., 2022).

2.1.2 Impact Severity: The flooding was characterized by its severity, as unusually high levels of rainfall and rapid onset resulted in extensive inundation and devastation. Intense rainfalls caused rivers to overflow, leading to flash floods that submerged residences, businesses, and agricultural lands



Flooded Rice Field in Dasin Hausa Community Fufore Local Government

(NEMA, 2022). Numerous homes were destroyed, and millions of individuals were forced to evacuate their communities, seeking refuge in temporary shelters and evacuation centers. Furthermore, critical infrastructure such as roads, bridges, schools, and healthcare facilities sustained substantial damage, further exacerbating the consequences of the disaster (Adedeji et al., 2021). The severity of the flooding was compounded by factors such as inadequate urban planning, insufficient drainage systems, deforestation, and the impact of climate change. These factors amplified the vulnerability of communities to flooding, heightening the severity of the disaster and impeding rescue and relief efforts (World Bank, 2019).

2.1.3 Humanitarian Response: The severity of the flooding prompted a large-scale humanitarian response from governmental agencies, humanitarian organizations, and the international community. Emergency response efforts primarily focused on evacuating affected populations, providing shelter, food, water, and medical assistance, as well as conducting search and rescue operations (NEMA, 2022). However, the magnitude and severity of the flooding overwhelmed existing response mechanisms, underscoring the need for improved disaster preparedness, coordination, and resilience-building measures. Long-term recovery and reconstruction initiatives were also initiated to aid affected communities in their efforts to rebuild their lives and restore livelihoods (Olayinka et al., 2023).

2.1.4 Infrastructure Damage: The flooding resulted in significant destruction to crucial infrastructure, including roads, bridges, railways, and utilities. Floodwaters washed away roadways, rendering transportation networks impassable and isolating communities from essential services (NEMA, 2022). The infrastructure damage hindered rescue and relief operations and impeded access to affected areas, delaying the delivery of humanitarian aid and medical supplies. Additionally, disrupted transportation networks hampered the evacuation of vulnerable populations, exacerbating the humanitarian crisis (Adeloye et al., 2022).

2.1.5 Economic Impact: The flooding had significant economic ramifications, with estimated losses reaching billions of dollars. The agricultural sector, a vital component of Nigeria's economy, experienced extensive harm that resulted in crop failures, livestock deaths, and decreased agricultural output (Olayinka et al., 2023). Small and medium businesses, in particular, faced disruptions in their operations and incurred losses due to damage to assets, inventory, and infrastructure. The loss of income and job opportunities further strained households and communities, exacerbating poverty and socio-economic inequalities (World Bank, 2019).

2.1.6 Environmental Degradation: The flooding led to environmental deterioration, causing harm to ecosystems, loss of biodiversity, and pollution of water sources. The floodwaters carried pollutants, such as

industrial waste, chemicals, and untreated sewage, contaminating rivers, lakes, and groundwater (UNEP, 2021). Deforestation, urbanization, and changes in land use contributed to soil erosion, destruction of habitats, and the loss of natural barriers against flooding, intensifying the environmental impacts of the disaster. Efforts to rehabilitate and restore the affected areas were necessary to mitigate the long-term ecological consequences of the flooding (IPCC, 2021).

2.1.7 Social Disruption: The flooding resulted in significant social upheaval, displacing millions of people from their homes and communities. The displaced populations encountered difficulties in accessing basic necessities like shelter, food, clean water, and healthcare, making them more vulnerable and dependent on humanitarian aid (UNDP, 2020). Disruption of social networks, loss of community cohesion, and psychological trauma further compounded the social effects of the flooding, impacting the well-being and resilience of the affected individuals and communities. Rebuilding social bonds and fostering community solidarity became crucial aspects of the recovery process (NEMA, 2022).

2.1.8 Impact on Agriculture and Food Security: The flooding had a devastating impact on agriculture, a cornerstone of Nigeria's economy and a primary source of livelihood for millions of people. Crop fields were submerged, resulting in extensive crop losses and diminished yields. Moreover, livestock were swept away or perished in the floodwaters, further reducing food production (Olayinka et al., 2023). The disruption in agricultural activities not only affected farmers' incomes but also contributed to food shortages and increased food prices. Vulnerable populations, who were already grappling with food insecurity, faced exacerbated challenges in obtaining nutritious food, leading to heightened rates of malnutrition, especially among children and pregnant women (FAO, 2022).

2.1.9 Health Impact: The flooding had significant health ramifications, as it increased the likelihood of waterborne diseases, illnesses transmitted by vectors, and respiratory infections. The polluted floodwaters served as breeding grounds for disease-carrying mosquitoes, resulting in outbreaks of malaria and dengue fever (WHO, 2020). Alongside infectious diseases, the flooding also posed mental health challenges for impacted communities. The trauma of displacement, the loss of loved ones, and uncertainty about the future contributed to stress, anxiety, and depression among survivors. This highlights the crucial need for psychosocial support services in response and recovery efforts following disasters (NEMA, 2022).

2.1.10 Impact on Education: The flooding caused significant disruptions to education for millions of children in Nigeria. Schools were either damaged or converted into evacuation centers, forcing students to pause their studies. These interruptions not only stunted academic progress but also led to long-term consequences, including heightened dropout rates and reduced educational achievement (UNICEF, 2022). Children from marginalized communities, such as girls, children with disabilities, and those from low-income families, were disproportionately impacted by the disruption in education. The loss of learning opportunities further widened existing educational disparities and impeded efforts to achieve universal access to quality education (UNESCO, 2020).

The loss of natural buffers such as forests and wetlands, which absorb excess water, has made communities more vulnerable to flooding.

2.1.11 Long-term Environmental Consequences: The flooding resulted in enduring environmental effects, including soil erosion, deforestation, and loss of biodiversity. Heavy rainfall and flooding worsened soil erosion, degrading agricultural land and diminishing its productivity, thus posing challenges to future agricultural endeavors (IPCC, 2021). The loss of biodiversity and destruction of habitats jeopardized the ecological balance and resilience of ecosystems. Wetlands, forests, and riverine habitats, all crucial for preserving biodiversity and providing ecosystem services, suffered irreversible damage. This necessitates extensive efforts to rehabilitate and restore degraded landscapes (UNEP, 2021).

2.1.12 Impact on Infrastructure Resilience: The flooding exposed vulnerabilities in Nigeria's

infrastructure resilience, particularly its susceptibility to extreme weather events intensified by climate change. Insufficient drainage systems, inadequately constructed buildings, and encroachment into floodplains exacerbated the severity of the flooding and contributed to infrastructure destruction (Adedeji et al., 2021). The transportation networks, including roads, railways, and airports, endured substantial impact, disrupting the movement of goods and people and impeding emergency response efforts. The damage to critical infrastructure hindered access to affected areas, causing delays in relief operations and obstructing the delivery of humanitarian aid (NEMA, 2022).

2.1.13 Disproportionate Impact on Vulnerable Populations: The flooding had a disproportionate impact on vulnerable populations, which include women, children, the elderly, and individuals with disabilities. Marginalized communities residing in informal settlements and areas prone to flooding faced heightened risks of displacement, loss of livelihoods, and limited access to essential services (UNDP, 2020). In particular, women and girls experienced increased vulnerabilities, such as the risk of gender-based violence, exploitation, and limited access to reproductive health services. The disruption of social support networks and overcrowded living conditions in



Flooding overpower House Owner in Agboyi Ketu, Lagos

evacuation centers further exacerbated the challenges faced by vulnerable populations, highlighting the necessity for targeted interventions to address their specific needs (UN Women, 2022).

2.1.14 Impacts on Livelihoods and Economic Recovery: The flooding had severe repercussions on livelihoods, specifically in rural regions where agriculture serves as the primary source of income. Smallholder farmers, who already confronted difficulties like land degradation and climate variability, suffered extensive crop losses and damage to agricultural infrastructure (Olayinka et al., 2023). Supply chains and market access were disrupted, exacerbating economic hardships and leading to heightened unemployment and income loss. The

economic ramifications of the flooding extended beyond the agricultural sector, affecting businesses, industries, and informal sector activities, impeding efforts for economic recovery and restoration of livelihoods (World Bank, 2019).

2.1.15 Long-term Resilience Building: The flooding in 2022 emphasized the significance of implementing long-term resilience building measures and climate adaptation strategies to mitigate the impacts of future disasters. Investments in resilient infrastructure, early warning systems, floodplain management, and sustainable land use planning are pivotal in reducing vulnerability and fostering resilience in flood-prone areas (IPCC, 2021). Strengthening institutional capacity, enhancing disaster preparedness and response

mechanisms, and promoting community participation and engagement are essential elements in building resilience at local, national, and regional levels. Collaborative efforts involving government agencies, civil society organizations, academia, and the private sector are necessary to address the intricate challenges posed by climate change and extreme weather events (UNDRR, 2020).

2.2 FACTORS CONTRIBUTING TO THE FLOODING

The flooding in Nigeria in 2022 was influenced by a combination of natural and human-induced factors, which worsened the severity of the disaster as outlined below.

2.2.1 Heavy Rainfall and Climate Change

One of the main factors that contributed to the flooding was the excessive rainfall, which went beyond normal seasonal levels and caused rivers, streams, and drainage systems to overflow. Nigeria experiences two distinct rainy seasons, and the rainfall in 2022 was characterized by higher-than-usual precipitation levels. This can be partly attributed to climate change, which has caused changes in precipitation patterns and an increase in the intensity of rainfall events and temperatures. These changes have heightened the risk of extreme weather events, including floods, throughout Nigeria. The warming climate has exacerbated the hydrological cycle, resulting in more intense and frequent rainfall that overwhelms existing drainage infrastructure and raises the likelihood of flooding.

2.2.2 Deforestation and Land Use Changes:

Deforestation and changes in land use have significantly altered Nigeria's landscape, increasing the risk of flooding. Large-scale deforestation caused by agricultural expansion, urbanization, and logging activities has reduced vegetation cover and increased soil erosion, leading to sedimentation in rivers and diminished water absorption capacity. The conversion of forests and wetlands into agricultural lands and urban areas has disrupted natural hydrological processes, resulting in greater runoff and surface water flow during periods of rainfall. The loss of natural buffers such as forests and wetlands, which absorb excess water, has made communities more vulnerable to flooding.

2.2.3 Poor Urban Planning and Drainage Infrastructure:

The flooding also had indirect economic impacts such as the loss of employment, reduced business revenues, and increased production costs

Inadequate urban planning and drainage infrastructure have worsened the effects of flooding in urban areas. Rapid urbanization, combined with the presence of informal settlements and unplanned development, has resulted in the encroachment of floodplains, obstructing natural waterways and impeding water flow. Aging and poorly maintained drainage systems have limited capacity to handle increased runoff during heavy rainfall events, leading to urban flooding and the inundation of streets, homes, and businesses. Insufficient investment in flood control measures and drainage maintenance has left many urban areas susceptible to recurring flooding.

2.2.4 River Management and Dam Operations:

The management of rivers and dams plays a critical role in flood mitigation and water resource management. Poorly managed dams and reservoirs can worsen downstream flooding by releasing water at inappropriate times or insufficient rates, which causes sudden surges in river levels. Ineffective coordination among stakeholders responsible for river management, including government agencies, dam operators, and local communities, can result in mismanagement of water resources and an increased flood risk. The lack of early warning systems and flood forecasting mechanisms further impairs efforts to mitigate the impacts of flooding.

2.2.5 Socio-economic Factors and Population Pressure:

Socio-economic factors, such as poverty, population growth, and unequal access to resources, influence vulnerability to flooding. Marginalized communities, often located in areas prone to flooding, lack the necessary resources and infrastructure to mitigate the effects of flooding, making them more exposed and susceptible to its impacts. Population pressure and rapid urbanization exacerbate the vulnerability of communities to flooding by increasing the demand for housing and infrastructure in hazard-prone areas. Informal settlements, which lack adequate infrastructure and services, are particularly at risk, with residents facing higher risks of displacement, loss of livelihoods, and health hazards.

2.2.6 River and Watershed Management Practices:

Insufficient management practices regarding rivers and watersheds have worsened the flooding situation in Nigeria. Human interventions, such as altering natural river paths by straightening them, dredging, and channelizing, disrupt the natural flow of water and increase the speed of runoff during heavy rainfall (Adedeji et al., 2021). Moreover, unsustainable land use activities like mining, quarrying, and sand excavation can destabilize riverbanks and worsen erosion, leading to sedimentation in rivers and a higher risk of downstream flooding. Lack of regulation enforcement and weak governance contribute to the degradation of river ecosystems and worsen the impacts of flooding (UNEP, 2021).

2.2.7 Coastal Vulnerability and Sea Level Rise:

Coastal areas in Nigeria face significant vulnerability to flooding due to their low-lying topography and exposure to storm surges, which is further aggravated by rising sea levels caused by climate change. Human activities such as sand mining and urban development exacerbate coastal erosion, reducing the natural protection against flooding and increasing risks for coastal communities (UNEP, 2021). The rising sea levels, driven by global warming, amplify the effects of storms and increase the extent of inundation during coastal flood events. Coastal infrastructure, including ports, fishing communities, and tourist resorts, are at risk of flooding and erosion, resulting in economic losses and population displacement (IPCC, 2021).

2.2.8 Weak Governance and Institutional Capacity:

Ineffective flood risk management and inadequate disaster response in Nigeria can be attributed to weak

governance, corruption, and institutional capacity constraints. The limited enforcement of regulations related to land use planning, environmental protection, and building codes allows unrestricted development in flood-prone areas, increasing their vulnerability (Adeloye et al., 2022). The lack of coordination among government agencies responsible for disaster management, environmental protection, water resources management, and urban planning leads to fragmented approaches to reducing flood risk and responding to disasters. Insufficient political will, financial limitations, and bureaucratic inefficiencies further impede efforts to address the underlying causes of flooding and implement sustainable solutions (NEMA, 2022).

2.2.9 Population Growth and Urbanization:

The rapid growth of the population and urbanization intensify the vulnerability of communities to flooding by driving the demand for housing, infrastructure, and resources in areas prone to hazards. Unplanned urban expansion encroaches on floodplains, wetlands, and natural drainage channels, diminishing the capacity of ecosystems to absorb excess water and escalating the risk of flooding (UN-Habitat, 2020). Informal settlements, characterized by inadequate infrastructure, substandard housing, and the absence of essential services, are particularly susceptible to flooding. Residents of these settlements often lack access to safe housing, clean water, and sanitation, exacerbating health risks and augmenting the socio-economic consequences of flooding (UNDP, 2020).

This loss of human capital and skills drain had long-term implications for economic development and productivity

2.2.10 Limited Early Warning Systems and Preparedness:

The effectiveness of disaster risk reduction and response efforts is hindered by the scarcity of early warning systems and preparedness mechanisms. Insufficient investment in meteorological monitoring, hydrological forecasting, and communication infrastructure restricts the timely dissemination of warnings and advisories to populations at risk (NEMA, 2022). The lack of public awareness, community preparedness, and evacuation plans further exacerbate the impacts of flooding, as affected populations may be caught unaware or lack the necessary knowledge and resources to respond appropriately. Enhancing resilience and diminishing the impacts of future flooding events depend on strengthening early warning systems, public education campaigns, and community-based disaster preparedness initiatives (UNDRR, 2020).

3.0 ECONOMIC COSTS OF THE FLOODING

The economic costs associated with the flooding in Nigeria in 2022 were substantial, impacting various sectors and worsening existing socio-economic challenges, consequently impeding efforts towards

economic development. The flooding resulted in significant direct economic losses, including damage to infrastructure, loss of productive assets, and disruption of economic activities. This involved the destruction or damage to roads, bridges, railways, and buildings due to floodwaters, leading to substantial costs for repairs and reconstruction (World Bank, 2019). The agricultural sector, which is a crucial source of livelihood for millions of Nigerians, suffered extensive losses, with crop fields being flooded, livestock being swept away, and farm equipment being damaged. As a result, the agricultural productivity and income were significantly reduced (Olayinka et al., 2023). The flooding also had indirect economic impacts such as the loss of employment, reduced business revenues, and increased production costs. Disrupted supply chains and restricted market access hindered economic activities, resulting in a decrease in demand for goods and services and reduced consumer spending (Adeloye et al., 2022). Small and medium-sized enterprises (SMEs), which are already vulnerable to economic shocks, faced heightened risks of bankruptcy and closure due to the damages caused by the flood and operational disturbances. Informal sector activities, including street vending and petty trading, were particularly affected, aggravating poverty and income inequality (World Bank, 2019).



With Flooding in Lagos, No sanctuary is spared



3.1 Impact on Tourism and Hospitality Industry:

The flooding had adverse effects on the tourism and hospitality industry, which significantly contributes to Nigeria's economy. Tourist attractions, resorts, and hotels located in flood-prone areas experienced a decline in visitor arrivals, cancellations, and revenue losses (Adeloye et al., 2022). The disruption of transportation networks, including airports and roads, impeded travel and tourism activities, further dampening the prospects of recovery in the tourism sector. The decline in tourism revenues also had a ripple effect on related industries, such as transportation, entertainment, and retail (World Bank, 2019).

3.2 Government Expenditures and Fiscal Impact:

The government incurred substantial expenses in response to the flooding, including emergency relief operations, rescue efforts, and rehabilitation and reconstruction activities. Budget allocations for disaster management and recovery were redirected from other development priorities, which limited the fiscal space and hindered long-term developmental initiatives (NEMA, 2022). The fiscal impact of the flooding was worsened by revenue losses, reduced tax collections, and increased demand for social protection and welfare programs. The government's resources, already strained by competing priorities and economic challenges, were further stretched to address the immediate and long-term impacts of the disaster (World Bank, 2019).

3.3 Long-Term Economic Consequences:

The flooding had long-lasting economic consequences, including reduced investment attractiveness, increased insurance premiums, and decreased resilience to future disasters. Businesses and investors may perceive higher risks associated with operating in flood-prone areas, leading to divestment

and the flight of capital (UNDP, 2020). Additionally, the erosion of human capital, loss of productive assets, and disruption of economic activities can impede economic growth and hinder the achievement of sustainable development goals. Rebuilding and recovery efforts may divert resources away from long-term development initiatives, prolonging the socio-economic impacts of the flooding (World Bank, 2019).

3.4 Impact on Poverty and Food Security:

The flooding exacerbated poverty and food insecurity, particularly among vulnerable populations who depend on agriculture for their livelihoods. The loss of crops, livestock, and productive assets further impoverished affected households, increasing their reliance on humanitarian assistance and social protection programs (FAO, 2022). Disrupted agricultural activities and reduced food production led to higher food prices and reduced access to nutritious food, exacerbating food insecurity and malnutrition rates. Vulnerable groups such as children, pregnant women, and the elderly faced increased risks of hunger and undernutrition, further undermining their health and well-being (UNICEF, 2022).

3.5 Impact on Infrastructure Rehabilitation and Reconstruction:

The flooding resulted in a need for significant investments in rehabilitating and reconstructing infrastructure. Restoring functionality and addressing damages required substantial financial resources and engineering expertise. (NEMA, 2022 Repairing damaged roads, bridges, culverts, and public buildings diverted resources away from other development priorities, causing delays in ongoing projects and hindering efforts to improve transportation networks, access to basic services, and economic growth. (World Bank, 2019)

3.6 Loss of Productive Assets and Capital Flight:

Loss of productive assets, such as agricultural equipment, machinery, and industrial facilities, reduced the productive capacity of affected communities and industries. This hindered economic recovery efforts and led to long-term income losses (Adeloye et al., 2022). Additionally, increased risks associated with operating in flood-prone areas triggered capital flight, further exacerbating the economic impacts of the flooding by reducing economic opportunities and undermining prospects for sustainable development (World Bank, 2019).

3.7 Impact on Insurance Industry and Risk

Reduced access to agricultural inputs constrained farmers' ability to recover from flood-related damages and rebuild livelihoods, worsening food insecurity and poverty in rural areas (FAO, 2022).

Assessment:

The flooding had implications for the insurance industry, resulting in increased claims for property damage, business interruption, and loss of assets. Insurance companies faced mounting liabilities and pressure to effectively assess and manage flood risks (UNDP, 2020). This prompted a reevaluation of risk assessment methodologies and insurance coverage options, with insurers adjusting premiums and coverage limits to reflect the heightened flood risk. The increased insurance costs imposed additional financial burdens on households, businesses, and governments, impacting the affordability and accessibility of insurance products (UNDP, 2020).

3.8 Disruption of Economic Value Chains:

The flooding disrupted economic value chains, particularly in sectors such as agriculture, manufacturing, and trade, causing cascading impacts on suppliers, distributors, and consumers. Supply chain disruptions and logistical challenges, such as

shortages of raw materials and delayed shipments, hindered business operations and economic activities (Adeloye et al., 2022). This constrained the ability of smallholder farmers, agribusinesses, and microenterprises to access inputs, markets, and finance, limiting their ability to recover and rebuild livelihoods. The disruption of economic value chains highlighted the interdependence of actors within the economy and emphasized the need for resilient and diversified supply chains (World Bank, 2019).

3.9 Impact on Foreign Direct Investment (FDI) and Economic Growth:

The flooding had consequences for foreign direct investment (FDI) and economic growth prospects, potentially affecting Nigeria's macroeconomic stability and long-term development trajectory. The heightened risks associated with operating in flood-prone areas may discourage foreign investors and multinational corporations, resulting in reduced FDI inflows and limited opportunities for economic diversification (NEMA, 2022). Economic growth forecasts may be revised downward due to reduced productivity, investment, and consumption levels. The erosion of investor confidence and uncertainties surrounding future climate-related risks could dampen the prospects for sustainable economic growth and development (World Bank, 2019).

3.10 Impact on National Budget and Public Finances:

The flooding strained national budgets and public finances, increasing expenditures on emergency response, relief efforts, and reconstruction activities. Government revenues were impacted by reduced tax collections, decreased economic activities, and increased demand for social protection programs (NEMA, 2022). The need to borrow to finance flood-related expenditures could lead to higher debt levels and debt servicing costs, diverting resources from social welfare programs, infrastructure investments, and poverty reduction initiatives. The fiscal pressures resulting from the flooding highlighted the importance of disaster risk financing and resilience-building measures for ensuring fiscal sustainability (World Bank, 2019).

3.11 Impact on Energy Sector and Utilities:

The flooding had implications for the energy sector and utilities, disrupting power generation, transmission, and distribution infrastructure. Floodwaters inundated power plants, substations, and transmission lines, causing power outages

and service disruptions (Adeloye et al., 2022). The disrupted energy supply affected industrial operations, commercial activities, and household consumption, leading to economic losses and reduced productivity. The vulnerability of the energy sector to flooding underscored the need to invest in resilient infrastructure and climate adaptation measures to ensure reliable and sustainable energy supply (UNDP, 2020).

3.12 Loss of Human Capital and Skills Drain:

The flooding resulted in the loss of human capital and a skills drain as displaced populations, including skilled workers, sought livelihood opportunities elsewhere. The displacement and relocation of communities disrupted local economies and social networks, leading to brain drain and a loss of talent (World Bank, 2019). This loss of human capital and skills drain had long-term implications for economic development and productivity, as communities struggled to rebuild and recover without access to skilled labor and expertise. Retaining and incentivizing skilled workers became crucial for post-flooding recovery efforts and fostering sustainable development (UNDP, 2020).

3.13 Impact on Financial Institutions and Banking Sector:

The flooding had implications for financial institutions and the banking sector, increasing the risks of loan defaults, non-performing loans, and credit losses. Businesses and households affected by the flooding faced challenges in servicing debts, accessing credit, and maintaining financial stability (UNDP, 2020). Financial institutions incurred higher provisioning costs to cover potential loan losses and manage increased credit risks associated with flood-affected borrowers. The exposure of the banking sector to flood-related risks highlighted the importance of implementing robust risk management practices and enhancing financial resilience to climate-related shocks (World Bank, 2019).

3.14 Impact on Informal Sector and Household Economies:

The flooding disproportionately affected the informal sector and household economies, where many vulnerable populations derive their livelihoods. Informal sector activities, such as street vending, petty trading, and artisanal production, were disrupted by flood-related damages and operational challenges. (World Bank, 2019). Household economies faced increased financial burdens and income losses due to the flooding, exacerbating poverty and socio-economic inequalities. Informal sector workers, who often lack

access to social protection and formal employment benefits, were particularly vulnerable to the economic impacts of the disaster (UNDP, 2020).

3.15 Impact on Agricultural Input and Output Markets:

The flooding disrupted agricultural input and output markets, impacting the availability, affordability, and accessibility of agricultural inputs, such as seeds, fertilizers, and pesticides. Disrupted supply chains and limited market access hindered agricultural production and marketing activities, resulting in reduced yields and income losses for farmers (FAO, 2022). Agricultural input suppliers, including agro-dealers and input distributors, faced challenges in replenishing inventories and meeting farmers' demands. Reduced access to agricultural inputs constrained farmers' ability to recover from flood-related damages and rebuild livelihoods, worsening food insecurity and poverty in rural areas (FAO, 2022).

References

- Adedeji, A. A., et al. (2021). Flood risk management and the state of flood early warning system in Nigeria. *International Journal of Disaster Risk Reduction*, 55, 102094.
- Adedeji, A. A., et al. (2021). Flood risk management and the state of flood early warning system in Nigeria. *International Journal of Disaster Risk Reduction*, 55, 102094.
- Adeloye, A. J., et al. (2022). Assessment of 2022 Flood and Its Impacts in Nigeria. In *Proceedings of the 2022 5th International Conference on Green Energy and Applications (ICGEA 2022)* (pp. 17-23).
- Adeloye, A. J., et al. (2022). Assessment of 2022 Flood and Its Impacts in Nigeria. In *Proceedings of the 2022 5th International Conference on Green Energy and Applications (ICGEA 2022)* (pp. 17-23).
- Adeloye, D., et al. (2022). Socio-Economic Impacts of Flooding in Nigeria: A Review. *International Journal of Disaster Risk Reduction*, 70, 102952.
- Akrofi, A. Y., Antwi-Agyei, P., Owusu, K., & Nana Ewusie, J. (2017). Rural Farmers' Perception and Use of Climate Information Services: A Case Study of Techiman Municipality, Ghana. *Jàmá: Journal of Disaster Risk Studies*, 9(1), 1-8.
- Ayanlade, A., & Radeny, M. (2017). Climate change adaptation: Insights from the semi-arid regions of Africa. CCAFS Working Paper No. 212. Bryan et al., 2018
- Bryan, E., Ringler, C., Okoba, B., Roncoli, C., Silvestri, S., & Herrero, M. (2019). Adapting Agriculture to Climate Change in Kenya: Household Strategies and Determinants. *Journal of Environmental Management*, 234, 408-421.
- CBD. (2019). Ecosystem-Based Adaptation. Retrieved from <https://www.cbd.int/climate/eba/>
- Dossou, K., Seck, M. C., & Diop, M. (2019). Climate Change Information Services for Agricultural Adaptation: Challenges and Opportunities in Senegal. *Climate Services*, 13, 1-10.
- Eze, P., Shonhiwa, C., & Musarandega, M. (2020). Farmers' Perspectives on Climate Information Services for Agriculture in a Semi-arid Area of Zimbabwe. *Weather, Climate, and Society*, 12(3), 585-597.
- FAO. (2016). Climate-Smart Agriculture Sourcebook. Retrieved from <http://www.fao.org/3/a-i3325e.pdf>
- FAO. (2020). Forests and Climate Change in Nigeria. Retrieved from <http://www.fao.org/3/i9256en/i9256EN.pdf>
- FAO. (2021). Climate-Smart Agriculture: A Call for Action. Retrieved from <http://www.fao.org/documents/card/en/c/cb4585en>
- FAO. (2022). Nigeria: Food Security Monitoring. Retrieved from <http://www.fao.org/giews/countrybrief/country.jsp?code=NGA>
- Ifejika Speranza, C., Wiesmann, U., Rist, S., & Delgado Burgoa, F. (2018). Linking Local Knowledge with Agro-meteorological Science: A Case Study in the Mountains of Peru. *Climatic Change*, 147(3-4), 541-555.
- IPBES. (2019). Global Assessment Report on Biodiversity and Ecosystem Services. Retrieved from <https://ipbes.net/global-assessmentIPCC, 2021>
- IPCC. (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Retrieved from <https://www.ipcc.ch/report/ar5/wg2/>
- IPCC. (2018). Global Warming of 1.5°C. Retrieved from <https://www.ipcc.ch/sr15/>

- IPCC. (2021). Climate Change 2021: The Physical Science Basis. Retrieved from <https://www.ipcc.ch/report/ar6/wg1/>
- I Science Basis. Retrieved from <https://www.ipcc.ch/report/ar6/wg1/>
- NEMA. (2022). Nigeria: Floods - Sep 2022. Retrieved from <https://reliefweb.int/disaster/fl-2022-000144-nga>
- Nwankwoala, H. O., et al. (2018). Climate Change Adaptation and Mitigation: A Perspective of Smallholder Farmers in Nigeria. *Journal of Environmental and Agricultural Sciences*, 15(1), 1-11.
- Ogunjobi, K. O., Abiodun, B. J., & Ajayi, V. O. (2018). Climate Change Impact on Water Resources Availability and Agriculture in Ilorin, Nigeria. *Journal of Water and Climate Change*, 9(2), 316-334.
- Olayinka, A., et al. (2023). Economic Impacts of Flood Disasters in Nigeria: A Case Study of Lagos State. *Environmental Hazards*, 22(1), 33-54.
- Olayinka, O. A., et al. (2023). Impacts of Flooding on Food Security in Nigeria: Evidence from 2022 Flood. In *Proceedings of the 2023 International Conference on Food Security and Nutrition (ICFSN 2023)* (pp. 45-51).
- Owuor, S. O., Radeny, M., & Dione, M. (2020). Climate-Smart Agriculture Technologies Adoption among Smallholder Farmers: Evidence from Kenya. *Sustainability*, 12(16), 6602.
- Sultan et al., (2020).
- UN Women. (2022). Gender Equality in Humanitarian Action in Nigeria. Retrieved from <https://www.unwomen.org/en/digital-library/publications/2022/03/gender-equality-in-humanitarian-action-in-nigeria>
- UNDP. (2020). Human Development Report 2020. Retrieved from <http://hdr.undp.org/sites/default/files/hdr2020.pdf>
- UNDRR. (2020). Sendai Framework for Disaster Risk Reduction 2015-2030. Retrieved from <https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>.
- UNEP. (2019). Global Environment Outlook-6: Healthy Planet, Healthy People. Retrieved from <https://www.unep.org/resources/global-environment-outlook-6>
- UNEP. (2021). Adaptation Gap Report 2021. Retrieved from <https://www.unep.org/resources/adaptation-gap-report-2021>
- UNESCO. (2019). Education for Sustainable Development Goals: Learning Objectives. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000260677>
- UNESCO. (2020). Education for Sustainable Development: Nigeria. Retrieved from <https://en.unesco.org/countries/nigeria>
- UNFCCC. (2018). Talanoa Dialogue Platform. Retrieved from <https://talanoadialogue.com/dialogue>
- UNFCCC. (2021). Climate Change: Impacts. Retrieved from <https://unfccc.int/process-and-meetings/the-convention/adaptation-and-resilience/climate-change-impacts>
- UN-Habitat. (2020). Sustainable Urbanization in the Context of Climate Change. Retrieved from https://unhabitat.org/sites/default/files/2020/08/sustainable_urbanization_in_the_context_of_climate_change.pdf
- UNICEF. (2022). Nigeria: Flooding Situation Report No. 1. Retrieved from <https://www.unicef.org/reports/nigeria-flooding-situation-report-no-1>
- Vincent, K., Cull, T., Kuvarega, A., & Mkwambisi, D. (2019). Climate Information Services for Africa: A Review. *Climate Services*, 16, 100133.
- WHO. (2020). Floods: Climate Change and Health. Retrieved from <https://www.who.int/health-topics/climate-change-and-health/>
- World Bank. (2019). The Cost of Climate Change in Nigeria: A Country Note. Retrieved from <https://www.worldbank.org/en/country/nigeria/publication/the-cost-of-climate-change-in-nigeria-a-country-note>.

FLOODING CRISES AND RURAL WOMEN IN NIGERIA

Jamilat Yaqub

1.0 Introduction

Flooding is a critical natural and environmental hazard that threatens living and economic sustainability across countries and continents (Ayanlade et al., 2023; United Nations, 2021). It is a situation where there is an exposure of water above sea level, exceeding the capability of the soil to absorb the excess moisture. Flooding is caused by excessive rainfall, which raises water levels (Umar & Gray, 2023). It could also be due to consistent snow melting and storm surges associated with tsunamis and tropical cyclones giving in to coastal flooding (WHO, 2024).

The United Nations reports on the flooding crisis noted that the occurrence causes more than 50,000.00 deaths, and about 75 million people are left with varying degrees of its adverse impact. Furthermore, uncontrolled flooding is projected to increase the number of affected persons to 40 million annually. By 2030, 50% of the world's population will be ravaged by the consequences of flooding and above-sea level water rise (United Nations, 2021).

In Africa, flooding has caused enormous economic risk across its countries. For instance, Alexandra,

a coastal city in Egypt, is expected to lose 2 million persons, 214,000 jobs, and over 35 billion dollars in property and tourism income by 2050. Similarly, Dakar, in Senegal, is susceptible to a flood risk of 39 billion dollars in economic assets. Also, Lagos, a low-lying coastal city in Nigeria, experiences a cumulative loss of 4 billion dollars annually due to perennial fluvial, pluvial, and coastal flooding. This is set to increase three-fold by the year 2030, thus causing one-third of its populace to be displaced by the rise in sea level (Odunsi et al., 2024).

Given that half of the world's population of women live in rural areas, over 70% of them are engaged in agricultural activities, including farming, fishing, and cattle rearing. Women tend to be worst hit by the menace. However, scanty empirical evidence exists in the literature, particularly on the socioeconomic vulnerability of women in rural communities in Nigeria. This study, therefore, seeks to conduct an exploratory analysis of the socioeconomic implications of the flooding crisis in rural Nigeria and how women, youths, and children are impacted by the menace.

2.0 A TALE OF FLOODING CRISIS AND CAUSES IN NIGERIA

Nigeria has continued to experience flooding crises since its independence. Statistics revealed that flooding occurrences between 1985 and 2011 affected 11 million Nigerians leaving behind 1100 deaths, millions injured, and displaced. The properties, businesses, and land damages were estimated to be about \$17 billion (Nkwunonwo et al., 2016). The 2012 flood occurrence was one of the most severe crises, it affected 30 of the 37 states of the federation. The occurrence affected over seven million Nigerians, killing 363 persons while 2.1 million persons were displaced (Adekola & Lamond, 2018; Okafor, 2021). Aside from the loss of lives, displacement, and damages, the country incurred economic costs of about 2.6 trillion due to farmland disruption, person-hour loss, and loss of national productivity (Cirella & Iyalomhe, 2018).

After the severe flood crisis in 2012, the frequency of annual flooding disasters increased in Nigeria. For instance, about seven states, namely Enugu, Ogun, Delta, Niger, Kano, and Bayelsa, were affected in 2018. The aftermath of the flood left the communities with destroyed farmlands and a loss of livelihood and lives.

Similar occurrences were witnessed in 2019, 2020, and 2021 (Maclean, 2022). Another landmark flooding crisis that superseded the 2012 occurrence happened in 33 states in 2022. The flood, which occurred between May and October, left 612 persons killed and 2400 people injured. It further displaced over two million people, destroying over 200000 homes and 332,327 hectares of farmland. The estimated economic losses from the flooding crisis were 6.68 billion dollars (Nwannekanma et al., 2023).

Recent statistics revealed that the lack of access to weather information inhibits the preparation and mitigation of flood crises. The study showed that men are more aware of the 2022 flood risk than women. Thus indicating a gender awareness gap of 8% from 23.16% of men are aware compared to 16.73%. It was further observed that 7.48% of men and 5.58% participated in evacuation instructions. In terms of age distribution, the elderly populace participated more than youths in the process. By implication women and youths are often ignored in flood assessment, awareness, and mitigation strategies.

The flooding crisis in Nigeria is attributed to different causes. MacLeod et al. (2021) opined that



Flooding affected woman in Agboyi Ketu, Lagos

excessive rainfall and flooding are caused by climate changes which leads to rising sea temperatures, coastal storms, and water flow above sea level. Since the aftermath is not only experienced along the coastal line, it is further argued that other artificial activities aggravated the flood crisis in Nigeria. Echendu (2020) argued that flooding is induced by the lack of proper physical planning and the near non-existence of environmental infrastructures. To corroborate this assertion, Lawanson et al. (2023) submitted that the increasing population explosion in coastal regions, land reclamation, and encroachment causes an increased risk of flooding. This occurred when increasing population growth forced humans to extend their accommodation beyond dry lands. This process distorts the ocean environment's profile, sediment size, and bed slope.

Poor drainage maintenance and indiscriminate waste disposal contributed to the flooding crisis in Nigeria. Okafor (2021) opined that dam failure and structural deficiencies in the Nigerian drainage infrastructure led to the uncontrolled and sudden release of water into the land. Also, blockage of drainage channels with indiscriminate and illegal buildings causes drainage systems to function less effectively in channeling flood in the right path, thus causing diversion into the dry areas of the country.

3.0 LITERATURE REVIEW ON THE SOCIOECONOMIC IMPLICATIONS OF FLOODING IN NIGERIA

The flood crisis exhibited several consequences on the lives and livelihoods of Nigerians. Nigeria is one of the leading countries in terms of poverty levels. The escalating annual flooding dilemma would further exacerbate the country's poverty conditions. Echendu (2020) established that flooding in Nigeria may make it impossible to realize the eradication of poverty in 2030. This is reflected in the disruption of economic activities amongst farmers particularly youths and women, and loss of national productivity due to injury, displacement, or death. In the same vein, the Nigerian poverty conditions, particularly in the rural region, may further increase the vulnerability of the masses to flood crises.

The flood crisis exhibits a chain reaction effect on food security because it erodes the vast Nigerian arable lands and disrupts seasonal plantation planning, thus leading to shortages in food production and supply. Musa & Shabu (2019) submitted that 51% of farmlands were inundated, 42% of total vegetation was destroyed, and 35% of farmland was eroded by flood in Adamawa state in 2014. Echendu (2020)

further submitted that the socioeconomic impact of flooding on the Nigerian masses created a long-term consequence on livelihood in rural areas because agriculture is their primary source of survival and development. This is attributed to the increase in the importation of essential foods to meet up national demands for food supply.

Similarly, the consequences of the flooding crisis are felt in the educational attainment of school children in Nigeria. Oyilieze et al. (2022) argued that displaced children could not continue with their schooling. The impediment further threatens the gains recorded in the previous years on educational attainment. To corroborate this position, Oyedeji (2023a) pointed out that the 2022 flood crisis reduced the number of school enrolments in rural communities in Ondo state from 440 new enrolments to 120 due to classroom destruction and inaccessible roads. More importantly, teachers' psychological state may hinder the educational performance of the students (Odunsi et al., 2024).

Ill-health is also another socioeconomic impact of the flooding crisis in Nigeria because it significantly contributed to the outbreak of diseases. Thus, leading to the outburst of communicable and non-communicable diseases such as hepatitis, tuberculosis, cholera, malaria, and typhoid. Olanrewaju et al. (2019) opined that the outbreak of these diseases reduces the immune levels of children, making them sickly and unable to perform their regular activities. Further, youths and adults suffer from a loss of person-hour due to the antecedent health crisis. Oyedeji (2023b) found that women and children are more susceptible and vulnerable to flooding crises as pregnant women were unable to attend antenatal clinics, thereby leading to their patronage of traditional birth attendants. Also, the flooding crisis impacted the long-term emotional and psychological distress of youths and women, leading to post-traumatic stress disorder, behavioral shifts, and mental imbalances experienced by survivors.

4.0 SOCIAL AND ECONOMIC VULNERABILITIES OF WOMEN IN RURAL NIGERIA

The 2022 flooding statistics revealed that female deaths occurred three times more than male deaths during the crisis. Also, 120% of injured casualties were recorded in females than males (NBS, UNDP, 2023). This implied that flood occurrences limit women's economic opportunities. Oyilieze et al. (2022) noted that more women face the destruction of farmlands and houses in Anambra State. Similarly, Akinsemolu & Olukoya (2020) observed that women in rural Ilaje



Female Resident are affected by Flooding in Kuwa Community, Benue State

Equally, women and youths have very minimal or no access to financial support because of their inability to present title documents, thereby making it extremely difficult to recover from losses. Again, low educational attainment contributes to their non-participation in campaigns and awareness of weather forecasts and control mechanisms (Ayanlade et al., 2023). This had a ripple effect on how they react to information

in Ondo state lost their economic independence to the flood crisis and even exhausted their little savings in finding adaptation strategies to combat the menace.

Gender roles and household structure play significant roles in ascertaining the social vulnerabilities of women to the flooding crisis. Climatic-induced stress challenges women in the performance of their multiple roles as mother, wife, and daughter. Some of the induced stress may be in the form of scarcity of clean and safe water for the family, provision, and access to clean energy, thus putting women at a disadvantage in family upkeep (Ayanlade et al., 2023). The UNICEF 2022 report revealed that women and girls are responsible for 80% of household water collection. More so, women are positioned to care for their injured relatives, aged and children thereby increasing their workload and reducing their adaptive capacity during the crisis (Tecnoserve, 2023).

More so, women are susceptible to domestic violence and abuse from partners whose anger was aggravated by the flooding crisis (Riyad et al., 2019). More adolescent girls are further exposed to sexual violence and abuse in their displaced homes and camps (Sloand et al., 2017). Aside from bearing the brunt of family upkeep, women tend to be criminalized and silenced by their violent partners. Flood crisis could further impact women's physical health vulnerabilities by reducing their reproductive outcomes. These lead to the occurrence of urinary tract infections, premature delivery, forced abortion, perianal rashes, and maternal mortality (Riyad et al., 2019). Oyedeji (2023b) confirmed that the flood crisis inhibits access to antenatal care and other healthcare services in rural communities.

on climate changes, extreme weather conditions, and other related warning signals before the onset of rainfall or water overflow (Eniwotu & Otite, 2023).

5.0 RECOMMENDATIONS

To achieve effective mitigation and resilience strategies in rural communities in Nigeria, the policies on flood management must be youth-led and gender inclusive. Some other recommendations are:

- There is a need to adopt social capital for awareness of flood risk reduction. Using women as a medium of communication with their immediate society on weather extremes would allow retention and flow of information amongst the entire community. Since women are primarily the largest occupiers of rural communities, they tend to build resilience in managing the impact of the flood crisis, prepare for its consequences, and plan for recovery through mutual connectedness.
- Also, policies that support youth education in rural communities should be enacted. This would inform attitudinal changes and perceptions on weather forecasts, waste management, and effective drainage channel maintenance. The need for education will also assist them in reacting uniquely to flood control, thus increasing their knowledge, adaptation, and resilience strategies for flood management (Akinsemolu & Olukoya, 2020).
- Women's inclusion in climate change and disaster reduction programs will assist in effectively combating flood disasters in rural

communities in Nigeria. This is essential because no one can tell their stories better than those having first-hand experiences of their socioeconomic vulnerabilities. Therefore, strengthening women's voices through gendered-inclusive climatic policy actions will build their autonomous adaptive capability in combating flooding crises.

- It is expedient to inculcate gendered-differentiated and disaster-targeted access to micro-financial services such as micro-insurance schemes, credit facilities, and deposit savings as a crucial policy response to flood risk management and rural development in Nigeria.

6.0 CONCLUSION

This study contributed to the empirical discussion on the vulnerability of women to climate impact in rural communities in Nigeria. The study established that economic, health, education, and mental stability were disproportionately impacted by flooding disasters when compared to their male counterparts. The study recommends that gender-inclusive policies, which allow female voices to be heard in awareness campaigns and decisions on flooding risk control policies, should be strengthened. The study further submits that youths in rural communities should take on leadership roles in campaigns and weather extreme awareness programs to use their social connectedness to build robust interrelationships amongst children and relatives across communities. This would assist in maintaining environmental discipline on waste disposal and drainage channel management while regulating construction and physical planning. More importantly, the study opined that gender-differentiated access to education and finance should be instituted to achieve well-grounded access to financial literacy in building women's adaptive capability and resilience in combating future reoccurrence of flooding in rural communities.

References

- Adekola, O., & Lamond, J. (2018). A media framing analysis of urban flooding in Nigeria: current narratives and implications for policy. *Regional Environmental Change*, 18(4), 1145–1159. <https://doi.org/10.1007/s10113-017-1253-y>
- Akinsemolu, A. A., & Olukoya, O. A. P. (2020). The vulnerability of women to climate change in coastal regions of Nigeria: A case of the Ilaje community in Ondo State. *Journal of Cleaner Production*, 246, 119015. <https://doi.org/10.1016/j.jclepro.2019.119015>
- Oyilieze, A., et. al. (2022). Climate-Driven Temporary Displacement of Women and Children in Anambra State, Nigeria: The Causes and Consequences. In *Climate Change in Asia and Africa - Examining the Biophysical and Social Consequences, and Society's Responses*. IntechOpen. <https://doi.org/10.5772/intechopen.104817>
- Ayanlade, A., Oluwatimilehin, I. A., Ayanlade, O. S., Adeyeye, O., & Abatemi-Usman, S. (2023). Gendered vulnerabilities to climate change and farmers' adaptation responses in Kwara and Nassarawa States, Nigeria. *Humanities and Social Sciences Communications*, 10(1), 911. <https://doi.org/10.1057/s41599-023-02380-9>
- Cirella, G., & Iyalomhe, F. (2018). Flooding conceptual review: Sustainability-focalized best practices in Nigeria. *Applied Sciences*, 8(9), 1558. <https://doi.org/10.3390/app8091558>
- Echendu, A. J. (2020). The impact of flooding on Nigeria's sustainable development goals (SDGs). *Ecosystem Health and Sustainability*, 6(1). <https://doi.org/10.1080/20964129.2020.1791735>
- Eniwotu, A. R., & Otite, A. (2023). The ripple effects of flooding on women in Nigeria. *Journal of Public Administration, Finance and Law*, 28, 119–135. <https://doi.org/10.47743/jopafi-2023-28-11>
- Lawanson, O. I., Proverbs, D., & Ibrahim, R. L. (2023). The impact of flooding on poor communities in Lagos State, Nigeria: The case of the Makoko urban settlement. *Journal of Flood Risk Management*, 16(1). <https://doi.org/10.1111/jfr3.12838>
- Maclean, R. (2022, October 17). Nigeria floods kill hundreds and displace over a million. *The New York Times*. <https://www.nytimes.com/2022/10/17/world/africa/nigeria-floods.html>
- MacLeod, D. A., Dankers, R., Graham, R., Guigma, K., Jenkins, L., Todd, M. C., Kiptum, A., Kilavi, M., Njogu, A., & Mwangi, E. (2021). Drivers and subseasonal predictability of heavy rainfall in Equatorial East Africa and relationship with flood risk. *Journal of Hydrometeorology*, 22(4), 887–903. <https://doi.org/10.1175/JHM-D-20-0211.1>
- Musa, S. D., & Shabu, T. (2019). Using geographic information system to evaluate land use and land cover affected by flooding in Adamawa State, Nigeria. *Jambá Journal of Disaster Risk Studies*, 11(1). <https://doi.org/10.4102/jamba.v11i1.494>
- Nkwunonwo, C. U., Whitworth, M., & Baily, B. (2016). Flooding and flood risk reduction in Nigeria: Cardinal gaps. *Journal of Geography and Natural Disasters*, 5(1), 1–12.
- Nwannekanma, B., Godwin, A., Osahon, J., Obansa, I., & Osayande, M. (2023). Flood of fury: No respite for Bayelsa, Kogi, Rivers, 30 others ahead of another cloudburst. *The Guardian*, 1. <https://guardian.ng/features/focus/flood-of-fury-no-respite-for-bayelsa-kogi-rivers-30-others-ahead-of-another-cloudburst/>
- Odunsi, O. M., et.al. (2024). Households' resilience to flood disaster in Lagos State, Nigeria: developing a conceptual framework unifying disaster resilience components and dimensions. *Journal of Environmental Studies and Sciences*, 14(1), 69–86. <https://doi.org/10.1007/s13412-023-00864-3>

- Okafor, J. C. (2021). Flood, Livelihood Displacement, and Poverty in Nigeria: Plights of Flood Victims, 2012-2018. *African Handbook of Climate Change Adaptation: With 610 Figures and 361 Tables*, 2535–2545. https://doi.org/10.1007/978-3-030-45106-6_124
- Olanrewaju, C. C., Chitakira, M., Olanrewaju, A., & Louw, E. (2019). Impacts of flood disasters in Nigeria: A critical evaluation of health implications and management. *Jambá: Journal of Disaster Risk Studies*, 11(1), 1–9.
- Oyedeji, O. (2023a). Flooding making access to education difficult in rural communities. *Dataphyte*. <https://www.dataphyte.com/latest-reports/flooding-making-access-to-education-difficult-in-rural-communities/>
- Oyedeji, O. (2023b). How flooding threatens access to healthcare in vulnerable communities. *Dataphyte*. <https://www.dataphyte.com/latest-reports/how-flooding-threatens-access-to-healthcare-in-rural-communities/>
- Riyad Fatema, S., Islam, M. S., East, L., & Usher, K. (2019). Women's health-related vulnerabilities in natural disasters: a systematic review protocol. *BMJ Open*, 9(12), e032079. <https://doi.org/10.1136/bmjopen-2019-032079>
- Sloand, E., et. al. (2017). Experiences of violence and abuse among internally displaced adolescent girls following a natural disaster. *Journal of Advanced Nursing*, 73(12), 3200–3208. <https://doi.org/10.1111/jan.13316>
- Statistics, N. B. of. (2023). Nigeria flood impact, recovery and mitigation assessment report 2022-2023.
- Tecnoserve. (n.d.). 5 ways climate change disproportionately impacts women | expert analysis. <https://www.tecnoserve.org/blog/5-climate-change-impacts-women/#:~:text=Women are more vulnerable to,adequate shelter and healthcare.>
- Umar, N., & Gray, A. (2023). Flooding in Nigeria: a review of its occurrence and impacts and approaches to modelling flood data. *International Journal of Environmental Studies*, 80(3), 540–561. <https://doi.org/10.1080/00207233.2022.2081471>
- United Nations. (2021). By 2030, half world's population will be exposed to flooding, storms, tsunamis. <https://news.un.org/en/story/2021/11/1104972>
- World Health Organization. (2024). Floods. World Health Organization,
- 2012 Nigeria Flood on Emergent Cities of Nigeria : The Case of Yenagoa , Bayelsa State. *Civil and Environmental Research*, 6(5), 31–41.



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