

A RESEARCH PROJECT
SUBMITTED TO VAN HALL
LARENSTEIN UNIVERSITY OF
APPLIED SCIENCES IN
PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR
THE DEGREE OF MASTERS IN
MANAGEMENT OF
DEVELOPMENT WITH
SPECIALIZATION IN
DISASTER RISK
MANAGEMENT



BUILDING COMMUNITY RESILIENCE TO PERENNIAL FLOOD

A CASE STUDY OF SMALLHOLDER FARMERS IN SAGBAMA
COMMUNITY, BAYELSA STATE, NIGERIA

SEPTEMBER, 2021

©AUTHOR: HARRISON
OGAGAOGHENE IMUGBA

Key terms – *Perennial Flood,
Resilience, Smallholder Farmers.*

**BUILDING COMMUNITY RESILIENCE TO PERENNIAL FLOODS – A CASE STUDY OF
SMALLHOLDER FARMERS IN SAGBAMA COMMUNITY, BAYELSA STATE, NIGERIA.**

A Research Thesis Submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment of the requirements for the Degree of Master in Management of Development with Specialisation in Disaster Risk Management (DRM)

By

HARRISON OGAGAOGHENE IMUGBA

Student Number: 000024586

Thesis Supervisor:

Karen Batjes

Assessor:

Ir. Astrid Van Rooji

September 2021

Van Hall Larenstein University of Applied Sciences, Velp,

The Netherlands.

© **HARRISON** OGAGAOGHENE IMUGBA 2021 All Rights Reserved ©

DEDICATION

This Research is dedicated to *Jennifer Kache* for her uncharred love and support towards my educational and career goal.

ACKNOWLEDGEMENT

Foremost, I am thankful to God Almighty for making it possible to complete this thesis. Abba! Heaven knows I am nothing without you.

As an OKP Scholarship holder, I would not be here without the financial contribution made by the NUFFIC board and thus I am indeed truly grateful. My gratitude also goes to my thesis supervisor Karen Batjes for her guidance through the research process and her motherly role played.

To my study mentor, Astrid Van Rooij, I do appreciate all of your kind words of advice and help during master study trajectory in the Netherlands.

I am also thankful to my beloved parents, Mr. & Mrs. Imugba for the valuable role played in the success of my near completed academic career. My siblings, for their encouragement towards my educational goals and support towards my journey to the Netherlands.

I would indeed be outraged if I forget to express my thanks to my bestie, Iqra Rafiq for her support and care throughout my stay in the Netherlands.

Special thanks to my friends whom I call brothers, Adonkie Ebiegberi and Emuobo Ugbeh for their immense support in this research which bears a part of its motivation.

Finally, I extend my warm thanks to all masters' student and teachers of the faculty of management of development for the immense training I got from classes.

God bless you all.

CONTENTS

1. INTRODUCTION.....	1
1.1 BACKGROUND OF THE STUDY.....	1
1.2 THE RESEARCH PROBLEM	2
THE PROBLEM OWNER	2
1.3 SIGNIFICANCE OF THE STUDY	3
1.6 RESEARCH AIM & OBJECTIVES	3
1.7 RESEARCH QUESTIONS.....	3
1.7.1 Sub Research questions	3
2. THE CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW	5
2.1 THE CONCEPTUAL FRAMEWORK	5
2.2 HAZARDS AND STRESSES.....	6
2.3 LIVELIHOODS.....	7
2.4 FUTURE UNCERTAINTIES.....	7
2.5 GOVERNANCE	8
3. METHODOLOGY	10
3.1 INTRODUCTION	10
3.2 COVID-19 CONTEXT OF THE RESEARCH	10
3.3 SCOPE OF THE STUDY.....	10
3.3.1 THE STUDY AREA.....	10
3.4 RESEARCH STRATEGY AND APPROACH	11
3.5 POPULATION AND SAMPLING.....	13
3.6 DATA COLLECTION	13
3.7 ANALYSIS PLAN.....	14
3.8 RESEARCH PLAN	14
3.9 ETHICAL CONSIDERATION	15
3.10 RESEARCH LIMITATIONS	15
4. FINDINGS.....	16
4.1 INTRODUCTION	16
4.2 DEMOGRAPHY OF RESPONDENTS	16
4.2.1 Age	16
4.2.2 Sex.....	17

4.2.3 Education level	17
4.2.4 Household Size	18
4.2.5 Land Size.....	18
4.2.6 Crop type.....	19
4.2.7 Summary of Respondents Demographics.....	19
4.3 VULNERABILITY OF SMALLHOLDER FARMERS TO PERENNIAL FLOOD	19
4.3 EXPLORING LIVELIHOODS & THE CURRENT COPING STRATEGY BY SMALLHOLDER FARMERS TO MITIGATE THE EFFECTS OF THE HAZARD.....	21
The Consequence of perennial flood on smallholder farmers	21
The Coping strategy used by the Smallholder farmers.....	23
4.4 ADAPTIVE CAPACITY OF SMALLHOLDER FARMERS TO THE PERENNIAL FLOODS.....	25
4.5 THE ROLE OF GOVERNANCE	26
Small Holder Farmers.....	26
Community Leaders	27
5. DISCUSSION.....	29
5.1 VULNERABILITY OF SMALLHOLDER FARMERS TO PERENNIAL FLOOD	29
5.2 EXPLORING LIVELIHOODS & THE CURRENT COPING STRATEGY BY SMALLHOLDER FARMERS TO MITIGATE THE EFFECTS OF THE PERENNIAL FLOODS	29
5.3 ADAPTIVE CAPACITY OF SMALLHOLDER FARMERS TO THE PERENNIAL FLOODS.....	30
5.4 THE ROLE OF GOVERNANCE	30
5.5 REFLECTION ON THE ROLE OF THE RESEARCHER	31
5.5.1 Reflection on the research process	31
5.5.2 Reflection on quality of data findings	32
6 CONCLUSION AND RECOMMENDATION.....	33
6.1 CONCLUSION.....	33
6.2 RECOMMENDATIONS.....	34
REFERENCES	36
APPENDICES	38
APPENDIX 1. QUESTIONS FOR SMALLHOLDER FARMERS	38
APPENDIX 2. QUESTIONS FOR KEY INFORMANTS FROM GOVERNMENTAL (COMMUNITY OR LOCAL) STRUCTURES	40
APPENDIX 3: Methods of data collection and the tool used	41

APPENDIX 4: DEMOGRAPHY OF SMALLHOLDER FARMER	42
--	----

List of Figures

Figure 1: The Resilience Framework	5
Figure 2: Map of Sagbama Community	11
Figure 3: Research Strategy	12
Figure 4. Age of respondents	16
Figure 5. Sex of respondents.....	17
Figure 6. Education level of respondents	17
Figure 7. Size of respondent household	18
Figure 8. Distribution of Respondent land size	18
Figure 9. Type of crops grown by the respondents	19
Figure 10. Digital elevation model of Sagbama community, Bayelsa state, Nigeria.	21

List of Images

Image 1: Creeping floodwaters into farmland.....	22
Image 2: Flooded piece of land in Sagbama community	22
Image 3:Photo showing the extent of flood reach on smallholder farmers home	23
Image 4:Harvested Cassava Stems	24
Image 5:Cassava storing & processing into Garri	24
Image 6:A tool used for making Garri.....	25
Image 7:Turning processed cassava into Garri	25
Image 8:Research assistant conducting interview session with a female smallholder farmer	26
Image 9:Research assistants conducting an Interview session with community leader (Amanayowe of Sagbama community)	27
Image 10:Photo showing the artificial dyke created by the government to mitigate the flood	28

List of Table

Table 1: Research Plan	14
Table 2: Demographic profile of respondents	42

LIST OF ACRONYMS

CCA – Climate Change Adaptation

DRR – Disaster Risk Reduction

FEMA – Federal Emergency Management Agency

IOM – International Organisation for Migration

LGA – Local Government Area

NCFRMI – National Commission for Refugees, Migrants & internally displaced person

NITP – Nigerian Institute of Town Planners

NEMA – National Emergency Management Agency

OCHA – United Nations Office for the Coordination of Humanitarian Affairs

OXFAM – Oxford Committee of Famine Relief

PR – Poverty Reduction

UNHCR – The United Nations High Commission for Refugees

UNICEF – United Nations Children Emergency Fund

V2R – From Vulnerability to Resilience

WOCON – Women’s Consortium of Nigeria

ABSTRACT

Flooding has become more common in many developing nations as a result of increasing urbanization and climate change. As a result, community people are constantly confronted with the harmful impacts of floods. Flooding is a recurring issue in Nigeria, causing huge economic losses as a result of damage to key infrastructures such as roads and buildings, and loss of crops and valuable agricultural land. The government's action, however, has also been painfully slow and bureaucratic for community members in dire need of government assistance, often leaving smallholder farmers more vulnerable to the threat hence urgent action is needed in many vulnerable communities to mitigate their effects and to build resilience to this menace.

This research was conducted using a qualitative research design and the strategy is a case study. Data collected were both primary and secondary sources. Primary data was collected through the use of semi-structured interviews, observation, and photo-elicitation. Secondary data sources were from existing literature related to the title.

The findings show that Sagbama community is located in a low-lying region and is classified as highly vulnerable to flooding. The lack of an appropriate early warning system to predict the nature of the flood also puts many smallholder farmers and their livelihoods at risk, as they frequently have to rely on indigenous knowledge combined with a lack of government support, and they do not have insurance for the yearly loss of crops due to the perennial floods that affect them. Many smallholder farmers' coping method in dealing with the recurring flood is to raise their stored food and valuables from the ground in their homes to prevent being damaged by floods. Even though, Smallholder farmers in Sagbama community have shown some adaptability to the perennial floods by planting annual crops and harvesting their crops earlier than usual even though it comes at the cost of low yield or production. The government's strategy to combat flooding in Sagbama community is more technical than people-oriented, like an artificial dike built of dirt to limit the amount of flood waters that enter the community. The primary field data collected shows that the majority of smallholder farmers are women, hence are at a disadvantage as they do not have a voice and are thus neglected in Sagbama community.

Based on the findings, the researcher recommends; Proper designation of flood-prone areas be made available to smallholder farmers and community members to enable them to be aware of inherent risk. Increased community awareness on the negative effect of the illegal digging near the river forcados to reduce the risk of flooding, Capacity building for Female smallholder farmers through income diversification to reduce the vulnerability on government relief items during the months of flooding and, strengthen the link between the government structures and smallholder farmers to better understand their needs and increase the declining rate of agricultural production. As a final point, the researcher recommends a further detailed study of the influence of gender on the vulnerability of smallholder farmers in Sagbama community to increase community resilience to the perennial floods.

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Floods are by far the most commonly occurring natural hazards in the world and have had a disastrous effect in numerous communities globally (Berezi, et al., 2019). In 2020 alone, floods affected 7 million people and resulted in 1,273 deaths in Africa, which, according to the disaster record database, EM-DAT, is the highest number recorded since 2006 (CRED, 2021). It is not surprising therefore that flooding is often perceived as the deadliest naturally occurring hazard. Further, evidence from the field suggests floods are increasing in frequency because of climate change (Onuigbo, et al., 2017) and urgent action is needed in many vulnerable communities to mitigate their effects and to build resilience to this menace.

Floods have a huge impact on less developed countries. Mainly due to poverty, lack of early warning, poor institutions promoting lack of insurance against the hazard, and, most importantly, a slew of issues with emergency response and early warning preparedness (Wizor & Agbabou, 2014). In Nigeria, floods constantly affect people living in flood-prone areas (Onuigbo, et al., 2017). Poor people are particularly vulnerable as it is they who live in flood-prone areas and steep slopes. The 2012 floods in Nigeria are seen as the most devastating floods to ever hit the country with over 363 people killed, and 597,476 homes damaged and displacing 2.3 million people. Some of the worst-hit states within the country affected by the 2012 floods were Kogi, Edo, Cross Rivers, Rivers, Benue, Delta, and Bayelsa State (Nemine, 2015). There were substantial economic damages recorded within those affected states such as the destruction of school buildings, markets, and loss of large hectares of fertile agricultural lands, and traditional houses made from mud and bricks (Berezi, et al., 2019). Apart from schools being closed for weeks, farmers across the country suffered huge losses to crop yield coupled with significant challenges related to food storage, processing, and marketing (Nemine, 2015). Although, the information on the amount of money spent by the government on disaster victims, particularly flood victims, remains limited in the professional literature, editorial commentary in the media routinely asserting or suggesting that the government spends billions of Naira on disaster victims every year. Furthermore, there is an absence of data on the level of losses in the affected parts of the country. (Berezi, et al., 2019).

The Southern part of Nigeria where the study area is located is no stranger to flooding. Bayelsa state was first hit by floods in 1999. Since then, the problem of flooding has continued to pose a serious threat to the local people, and their livelihoods (Mmom & Ayakpo, 2014). Flooding has become a perennial problem for many people living close to rivers. Sagbama which is located in Bayelsa State, is no exception, as many people in the community especially smallholder farmers live in areas close to the floodplain which are prone to flooding by river Forcados (Mmom & Ayakpo, 2014). The increasing frequency of the flooding, consequent loss of crops, and reduced yields have made it exceedingly difficult for smallholder farmers to recover from each onslaught. It is interesting to know that despite government compensation schemes offered through the National Emergency Management Agency (NEMA), the risk and vulnerability remain unabated (Berezi, et al., 2019)

Much has been researched on identifying the level of vulnerability in the region (Mmom & Ayakpo, 2014), But there is little or no information on how communities themselves can take action to become resilient. It is common knowledge among disaster risk professionals that there is no blueprint for reducing the risk that vulnerable communities face as it depends on the context and the risks involved. This study, therefore, focuses specifically on the vulnerability and resilience of Sagbama community to perennial floods.

1.2 THE RESEARCH PROBLEM

Flooding has become more common in many developing nations as a result of increasing urbanization and climate change. As a result, community people are constantly confronted with the harmful impacts of floods (Mensah & Ahadzie, 2020). Flooding is a recurring issue in Nigeria, causing huge economic losses as a result of damage to key infrastructures such as roads and buildings, and loss of crops and valuable agricultural land (Nemine, 2015). The government's action, however, has also been painfully slow and bureaucratic for community members in dire need of government assistance, often leaving smallholder farmers more vulnerable to the threat (Wizor & Agbabou, 2014). Various studies have also highlighted Nigeria's flood vulnerability and some of the causes are proximity to rivers, land use, and elevation above sea level (Mmom & Ayakpo, 2014). New, inclusive ways, therefore, have to be found in Sagbama community to build resilience to the persistent problem of flooding and at the same time reduce community dependence on the government.

This research thus aims to investigate the adverse effects of perennial flooding on the economic activities of Sagbama community which comprises mainly smallholder farmers and to understand their level of resilience in dealing with this hazard with a view to providing recommendations to build community resilience.

THE PROBLEM OWNER

The Commissioner of this study – The National Emergency Management Agency (NEMA) was founded to manage disasters in Nigeria under Act 12 as amended by Act 50 of 1999. Since its inception in 1999, NEMA has been engaged in delivering emergency aid and assisting in the management of disaster-related problems in Nigeria. The Federal Government of Nigeria, through NEMA, has also made a statement in support of state and local governments in disaster relief and response. NEMA has frequently delivered relief items e.g food items consisting of bags of rice, noodles, or building materials such as wood, nails, etc. to the Sagbama community in a bid to recover in the past due to its vulnerability to flooding. COVID-19 has brought with it some changes like funds being diverted towards the healthcare of people affected by the virus and left smallholder farmers in flood vulnerable communities like Sagbama fending for themselves.

The knowledge needed by NEMA is to comprehend how the smallholder farmers in the Sagbama community can become resilient to the recurring or perennial floods.

1.3 SIGNIFICANCE OF THE STUDY

The study is expected to provide vital knowledge using a framework aimed at building the resilience of smallholder farmers in Sagbama town against the recurring flood hazard in the region.

The findings of this work shall therefore go a long way in identifying ways to build the resilience of Sagbama smallholder farmers and the community to deal with the onslaught of the perennial floods that they are being exposed to annually. It shall identify most appropriately, the challenges smallholder farmers face within the community and identify good practices to reduce or mitigate flooding.

This study is of immense importance to smallholder farmers, community developmental organisations, NEMA, government ministries, researchers, and Sagbama community members. The study upon completion will enable flood vulnerable communities like Sagbama in Nigeria to be aware of the factors that contribute to their vulnerability, and how to cope with the situation. It is envisaged that the findings of this study will also encourage community developmental organisations to create sustainable flood mitigation strategies to protect the livelihoods of smallholder farmers and other income-generating activities in vulnerable communities as well.

This study will serve as a source of information for relevant government bodies on how to address disaster risk management problems affecting vulnerable communities like Sagbama community. Specifically, the results of this study will provide an information base that will help NEMA to formulate better interventions in support of community resilience to perennial floods. Finally, this study hopes to bring to light the inherent flood risk perception of Sagbama community members, and where there is a need for more awareness to be able to make better decisions and ensure resilience.

1.6 RESEARCH AIM & OBJECTIVES

This study aim to investigate ways to increase community resilience to perennial floods in Sagbama community.

The specific objectives of this study include;

- Identify the challenges to smallholder farmers in the study region due to perennial flooding.
- Explore the smallholder farmer's capacity to cope with the effects of the perennial floods.
- Gain insight into the government and other community-based organisations or institution's current community-level flood risk management plans and the interventions in place for mitigation of the flood risk.

1.7 RESEARCH QUESTIONS

What are the factors that influence smallholder farmers' resilience to perennial floods in Sagbama community?

1.7.1 Sub Research questions

1. Why are smallholder farmers in Sagbama community vulnerable to perennial floods?
2. What kind of coping strategies do smallholder farmers currently use when they are affected by perennial floods?

3. What capacities are there for improving smallholder farmer's adaptability to perennial floods?
4. What are the flood management plans made by the government or other stakeholders for smallholder farmers in Sagbama community?

2. THE CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

In this section, keywords used will be defined based on the works of others while expressing the views of the researcher, issues relevant to the scope of this research will be highlighted and the key elements (factors) of the conceptual framework for analysis will be described.

2.1 THE CONCEPTUAL FRAMEWORK

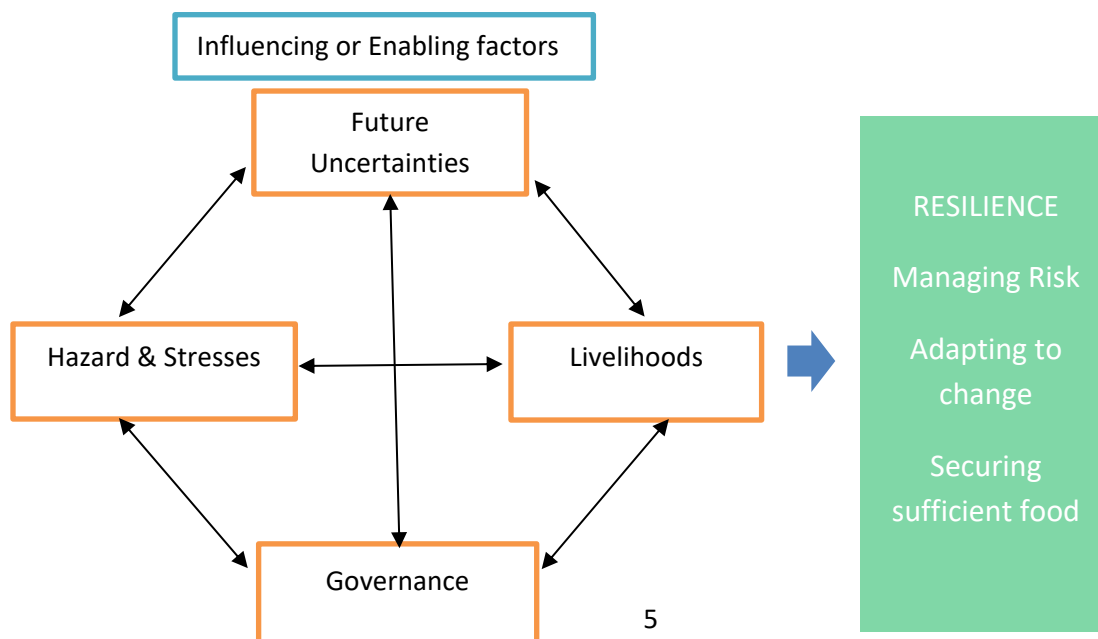
The conceptual framework used for this study draws its thinking from Katherine Pasteur's definition of the term resilience where she defines resilience as the community's ability to deal with, adapt, and recover from a hazard without jeopardizing its ability to secure food (Pasteur, 2011).

Central to this research is the understanding of how smallholder farmers themselves can become resilient to perennial floods and therefore based on the definition by Pasteur, the study will look at key factors that underlie building resilience relatable with the study. These factors are

- **Hazard and stresses:** Vulnerability of smallholder farmers to the perennial floods
- **Livelihoods:** Exploring livelihoods and the current coping strategy by smallholder farmers to mitigate the effects of the hazard
- **Future uncertainties:** Their adaptive capacity to deal with a future occurrence of the hazard, and
- **Governance:** The role of governance in building their resilience.

These underlying factors bear an influence on smallholder farmer's resilience to the perennial flood. The livelihood of smallholder farmers in Sagbama community is at risk from this perennial flood and thus based on the delineation of the identified factors, the information will help in developing better strategies aimed at positively affecting farmers' livelihood and reducing the impact on vulnerable farmers in the study area. Below is a visual representation of the conceptual framework to be used for this study.

Figure 1: The Resilience Framework



2.2 HAZARDS AND STRESSES

Katherine Pasteur described here that in determining resilience, there is a need to understand what kind of hazards and stresses will push households or communities into crisis and what can be done to reduce the exposure of people and their livelihoods to such hazards and stresses. But what are hazards and stresses?

A **hazard** is a harmful occurrence, human action, or situation that can result in death, injury, or other health consequences, property damage, loss of livelihoods and services, social and economic upheaval, or environmental degradation (reference). While **stresses** are those minor, low-impact events and seasonal variables that might jeopardize livelihoods, such as unemployment, price fluctuations, illness, local disputes, or gradual changes in climate.

In a bid to build smallholder farmer resilience to the perennial flooding which is the hazard in this case, it is therefore important to unravel what can be done to limit the local people and their livelihood vulnerability to the flood, as well as what is making them vulnerable (Heijmans, 2014). According to Merriam-Webster, the term "perennial" means "frequently repeated or recurrent" therefore perennial floods are repeating floods. This phenomenon also takes place when lakes, ponds, river beds, soil, and vegetation cannot hold all the water, so excess water runs off the land in large amounts that cannot be transported in river channels or retained in lakes, natural ponds, or man-made reservoirs (Berezi, et al., 2019). Therefore, it is necessary to ensure that the local people are aware of potential risks and have taken appropriate efforts to avoid or prepare for them if they are unavoidable (Pasteur, 2011).

Although many individuals define floods differently, all definitions include an element of disaster risk. The formula for determining disaster risk is when a hazard (flood) meets *vulnerability* or susceptible conditions and limits a community's capability to cope with the effects that the hazard brings, according to disaster risk professionals (Twigg, 2015).

The term **Vulnerability** is a function of exposure to the negative effect(s) of a hazard. To this end, the vulnerability of a location on the earth's surface to flooding is a consequence of the region's exposure to the hazard (a natural occurrence) and the manmade activities that obstruct the free flow of water within that locality (Berezi, et al., 2019). This aims to understand the risk landscape including why people are vulnerable and what is the nature of the hazard upon which they are vulnerable, and increase their risk awareness, and devise an early warning system to minimize the effect of the hazard on vulnerable communities and build back better (Pasteur, 2011).

In addition, GIS and remote sensing is becoming popular in determining vulnerability to flooding in many research done in Nigeria where Digital Elevation Models (DEM) are employed to simulate the extent of flooding exposure in coastal regions (Komolafe, et al., 2015) whereby the output of the models shows water elevation heights in meters and possible settlements at risk within flood-prone areas of the region (Onwuteaka, 2014).

2.3 LIVELIHOODS

Several definitions for **livelihood** are provided in existing literature, however, the Oxford dictionary meaning of the terminology connotes *“as the means to make a living”* or a mix of the resources utilized and activities to live. According to Ellis, Livelihoods are often associated with poverty and rural development, where he also defined as the *“composition of assets (natural, physical, human, financial and social capital), the activities, and the access to these that together determine the living gained by an individual or household”* (Ellis, 2000).

Hazards put a great deal of pressure on livelihoods with significant challenges in their social and health risks that may have considerable negative effects on livelihood capital. It is important that not only the risk on livelihood is reduced but also that the resistance to livelihood risk can be improved (SU, et al., 2018).

According to Pasteur, A livelihoods analysis should explore in detail the characteristics of the groups that are least able to cope and recover when hazards and stresses occur (Pasteur, 2011). Hitherto, the Livelihood context here will thus explore coping which is managing resources in adverse situations and they may entail a range of activities which are often defense mechanisms that people use for handling stress or temporary solutions to a problem according to (Twigg, 2015).

Communities require enough resources (such as cash, food, local organizations, and skills) to call on in times of need if they are to be resilient. It is however important to note that people with limited livelihood alternatives are more likely to be forced to live or work in hazardous or stressful environments. Therefore they are faced with dire circumstances, these people may turn to risky or unpleasant livelihood activities such as begging, illicit industrial employment, forest exploitation, or prostitution (Pasteur, 2011).

While reviewing the literature, It is becoming evident that the livelihoods of marginal and small farmers and even fishermen in vulnerable communities are affected through their loss of assets, loss of food sources (crops or stores), and loss of employment or income-earning opportunities. This situation is worst among smallholder farmers who are living close to coastal areas as in the case of the Sagbama community and may be forced to take desperate measures to survive such as abandoning their homes or selling vital land or tools upon which their livelihoods depend on as they have no savings or other alternatives like insurance (Mucherera & Mavhura, 2020). This might be referred to as a way of coping with the floods, and it destabilizes their future recovery and leads them deeper into poverty with each shock, i.e. flood recurrence (Twigg, 2015).

2.4 FUTURE UNCERTAINTIES

Future uncertainties are also seen as adaptive capacity. Over the last several decades, the necessity for immediate action to adapt to changing climate and its consequences has become a focal point of many climate-related conversations throughout the world, with an emphasis on building resilience and adaptive capacity to climate-related hazards and natural disasters (Holzkämper, 2017). Capacity refers to the people's and communities' strengths, coping mechanisms, and resources that can be utilized to mitigate, prepare for, and cope with the devastating impacts of disasters, or to swiftly recover from a disaster (Twigg, 2015). Capacities can therefore mean resources, knowledge, skills, social safety nets, etc. while

coping refers to methods or ways employed by people or vulnerable populations to deal with the effects of a hazard (flood).

Given the future challenges and complexities posed by climate change, (Douxchamps, et al., 2016) posits that adjusting to changing climate will increase household food security, reduce climatic risk, and have a substantial beneficial influence on land productivity, assuring continued output. It is important to know that communities are often highly aware of their physical environment and may have already created local techniques or coping strategies for prediction, early warning, readiness, and management of the hazard. Communities are also likely to be aware of the available local resources and capability for action in response to the hazard (Pasteur, 2011).

Hence, to strengthen agricultural producers' resilience to climate variability and to preserve and improve output, smallholders' indigenous knowledge and activities must be supplemented with government and other institutional support for effective and successful adaptation to the perennial flood (Williams, et al., 2019). This way of thinking highlights the need of designing community-driven interventions that will produce more accurate and appropriate analyses, plans, and actions aimed at building community resilience.

2.5 GOVERNANCE

The governance context here refers to a variety of official and unofficial organizations, rules, and practices that operate at various levels, from local to worldwide. These systems exist at every level, from the home to the local community to the international level. Not only do they contain official institutions and regulations, but also informal structures such as cultural rules of behavior (Pasteur, 2011). When trying to build resilience, it is important to look at the role of government in the exposure or mitigation of the risk or hazard. Floods can literally 'wash away' overnight what communities may have acquired over years in terms of development and growth and It is still being reported to be disruptive to the livelihood of community members (Ruiz-Cortés & Alcántara-Ayala, 2020). But what is the role of governance in building resilient communities?

According to Tran, Smallholder farmers in many communities are often politically marginalized and have little say in the policy or institutional decisions that affect them (Tran, 2019). For example in developed countries like the USA, It was discovered that development along the coastline and flood-path increased their vulnerability to flooding when it is met with increased rainfall and rising sea level. It was also analyzed that the federal flood policies and programs in the USA are costly, ineffective, and have inadvertently encouraged development in a high-risk flood zone. They also revealed that community-based flood risk management is an effective way to reduce flood damages in the USA (Tyler, et al., 2019).

However, in many developing countries, the government has only focused on providing flood risk management plans which failed to reduce its effect, and residual risk. This is because there is an almost exclusive focus on structural flood defense measures like building dams or levees, rather than an understanding of social and institutional processes, such as inclusive community engagement with government bodies and community-level responsibility, which plays an important role in assisting people

to cope with flooding and thus making communities more resilient to the effects of flooding when it occurs (Nye, et al., 2011).

There is therefore a need to encourage an inclusive approach towards building resilience in flood vulnerable communities through multi-stakeholder partnerships. These relevant stakeholders such as community members, local chiefs, governmental bodies tasked with flood mitigation or response, and local or international non-governmental organisations (NGOs) need to come together and develop strategies that will sustainably mitigate the risk of flood.

3. METHODOLOGY

3.1 INTRODUCTION

Every research work has a methodology which is the procedure adopted in carrying out the research. Therefore, this chapter deals with Covid – 19 as the context for this research, the scope of the study (Sagbama community), research strategy, population and its sampling criteria, data collection & methods used for the analysis, ethical consideration as well as limitations to the research.

3.2 COVID-19 CONTEXT OF THE RESEARCH

This research was conducted while the Covid-19 Pandemic was still very in the sphere of things. It had become the new normal. Lockdown restrictions in Nigeria coupled with the state of the limited number who had been able to get vaccinated made it difficult for the researcher to carry out the primary data collection personally. International travel restrictions demanded that people who boarded flights must show proof of vaccination or have taken a PCR test no longer than 48 hours.

Given this circumstance, the researcher performed the fieldwork study from The Netherlands, observing and according to the COVID-19 rules and regulations in the country. The researcher used WhatsApp video calls to conduct the Interviews with smallholder farmers and key informants, however, there were instances where the network was an issue for communication and hence the interviews were done exclusively by the research assistant while keeping in constant contact with the researcher via WhatsApp text message. When the network was restored, the researcher was able to communicate freely with the study participants.

3.3 SCOPE OF THE STUDY

This research or study is restricted to Sagbama community which is a part of Sagbama local government area (LGA) in Bayelsa State, Nigeria. *See figure 1.*

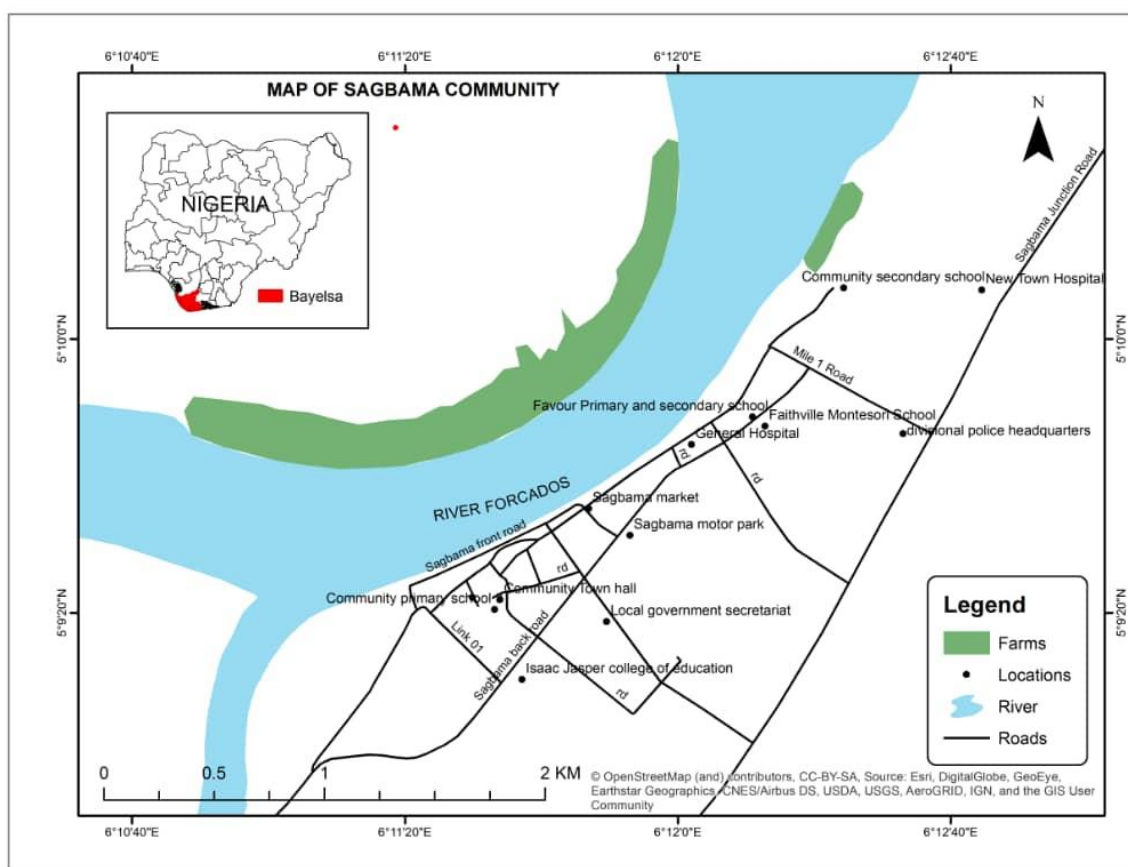
3.3.1 THE STUDY AREA

Sagbama community is a relatively small community situated on the left bank of the Forcados River. It is a tributary of the River Niger (Major River in Nigeria). Sagbama community has no administrative boundary, nevertheless, an attempt was made using ArcMap software to calculate its area, which was estimated to be about 7.14 km² of land. It was established in 1976 and is one of the oldest Local Government Areas (LGAs), and the main headquarters of Sagbama Local Government Area (LGA) in Bayelsa State, Nigeria (Mmom & Ayakpo, 2014). The area of study enjoys a tropical monsoon climate, with prolonged and heavy rainy seasons ranging from 2000 to 2500 mm from April to October. The soil is a mix of both sand and loam, and underneath the surface of this beautiful soil type lies an impenetrable hard layer that is constantly leached due to the frequent rainfall in this area. Throughout the year, the weather in the study is hot and humid, with a generally continuous high humidity. Sagbama community is also well-drained with fresh and saltwater, and the (inflow of seawater inland is the cause of the saltwater).

Sagbama community is home to the Ijaw, Isoko, and Urhobo ethnic nationalities, with the Ijaws making up a large proportion of the population (Mmom & Ayakpo, 2014). The exact population data for Sagbama

community isn't known but the population data of Sagbama Local Government Area (LGA) according to the 2006 population census is 21,448. However, it is important to note that Sagbama community which is a part of Sagbama LGA is only a fraction of that number. Most of the relief is lowland providing a viable and rich natural resource base livelihood for smallholder farmers for whom this study is intended for and the farming practice by this study group is mixed cropping consisting mainly of yam, cassava, and vegetables. Over the decades, Sagbama community has seen its fair share of oil spill tragedies, and it is still recovering, but the yearly and repeated flooding in this impoverished community has put the frosting on the cake (Berezi, et al., 2019). The map of the study area is shown below (see figure 2)

Figure 2: Map of Sagbama Community



Software used: ArcGIS

Sources: Open Street map, Google Earth, Author Fieldwork (2021)

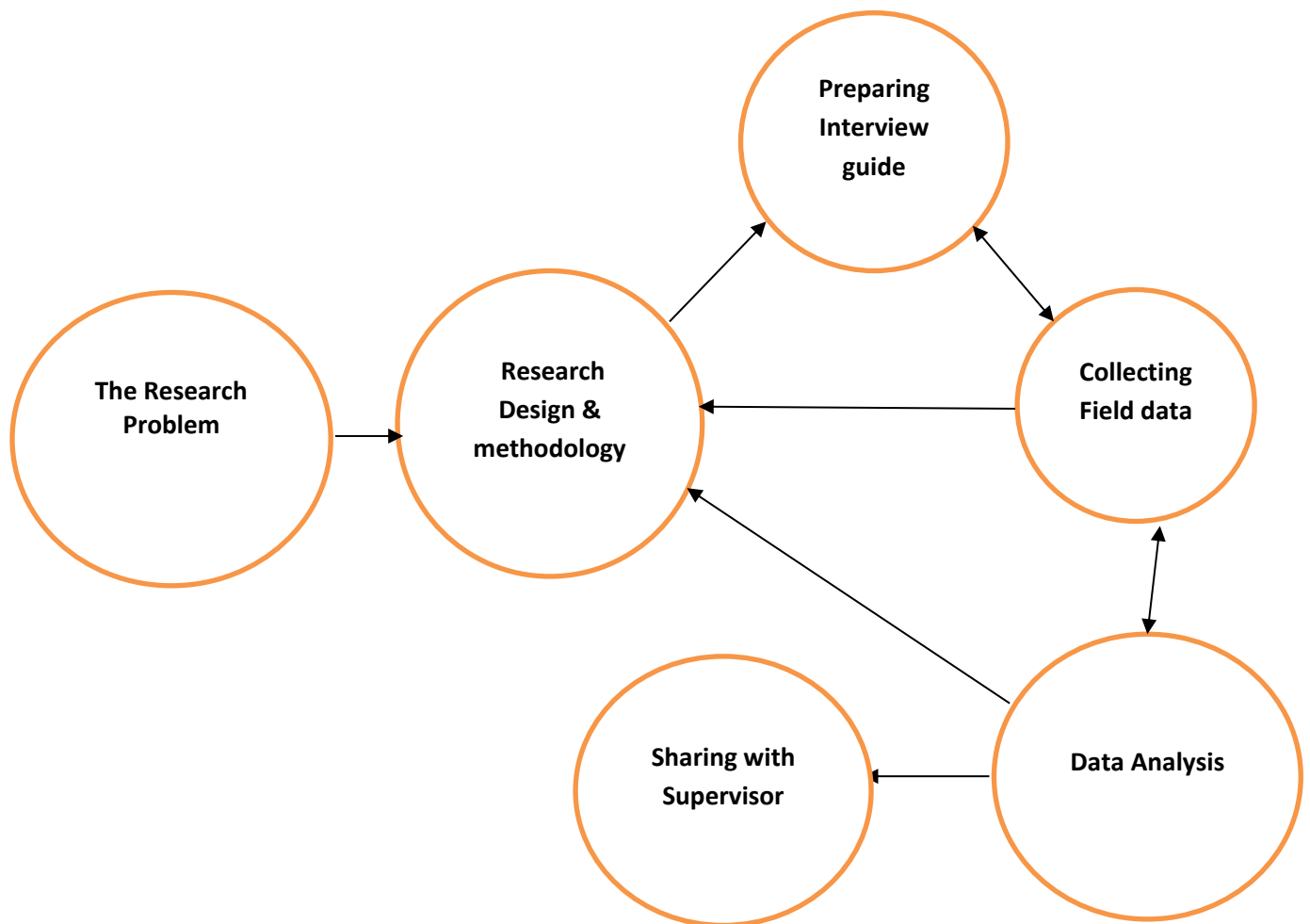
3.4 RESEARCH STRATEGY AND APPROACH

This research was conducted using a qualitative research design and the strategy is a case study. A case study as Robert Yin defined it is an empirical investigation into a current phenomenon (the 'case') in-depth and within its real-world context" i.e. when the boundaries between phenomenon and context are not obvious; and when numerous sources of evidence are being utilized (Yin, 2009). The goal of this study is

to have a clear perspective of the real factors on the ground and not to generalize, which will enrich the understanding of the smallholder farmer's vulnerability to the perennial flood hazard. The research process is shown in the figure below, however, it is important to note that like other research strategies, a case study research is a linear but iterative process which means that the arrows don't always go in one direction in a way but back and forth.

The strategy for undergoing this research is shown in the figure below.

Figure 3: Research Strategy



Source: Author (2021)

3.5 POPULATION AND SAMPLING

The specific population for this study was Smallholder farmers in Sagbama community. A purposive sampling method was employed to select a total of 21 respondents from the population relevant for this study. The 21 respondents consisted of 17 individual smallholder farmers and 4 key informants comprising of 2 officials within community-level government structures, 1 working in a disaster response organisation, and 1 official working in the health sector. The criteria for selecting the 17 individual smallholder farmers were – He/she must be a smallholder farmer living in Sagbama Community. This is because Smallholder farmers themselves have been exposed to this perennial floods. After all, they are better suited to give answers to sub research question 1, 2 and 3 which encompasses their vulnerability and how they are currently coping with the perennial floods that they are being exposed to annually as well as their adaptive capacity which help the researcher to know what strategy they adopted to make them resilient to the flood.

Furthermore, 4 Key informants from the government structures or local institutions that are responsible for Sagbama community were interviewed as key informants. During the identification and selection of the respondents, convenience sampling was used based on easy accessibility. This indicated sample size gave this research a clear perspective of the flood management plans by the identified administrative stakeholders and provided subsequent answers to sub-research question 3 and while addressing sub-research question 4.

3.6 DATA COLLECTION

In this study, data were collected using both primary and secondary methods. The secondary methods consist of the study of literature related to community resilience, smallholder farmers, and perennial floods. While the primary data includes observation strategy, photo collection and elicitation, and semi-structured interviews.

Two research assistant was employed for collection of primary data. The research assistants are local, can communicate in the local language, and are current university students. The research assistants were briefed on the research objective and introduced to the interview guide. The interview guide was then employed to collect data during the semi-structured interviews. Before going into the field, the researcher conducted a pilot interview with two smallholder farmers with the help of research assistants to see if the responses supported the research goals.

With COVID-19 as the context in which this research is being carried out, the semi-structured interviews were conducted through WhatsApp together with the research assistants and recorded with the permission of the respondents for ethical consideration. An Interview guide was created to aid in the logical flow of questions being asked to respondents and for time management. The purpose of using the semi-structured interview is to give some freedom to the respondents to fully express their views without being restricted to predefined questionnaires and allows the researcher to probe for more answers when there is a need for clarity.

While conducting the semi-structured interviews, observation strategy was used as it is important to this research especially when using sensory organs such as the eyes for example, and it also feeds into photo

collection and elicitation. Photo collection and elicitation involve taking photos of observed phenomena that gave a rich picture of the flooding effect and this coupled with the researcher's diary during primary data collection are important tools when undergoing this research.

Additionally, more information was collected from key informants through the snowballing system as the author has limited connections and can't reach the respondents physically. In the instance where the researcher may not be able to talk with a key informant, the research assistants were briefed and sensitized on how to carry out the semi-structured interviews while taking into account all of the relevant key points.

3.7 ANALYSIS PLAN

All of the recorded data was transcribed, the responses were coded, and the data were categorised under different themes which are Vulnerability, coping strategy, adaptive capacity, and the role of governance. These themes are based on the conceptual framework of this study related to building community resilience. Afterward, the researcher utilized these themes to determine the requirements, gaps, and interconnections through triangulation based on the data collected from both primary and secondary sources to properly analyze the resilience of smallholder farmers in Sagbama community perennial floods. Furthermore, the themes were then put into comparable categories to analyze how they connect to and answer the main research question.

3.8 RESEARCH PLAN

The research plan is a timeline or timeframe upon which the entire research would be carried and below is a visual representation of the timeline for the study. Color codes are used to show where each research activity lies.

Table 1: Research Plan

Activities	June			July				August				Sept
	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1
Submission of Research proposal												
Present to supervisors for feedback												
Literature review												
Draft research Tools (Interview guide)												
Coaching session												
Planning and orientation with Research Assistant												
Selecting and contacting Respondents												
Data Collection through Field Survey												
Data Analysis												
Report writing												
Coaching session												
Drafting of Final Report and Review												
Submission of Final Report												

Source: Author (2021)

3.9 ETHICAL CONSIDERATION

The researcher examined and followed all ethical issues when doing this study, notably during data collection. All data collection techniques were approved by all respondents after they were asked for their agreement to engage in the study with the assurance that all data would be kept confidential. Before beginning the interview, both the researcher and the research assistant stated the research's objectives. No one was forced to participate in the study, according to the researcher

Furthermore, before beginning the tape recording, the research assistant inquired about the respondents' permission while reassuring them that it will be confidential. Following COVID-19 preventative measures, research assistants also maintain a safe distance while conducting community surveys.

3.10 RESEARCH LIMITATIONS

There were limitations to the main data collection because the researcher was unable to conduct the research personally. This indicates that, despite the availability of tape recordings, the researcher found it difficult to pick up on nuances such as establishing rapport with respondents, which may have enhanced the validity of the replies obtained during the semi-structured interviews.

Other research limitations such as availability of internet connection, data usage, and transport to respondents were supported to the research assistants through money to aid in the success of the primary data collection.

4. FINDINGS

4.1 INTRODUCTION

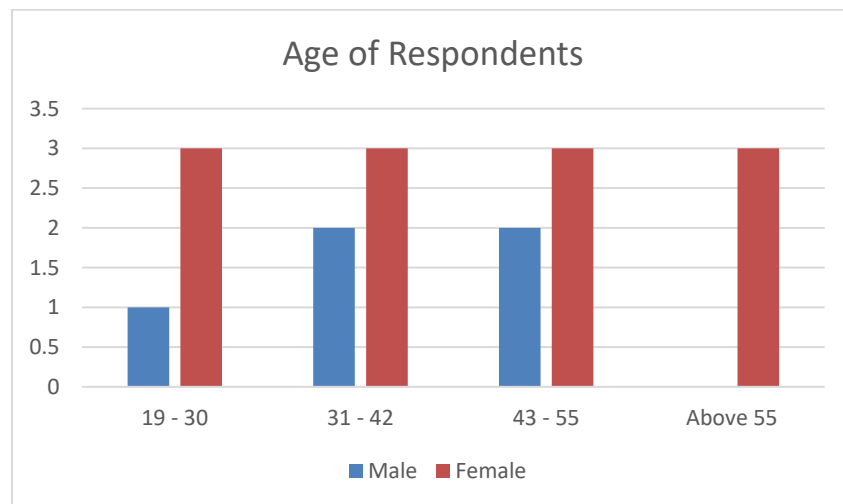
This chapter deals with the results of the field data collection. The information shown below were obtained from the semi-structured interviews collated by the researcher through his research assistant for understanding how smallholder farmers in Sagbama community can become resilient to the perennial floods.

4.2 DEMOGRAPHY OF RESPONDENTS

The demographic characteristics of 17 semi-structured interview respondents are presented in the figures below. Age, gender, education level, household size, land size, and kind of crops cultivated by respondents who are smallholder farmers in the Sagbama community are all shown in the charts below. The square meter is the unit of measurement for land size (Sqm).

4.2.1 Age

Figure 4. Age of respondents

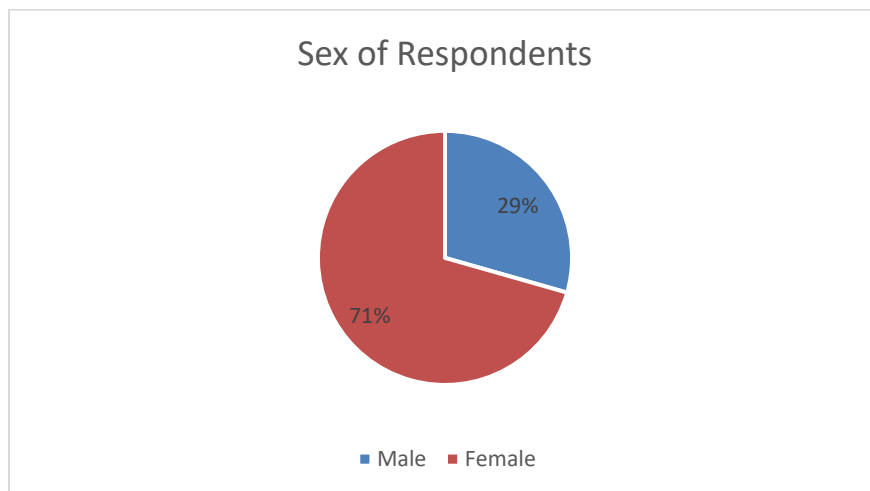


Source: Author Field Survey (2021)

According to the data presented in the bar chart above, A total of 17 smallholder farmer respondents comprised of 1 male & 3 females aged between 19-30, 2 males & 3 females aged between 31-42, 2 males & 3 females aged between 43-55, and 3 females aged above 55.

4.2.2 Sex

Figure 5. Sex of respondents

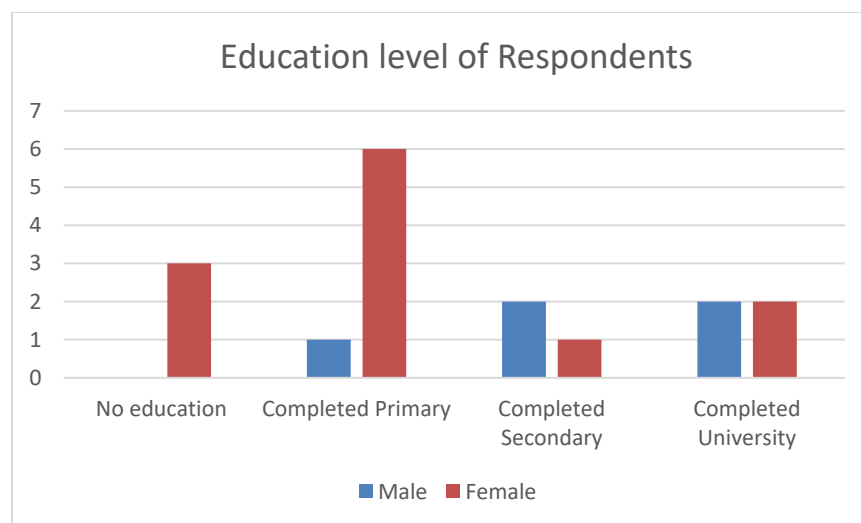


Source: Author Field Survey (2021)

According to the data presented in the pie chart above, out of a total of 17 smallholder farmer respondents, 71% are females and 29% are males.

4.2.3 Education level

Figure 6. Education level of respondents

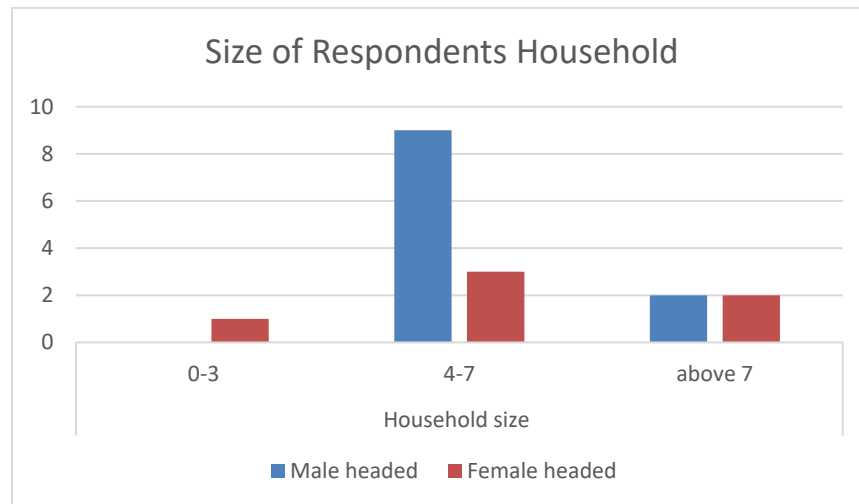


Source: Author Field Survey (2021)

According to the data presented in the bar chart above, 2 males & 2 females have completed university, 1 male & 2 females completed secondary education, 1 male & 6 females completed primary education, and 3 females with no education.

4.2.4 Household Size

Figure 7. Size of respondent household

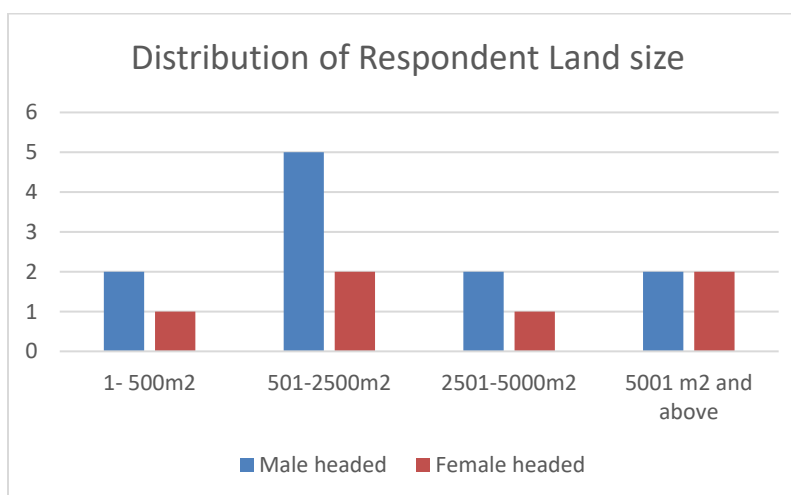


Source: Author Field Survey (2021)

According to the data presented in the bar chart above, 1 female-headed household has a size of 0 – 3 persons, 9 male-headed & 3 female-headed household has a size of 4 – 7 persons, and 2 male-headed & 2 female-headed has a size of 2 persons.

4.2.5 Land Size

Figure 8. Distribution of Respondent land size

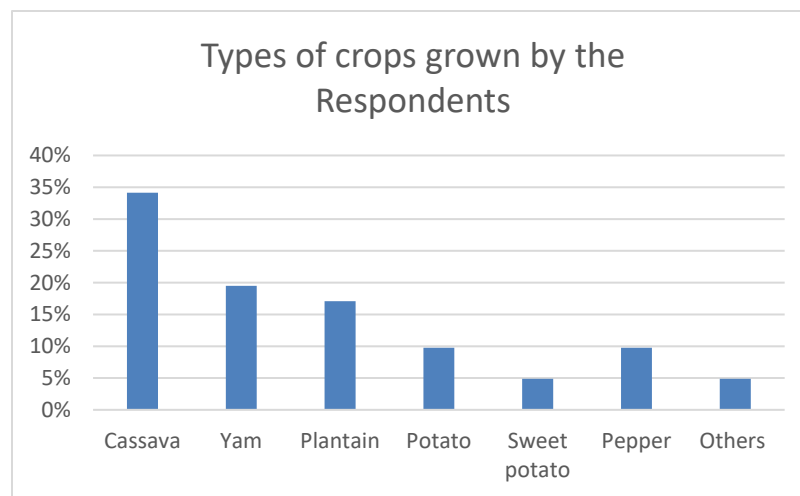


Source: Author Field Survey (2021)

According to the data presented in the bar chart above, 2 male-headed & 1 female-headed household has a land size of 1- 500m², 5 male-headed & 2 female-headed household has a land size of 501-2500m², 2 male-headed & 1 female-headed household has land size of 2501-5000m², 2 male-headed & 2 female-headed household has a land size of above 5000m².

4.2.6 Crop type

Figure 9. Type of crops grown by the respondents



Source: Author Field Survey (2021)

According to the data presented in the bar chart above, 34% of the respondents grow cassava, 19% grows Yam, 17% grows plantain, 9% grows potato, 5% grows sweet potato, 9% grows pepper, and 5% grows other crops e.g Groundnut, Cocoa yam, Pumpkin Leaf, Sugar Cane & onion.

4.2.7 Summary of Respondents Demographics

According to the data presented in the table (see table 3), there are a total of 17 respondents, 5 males, and 12 females. The majority of the smallholder farmers have only completed primary school and out of the 17 respondents, there are 11 Male headed households & 6 Female headed households with an average household size of 6.8 persons.

The chart also shows the land distribution among the respondents, with 2 respondents cultivating on 500Sqm, 7 respondents cultivating on 501 – 2500Sqm, 3 respondents cultivating on 2501 – 5000Sqm, and 4 respondents cultivating on land larger than 5000Sqm. Cassava, potato, yam, and plantain are the most often planted crops, with some responders also growing sugarcane, pumpkin leaves, groundnut, and corn. One person stated that he plans to grow Onions and Pepper the next year.

4.3 VULNERABILITY OF SMALLHOLDER FARMERS TO PERENNIAL FLOOD

The Vulnerability & Capacity Analysis (VCA) is used here to describe the vulnerabilities and capacities of the Sagbama Community at risk of flooding. The VCA functions as a diagnostic tool to understand problems and their underlying causes, assess specific risks, prioritize sequential actions & inputs to empower and mobilize vulnerable communities (Heijmans, 2014).

Based on the information retrieved from the semi-structured interviews, the table below highlights the issues and vulnerabilities as well as the capacities and opportunities for resilience.

Table 2. Capacity Vulnerability analysis (CVA) matrix of Sagbama community

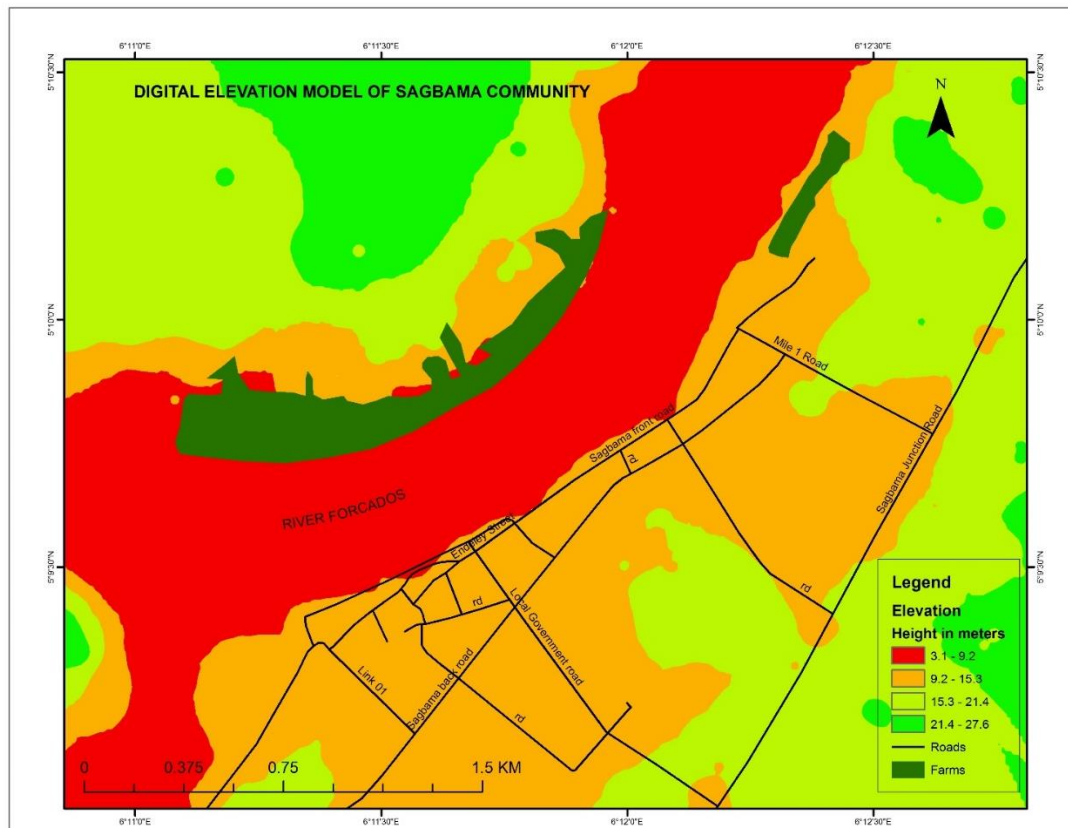
Hazard priority 1: Flood		Issues and Vulnerabilities	Capacities and opportunities for resilience
Frequency, duration, seasonality, and trends		Annually, September to November every year, increasingly severe possibly due to climate change.	
Warning signs, Early warning		Poor early warning system, heavy dependence on local knowledge e.g. rise in water level of river forcados	Good knowledge of past disasters (Indigenous knowledge) Increased EW system
Underlying causes		<ul style="list-style-type: none"> • Low lying land • Deforestation of surrounding communities due to urbanization contributing to climate change hence exacerbating the intensity of rainfalls • Lack of awareness about climate change and its consequence. • No assistance from the government during the perennial floods. 	Rich and Abundant natural habitat Increase climate change awareness
Groups affected		<ul style="list-style-type: none"> • All smallholder farmers • All Households dependent on farming through loss of crops and income • Female-headed households due to lack of husband support. 	Smallholder farmers share information.
Assets and services affected		<ul style="list-style-type: none"> • Crops are destroyed • Farmlands are completely immersed in water. 	Strong local leadership (Community chief, Youth head, and Women leaders)
Immediate response		No response strategy	Increase community-level disaster preparedness

Source: Author Field Survey (2021)

In a bid to further show the physical vulnerability of Sagbama community to the perennial floods owing to the closeness to river forcados as well as its low-lying land, A Digital elevation model of the community was created by the researcher using Arc GIS and the data sources are Google Earth. The figure below (see figure 10) shows the farmland location of smallholder farmers along the river forcados. The areas where the elevation measures 3.1 – 9.2 are highly vulnerable (Red), areas measuring 9.2 – 15.3 are moderately

vulnerable (Orange), and areas measuring 15.3 – 21.4 are of low vulnerability. The areas above 21.4 meters are considered safe areas.

Figure 10. Digital elevation model of Sagbama community, Bayelsa state, Nigeria.



Software used: ArcGIS

Sources: Open Street map, Google Earth, Author Fieldwork (2021)

4.3 EXPLORING LIVELIHOODS & THE CURRENT COPING STRATEGY BY SMALLHOLDER FARMERS TO MITIGATE THE EFFECTS OF THE HAZARD

The Consequence of perennial flood on smallholder farmers

According to the respondents, Smallholder farmers are exposed to floods every year. All respondents unanimously stated that the period of the flood is within September - November every year. The whole land is covered by the flood when it occurs. When asked about the severity of the flood, one of the respondents replied saying;

“Na everywhere for the farm, the flood dey affect” meaning it affects all parts of his 1-acre farmland.

He further stated

“The thing when dey pain me be say, the money when I dey get because of the flood nor dey even reach labor” which means that as a result of the flood and the damage to his crops, his income is low

Another respondent replied;

“The flood dey affect money when dey enter my hand, see as my cassava small and as the flood dey come, people dey commot for the area so nowhere to even sell my cassava” which means that it affects her production and her income in the sense that she is unable to sell to the community.

Image 1. Creeping floodwaters into farmland



Source: Research Assistant Fieldwork (2021)

Image 2. Flooded piece of land in Sagbama community



Source: Research Assistant Fieldwork (2021)

Image. Photo showing the extent of flood reach on smallholder farmers home



Source: Research Assistant (2021)

Apart from the effects of the flood on farmlands of the smallholder farmers in Sagbama community, the flood also affects their shelter. A female respondent shared this

My cassava and yam are destroyed by the flood. Sometimes we don't have where to sleep and in most cases, I sleep on the sand or an open dry field. The flood halts all farming on my farm and I barely have anything to sustain myself and her family.

The flood affects smallholder farmers in many ways as one female smallholder farmer stated that she had to move her family to another location, as well as the fact that their feet shrink as they are frequently immersed in water for long periods during the flood season. It exposed them (small holder farmers) particularly kids to waterborne diseases such as cholera, typhoid, malaria, etc. Food is becoming scarce for her and her family since they are unable to harvest all of their crops and a large amount of product is being destroyed due to the floods.

Respondents also indicated that the flood brings animals from the forests which are snakes, wild cats, and earth worms.

The Coping strategy used by the Smallholder farmers

The strategy smallholder farmers in Sagbama community used in dealing with the perennial flood based on the results from the semi-structured interviews include blocking the flood waters, raising their properties from the ground when the flood waters enter into their homes, a 45-year-old female respondent elaborated saying

“I cannot do anything except use blocks to stop the water and then I use woods to lift my properties from the ground so that it will be not be destroyed, even though I can’t save them all. Even on my farm, I use bamboo sticks to lift my cassava stems a little bit from the ground too”

Image 3. Harvested Cassava Stems



Source: Research Assistant Feildwork (2021)

Image 4. Cassava storing & processing into Garri



Source: Research Assistant Feildwork (2021)

Another respondent stated

“I go to the farm and harvest my crops, my cassava normally would stay for up to 3 years to mature but because of the flood. I have to harvest them in august every year otherwise, I won’t have anything from my farm as the flood would destroy it”

In addition, the majority of respondents do nothing but rely on the government for help during the flooding period, however, a lot of them do not receive anything from the government. When asked if they get assistance from the government, they either responded with “no assistance” or say that they are informed that sometimes some food items like a bag of rice are brought to the community but they still

did not receive anything. Others indicated that certain persons of power within the community share these food items among themselves.

One male respondent even said:

“I don’t receive any help from the government at all, and I have personally sent several letters to the government but to no avail. Besides that, one bank called me that they want to help me but I went there many times but every time there is always an issue with either my BVN – Bank verification number or my account itself so I just forget about it”

4.4 ADAPTIVE CAPACITY OF SMALLHOLDER FARMERS TO THE PERENNIAL FLOODS

Based on the results from the semi-structured interviews with the smallholder farmers, their way of adapting to the perennial floods is through early harvest where one respondent says

“I don’t do anything on my farm to preserve my crops except harvest early because my farmland is completely immersed in water”

A female respondent added saying

“It is the harvested crops that we will eat until the flood waters have gone. And if I don’t dig on time, then maybe I will go and borrow money for the next planting season”

Image 5. A tool used for making Garri



Source: Research Assistant Feildwork (2021)

Image 6. Turning processed cassava into Garri



Source: Research Assistant Feildwork (2021)

Furthermore, just two respondents stated that they are warned by radio, but many smallholder farmers are not notified about the impending flood and learn about it from one another. One responder claimed

that, even when she is not told of the flood when it is about to occur, she does know when it occurs each year. She stated

“I know when the flood is coming because I can see that the water will start rising around late august and so by early to mid-august, I will start to harvest my cassava”

The interview session with the respondents also revealed that none but one of the respondents is a part of a co-operative when inquired about support groups or organisations that they are part of. The respondent shared that as a result of the perennial flood, he formed a co-operative with two of his friends which he named AB Lilly. The cooperative according to him was to help towards financial contribution where he and his friends would put money together and each month, one person gets to collect the money generated from all participants.

4.5 THE ROLE OF GOVERNANCE

Small Holder Farmers

According to the findings of the interviews, small-holder farmers' farmlands are being neglected. They stated that the government does not assist smallholder farmers, forcing them to fend for themselves during the flood. However, few of them pointed out that they are aware of the government giving aid to community leaders to distribute among those affected by the flood but they don't receive anything personally, possibly due to embezzlement. According to a female small holder farmer:

I do not receive any help from the govt. although I heard that the government had provided foodstuff to the community but she didn't receive it because leaders share it among themselves.

Image 7. Research assistant conducting interview session with a female smallholder farmer



Source: Research Assistant Fieldwork (2021)

Another respondent highlighted the inefficiency of community leaders during flooding saying that:

The government does assist but leaders embezzle the money. They just come and take pictures and information from residents regarding the loss.

One of the small holder farmers who own a cooperative for himself and his friends who are also smallholder farmers mentioned the complexity of getting assistance from a financial institution. He stated that the bank required a list of documents from him which they usually do not have access to. All respondents categorically said they are not aware of, nor receive any relief or assistance from other non-governmental organisations.

Community Leaders

The flood history in the study region is described by one of the Sagbama community leaders. According to him, the first flood occurred in the 1950s. The flooding happened then as a result of residents covering water with sand and erecting buildings on top of it without thinking about the implications. The Nigerian federal government then built a dam in response to the first flood, and the areas that had been inundated became dry, and people began to build. After some years, the flood levels overtook the dam, the young people began crying that God was about to drown us in water since the height of the water was far higher than they had ever seen, particularly like in the 1950s. The water destroyed a lot of things, buildings, and homes, and even lives lost in 2012. It is considered the worst flood in the state, He said.

Image 8. Research assistants conducting an Interview session with community leader (Amanayowe of Sagbama community)



Source: Research Assistant Fieldwork (2021)

Another key informant in the community government structure went on to add that the government gives food and other necessities to those in need, but that they are unable to help or satisfy everyone in the community, and that only a select few will gain. The community participates by sharing the loss with

government officials, and thereafter, the government may contribute funds to purchase sand and rebuild flooded sections or water fronts.

He further stated that

We keep the government informed about the community's loss due to the flood. We can only discuss the things we come across based on our personal experiences. Officials from the government will arrive and take pictures and recordings. Some musicians also come here to make music videos to promote government awareness.

According to respondents from Key Informant Interviews, the plan proposed by the government may help the farmers but its focus is on protecting the homes of the people living in the community. It was revealed that the government is currently preparing a dyke to block the water from entering the community up till the next community (Adagbagbari Community).

He advised that the areas that are mostly flooded should be filled with sand or dykes. While other areas should be completed with bridges so the water can flow easily to the river or surrounding forests.

Image 9. Photo showing the artificial dyke created by the government to mitigate the flood



Source: Research Assistant Fieldwork (2021)

5. DISCUSSION

This chapter deals with discussing the results of the research that is analysed in chapter 4.

5.1 VULNERABILITY OF SMALLHOLDER FARMERS TO PERENNIAL FLOOD

Existing literature suggests that people living close to coastal areas are highly vulnerable to floods, Sagbama community is not an exception (Mmom & Ayakpo, 2014). It is supported by the interview results from smallholder farmers in Sagbama community that are exposed every year. This is because smallholder farmlands and settlements are of lower elevation as compared to some safe areas which are higher as shown in the digital elevation model of Sagbama community (see figure 2).

According to Komolafe et al. (2015), there is no current model in the country for estimating flood vulnerability and the predicted consequence of an imminent disaster.

Furthermore, many smallholder farmers in Sagbama community are aware of the periods of flood based on their experience, however, they still suffer production losses due to the inability to accurately predict the magnitude of the flood. This is because government does not efficiently deliver timely and accurate information to the smallholder farmers leaving them to fend for themselves.

Awere et al. (2016) emphasized the importance of smallholder farmers in Sub-Saharan Africa. He stated that small-scale farmers, the majority of whom are women, play an important role in producing food for the current and future generations. Despite the fact, they are the ones that suffer most from floods and other climate change-induced disasters as a result of government negligence, vulnerability to climate risk, and limited adaptive capacity. This is also evident from interview findings which shows that women constitute major part the majority of smallholder farmers in Sagbama community and they are being neglected by the government in terms of giving information and awareness to prepare for the flood.

5.2 EXPLORING LIVELIHOODS & THE CURRENT COPING STRATEGY BY SMALLHOLDER FARMERS TO MITIGATE THE EFFECTS OF THE PERENNIAL FLOODS

The literature shows that the livelihoods of marginal and small farmers in vulnerable communities are affected through their loss of assets, loss of food sources (crops or stores), and loss of employment or income-earning opportunities. This situation is most dire among smallholder farmers who are living close to coastal areas and may be forced to take desperate measures to survive such as abandoning their homes or selling vital land or tools upon which their livelihoods depend on as they have no savings or other alternatives like insurance (Mucherera & Mavhura, 2020). This is also supported in the case study of Sagbama community where the smallholder farmers have no option but to leave their flooded homes and harvest their crops early, which negatively impacts the amount of crop being produced. In addition, they also experienced health issues as a result of the filthy flood water, which (Komolafe et al., 2015) stated that the impact of flooding on water quality and human health is severe, particularly in rural communities that rely solely on river water for survival due to a lack of access to clean water. Furthermore, their inability to cope with floods forced them to rely on the government for assistance during the flooding season, but they all admit to having received nothing from the government.

5.3 ADAPTIVE CAPACITY OF SMALLHOLDER FARMERS TO THE PERENNIAL FLOODS

According to (Abdul-Razak & Kruse, 2017), the adaptive capacity of the smallholder farmers is strongly influenced by gender and level of education. The Interview findings revealed that many smallholder farmers are females with low education levels specifically completed primary education which indicated that they have limited knowledge or expertise to deal with the flood. Since they do not have any other option, their strategy to adapt to the perennial flood is to harvest their crops earlier in the month of August, before September when the flood comes. The early harvesting of their crops hurts their expected income which (Twigg, 2015) indicated that a low level of adaptability drives them deeper into poverty.

Furthermore, the lack of cooperatives among smallholder farmers in the Sagbama community indicates a limited adaptation ability to flooding as they face difficulty in bouncing back after each onslaught of the perennial flood. Abdul-Razak & Kruse (2017) also emphasizes that disaster relief aid in cash or kind provided by cooperatives or any other organization can improve small-holder farmers' adaptive ability to flooding.

5.4 THE ROLE OF GOVERNANCE

Governance is important in building the resilience of smallholder farmers because it determines how people can access resources, skills, and markets to strengthen and diversify their livelihoods, how they protect themselves from hazards, and how they access assistance to help them recover when they are affected (Pasteur, 2011). The smallholder farmer interview results indicated poor governance in the Sagbama community makes smallholder farmers vulnerable to flooding owing to a lack of information and access to essential services to enhance their livelihood. It has been revealed that small-holder farmers do not have access to financial institutions such as banks to recover from floods. According to small-holder farmers, the complex procedure for obtaining bank help limits their options. Furthermore, their lack of understanding of other skills pushed them to rely on one source of income, making them more vulnerable to flooding.

The plan proposed by the government against flooding in the Sagbama community is more technical than people-oriented based on the interview results. There are no extension services for smallholder farmers to enable them to get access to knowledge about improving their livelihood, increasing food security, and productivity. According to a key informant, the government is currently constructing a dyke to reduce the impact of floods in Sagbama community which is supported by Nye, et al. (2011), government providing risk management plans in developing countries has failed to reduce the flood risk. The reason is that there exclusive focus on structural flood defense measures like building dams or levees, rather than an understanding of social and institutional processes, such as inclusive community engagement with government bodies and community-level responsibility, which plays an important role in assisting people to cope with flooding and thus making communities more resilient to the effects of flooding when it occurs.

5.5 SUMMARY OF RESILIENCE OUTCOMES

Following the conceptual framework of this study, the findings of the study shed lights on the resilience of smallholder farmers to the perennial floods in Sagbama community.

Managing Risk: Due to limited awareness of the severity of floods, smallholder farmers in Sagbama community are facing difficulty with coping with the perennial floods. This has resulted in reduced crop production yearly and increased health risk for smallholder farmers household.

Adapting to change: Many smallholders do not get informed of the incoming floods, as they have to rely on their knowledge and experience of the perennial floods from the past years. Even though they have developed a strategy for adapting to the perennial floods, they have little knowledge on the impact of climate change on the severity of the hazard and its resulting effect on their livelihood.

Securing sufficient food: The smallholder farmers in Sagbama community grow a variety of cash crops each year but due to the hazards and stresses like limited financial support that they are subjected to negatively affects their resilience to secure sufficient food.

5.6 REFLECTION ON THE ROLE OF THE RESEARCHER

5.6.1 Reflection on the research process

This research began with much anticipation since it was finally time for the researcher to put all of the knowledge gained in classes and the mini-research assignment into practice. The researcher began by writing out the research problem. The researcher has to examine some literature on community resilience in order to draft the research problem. He came across a few intriguing papers that helped him justify the importance of doing a research on smallholder farmers in Sagbama community of Bayelsa State, Nigeria. Following that, the researcher decided on a research plan that required an in-depth investigation, and therefore chose the case study strategy.

The researcher chose to do further literature research before drafting the research aim, research question, sub questions, and methodology. Students were given the opportunity to pitch their thesis proposals. Initially, the researcher intended to do a study on governance, which is one component of community resilience, but after receiving feedback from the teachers, the researcher realized the need of broadening out while conducting a comprehensive study on the community. Because they are experts in the field, the researcher received the feedback in good faith and with his continued desire to learn. Following the presentation of the study proposal, the researcher was appointed a thesis supervisor who would guide him through the whole research process. He went on to read more material and discovered that, according to the conceptual for the research - Katherine Pasteur's *From Vulnerability to Resilience* – it is critical to consider all elements of community holistically.

The researcher received important input from both the supervisor and the second assessor after submitting the study proposal in print form. Before continuing with the primary data collection of the respondents, he was requested to make certain adjustments to the work. The researcher was ultimately

given permission to continue with my primary data collection, which he did, but not before creating a semi-structured interview guide that was tailored to the study objectives. Because the researcher enjoys connecting with individuals, the data collecting part was quite engaging. However, due to complications caused by Covid-19, he was unable to travel to collect the primary data on his own.

To gather data utilizing a partially structured interview guide, the researcher had to engage two research assistants. He found data analysis to be quite difficult because it was time consuming and required a lot of focus. He felt like giving up at times, but he would take a step back and do something else that stimulated him, such as listening to music or playing video games. This aided him in overcoming the difficult task of data analysis. When the study questions were addressed by the data while applying the conceptual framework throughout the analysis, he felt a great weight lifted off his shoulders. He became even more ecstatic as he discussed his results with his thesis supervisor, who provided him with comments and allowed him to polish his presentation of his findings in the final thesis report.

5.6.2 Reflection on quality of data findings

The researcher engaged two research assistants and informed them on the study while also negotiating the compensation package. He requested that they do a pilot interview, which proved to be challenging at first but gradually gained traction. He was astounded by how well the research assistants interacted with the respondents.

He had to ask the assistants to go back and collect some missing information because some of the respondents offered unclear replies. As a result, the researcher had to make changes to the questionnaire to make it more understandable. Because the research assistants were unable to follow up on the interviews given the lack of internet access in the study region, the research assistants were forced to conduct some of the interviews themselves. With the agreement of all research participants, photographs of observed phenomena related to the study were taken, and recordings of interview sessions were made.

The researcher observed that the V2R framework didn't allow the research to go much into detail relating to the livelihoods of the smallholder farmers. It was also observed that newer discussion among disaster risk professionals challenges that the framework does not support the concrete analysis of a key element that is crucial to resilience in today's scientific discourse which is the **Environmental** factor.

6 CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

This research was written to understand the factors that influence smallholder farmers' resilience to perennial floods in Sagbama community, Bayelsa state Nigeria. Thus, based on the study findings and discussions, this chapter provides answers to the primary research question as well as its sub-questions.

Why are smallholder farmers in Sagbama community vulnerable to perennial floods? Because the majority of smallholder farmers grow their crops close to river forcados, they are subject to recurring flooding. Furthermore, according to data obtained, Sagbama community is located in a low-lying region and is classified as highly vulnerable to flooding. The lack of an appropriate early warning system to predict the nature of the flood also puts many smallholder farmers and their livelihoods at risk, as they frequently have to rely on indigenous knowledge combined with a lack of government support, and they do not have insurance for the yearly loss of crops due to the perennial floods that affect them.

What kind of coping strategies do smallholder farmers currently use when they are affected by perennial floods? Many smallholder farmers' coping method in dealing with the recurring flood is to raise their stored food and valuables from the ground in their homes to prevent being damaged by floods. Floods also have a massive effect on their farmlands since they are submerged in water from September to November, and farmers are forced to harvest early before the flood in August or risk losing all produce. The crops are then processed to finished product (Garri) to sell and some of them are preserved until the following harvest season.

What capacities are there for improving smallholder farmer's adaptability to perennial floods? Smallholder farmers in Sagbama community have shown some adaptability to the perennial floods by planting annual crops and harvesting their crops earlier than usual even though it comes at the cost of low yield or production. With the yearly loss of crops among smallholder farmers in Sagbama community, their resilience is stretched thin.

What are the flood management plans made by the government or other stakeholders for smallholder farmers in Sagbama community? The lack of disaster risk governance in Sagbama community has put smallholder farmers and its residents at risk of the perennial flood. Based on the interview findings, the government's strategy to combat flooding in Sagbama community is more technical than people-oriented, like an artificial dike built of dirt to limit the amount of flood waters that enter the neighborhood. Aside from that, nothing is being done at the community level – local government – to address this threat.

In conclusion, the factors that influence smallholder farmers' resilience to the perennial floods are;

1. Topography of the land. Sagbama community is prone to flooding hence it is always affected by increased rainfall or the natural rise of the river forcados.
2. Environmental deforestation of surrounding communities due to urbanization contributing to climate change hence exacerbating the intensity of rainfalls.
3. Lack of community awareness about climate change and its consequence.

4. Low Education level in Sagbama community. Based on the primary data retrieved from respondents, the Majority of smallholder farmer's education level is primary education which influences their resilience.
5. There is no help from the government. Smallholder farmers are forced to cope with the negative effects of the perennial floods alone and have little understanding of alternate sources of income owing to a limited level of education.
6. Gender. The primary field data collected shows that the majority of smallholder farmers are women, hence are at a disadvantage as they do not have a voice and are thus neglected in Sagbama community.
7. Inadequate flood protection system. According to a key informant, the present dyke construction is more or less a trial-and-error technique by the government to limit the amount of flood waters entering the community.
8. Livelihoods in Jeopardy. The livelihoods of smallholder farmers are jeopardized by the perennial flood since they are particularly vulnerable to the threat because their income is heavily reliant on agriculture. Furthermore, there is a low agricultural production as a result of the smallholder farmer's livelihood being flooded yearly.

6.3 RECOMMENDATIONS

Based on the conclusion summarized above, the listed recommendations below are expected to increase the resilience of the smallholder farmers in Sagbama community to the perennial floods

1. NEMA in partnership with the Federal Ministry for Humanitarian affairs, Disaster management and Social development in Nigeria design a program to increase community awareness on the negative effect of illegal digging near the river forcados to reduce the risk of flooding and promote DRR and CCA strategies.
2. NEMA – Provision of advocacy services to multiple stakeholders including OXFAM, OCHA, IOM, WOCON on behalf of Sagbama community and to policymakers at local, district, and national level towards the capacity building for Female smallholder farmers through income diversification to reduce the dependence on relief items during the months of flooding.
3. NEMA in partnership with the federal ministry of Agriculture strengthens the link between the key government structures and relevant NGOs towards better understand the needs of smallholder farmers and increase the declining rate of agricultural production.
4. NEMA in collaboration with OXFAM, NIMET, and Sagbama Community Leaders design an early warning system for Sagbama community to increase disaster preparedness, protect the smallholder farmer's livelihood and reduce the effect of the perennial floods.
5. NEMA in collaboration with National Commission for Refugees, Migrants & internally displaced persons create a safe house in designated safe areas (see figure 10) for vulnerable smallholder farmers to live in the period of the perennial floods.
6. NEMA in partnership with the Nigerian Institute of town planners create a well-informed proper designation of flood-prone areas to be made available to smallholder farmers and community members to enable them to be aware of inherent risk.

While this research focused on understanding the resilience of smallholder farmers in Sagbama community, Bayelsa state to the perennial floods. Primary data revealed that the perennial flood affects women more than men and the majority of the smallholder farmers are women who have low education levels, face significant challenges in receiving government assistance, and moving to a safer place during the perennial floods. Therefore, the researcher recommends a detailed study of the influence of gender on the vulnerability of smallholder farmers in Sagbama community to increase community resilience to the perennial floods.

In conclusion, a qualitative study on smallholder farmers land ownership in Sagbama community and its influence on their access to microloans is also recommended.

REFERENCES

- Abdul-Razak, M. & Kruse, S., 2017. *The adaptive capacity of smallholder farmers to climate change in the Northern Region of Ghana*. s.l.:s.n.
- Awere, K., Jakpa, J. & Owusu, A., 2016. *Smallholder farmers' vulnerability to floods in the Tolon District, Ghana*. s.l.:s.n.
- Berezi, Obafemi, A. & Nwankwoala, H., 2019. Flood Vulnerability Assessment of Communities in the Flood Prone Areas of Bayelsa State, Nigeria. 9, Volume 5, pp. 19-36.
- CRED, 2021. *Disasters Year in Review - Global Trends and perspectives*, s.l.: UCLouvain.
- Douxchamps, S. et al., 2016. *Linking agricultural adaptation strategies, food security and vulnerability: evidence from West Africa*. s.l.:s.n.
- Ellis, F., 2000. *Rural Livelihoods and Diversity in Developing Countries*. 2 ed. Oxford: Oxford University Press.
- Heijmans, A., 2014. *Reaching Resilience*. 2.0 ed. s.l.:European Union.
- Hollweck, T., 2016. *Robert K. Yin. (2014). Case Study Research Design and Methods (5th ed.). Thousand Oaks, CA: Sage. 282 pages..* s.l.:s.n.
- Holzkämper, A., 2017. *Adapting Agricultural Production Systems to Climate Change—What's the Use of Models?*. s.l.:s.n.
- Jeb, . D. . N. & Aggarwal , S. . P., 2008. Flood inundation hazard modeling of the River Kaduna using remote sensing and geographic information systems.. *Journal of Applied Sciences & Research*, 4(12), pp. 1822-1833.
- Joice , K. J. et al., 2020. Community resilience mechanism in an unexpected extreme weather event: An analysis of the Kerala floods of 2018, India. *International Journal of Disaster Risk Reduction*, 49(101741), pp. 2 - 3.
- Komolafe, A., Adegboyega, S. & Akinluyi, F., 2015. *A Review of Flood Risk Analysis in Nigeria*. s.l.:s.n.
- Mensah, H. & Ahadzie, D. K., 2020. Causes, impacts and coping strategies of floods in Ghana: a systematic review. *SN Applied Sciences*, 5.2(5).
- Mmom, P. C. & Ayakpo, A., 2014. Spatial analysis of flood vulnerability levels in Sagbama Local Government Area using geographic information systems (GIS). *International Journal of Research in Environmental Studies*, 1(1), pp. 1-8.
- Mucherera, B. & Mavhura, E., 2020. Flood survivors' perspectives on vulnerability reduction to floods in Mbire district, Zimbabwe. *Jàmbá Journal of Disaster Risk Studies*, 3.12(1).

- Nemine, E. L., 2015. Flood Disasters in Nigeria: Farmers and Governments' Mitigation. *Journal of Biology, Agriculture and Healthcare*, 5(14), pp. 2224-3208.
- Nye, M., Tapsell, S. & Twigger-Ross, C., 2011. New social directions in UK flood risk management: Moving towards flood risk citizenship?. *Journal of Flood Risk Management*, 12, 4(4), pp. 288-297.
- Onuigbo, I. C. et al., 2017. Flood Vulnerability Mapping of Lokoja Metropolis Using Geographical Information System Techniques. *Journal of Geosciences and Geomatics*, Volume 5, pp. 229-242.
- Onwuteaka, J., 2014. *GIS Modeling of Flooding Exposure in Nigerian Coastal Areas from Sea Level Rise*. s.l.:s.n.
- Pasteur, K., 2011. *From Vulnerability to Resilience - A framework for analysis and action to build community resilience*. 1st ed. Warwickshire: Practical Action Publishing Ltd.
- Ruiz-Cortés, N. S. & Alcántara-Ayala, I., 2020. Landslide exposure awareness: a community-based approach towards the engagement of children. *Landslides*, 17(6), pp. 1501-1514.
- SU, F., SAIKIA, U. & HAY, I., 2018. *Relationships between Livelihood Risks and Livelihood Capitals: A Case Study in Shiyang River Basin, China*. s.l.:s.n.
- Tran, T. A., 2019. Land-use change driven out-migration: Evidence from three flood-prone communities in the Vietnamese Mekong Delta. *Land Use Policy*, 11. Volume 88.
- Twigg, J., 2015. *Disaster Risk Reduction*. 9 ed. United Kingdom: Overseas Development Institute.
- Tyler, J., Sadiq, A.-A. & Noonan, D. S., 2019. A review of the community flood risk management literature in the USA: lessons for improving community resilience to floods. *Natural Hazards*, 4.96(3).
- Williams, P. A., Crespo, O. & Abu, M., 2019. *Adapting to changing climate through improving adaptive capacity at the local level – The case of smallholder horticultural producers in Ghana*. s.l.:s.n.
- Wills, I., 2014. *Bayelsa State 5th Environment Outreach Lecture and Environmental Awards*. s.l., s.n.
- Wizor, C. & Agbabou, D., 2014. *Impact of the 2012 Nigeria Flood on Emergent Cities of Nigeria: The Case of Yenagoa, Bayelsa State*. s.l.:s.n.
- Yin, R. K., 2009. *Case Study Research: Design and Methods*. 4th ed. London: Sage Inc.

APPENDICES

APPENDIX 1. QUESTIONS FOR SMALLHOLDER FARMERS

A SEMI – STRUCTURED INTERVIEW GUIDE FOR BUILDING RESILIENCE TO PERENNIAL FLOODS– A case study of Small Holder Farmers in Sagbama Community, Nigeria.

My name is *Harrison O. Imugba*. I am currently doing my Master's in Management of Development, with a specialization in Disaster Risk Management at Van Hall Larenstein University of Applied sciences in the Netherlands. As part of my studies, I am required to do a research study on building Community resilience to Perennial floods in Nigeria. My research is specifically aimed at investigating ways to increase smallholder farmer's resilience to the perennial floods in Sagbama community, Nigeria.

Could you kindly assist me by answering questions related to my research? Your participation is voluntary and all information provided will be kept confidential.

I guarantee you that the discussion will be short, between 35-50 minutes and you can stop at any time you want. If you do agree, we can start.

Name of respondent.....

Age of respondent: a) between 19-30 ☐ b) between 31-42 ☐ c) between 43-54 ☐

d) 55 and above ☐

Sex: M ☐ F ☐

Education level of respondent

a) Complete university ☐ b) completed secondary school ☐ c) not completed secondary school ☐ d) complete primary school e) not complete primary ☐ f) no education ☐

Type of household

a) Single female-headed household ☐ b) male-headed household ☐

Household size:

Land size

a) 1- 500m² ☐ b) 501-2500m² ☐ c) 2501-5000m² ☐ d) 5001 m² and above ☐

1. What kind of crops do you grow on your farmland?
2. Have you been exposed to flooding before?
 - If Yes, When did it happen?
 - If Yes, How often are you exposed to it?
 - If No, Did you prepare for it?
3. Can you share your knowledge of where flooding mostly occurs in Sagbama Community?

4. Did the flood affect your livelihood?
 - If Yes, How did it affect your livelihood?
 - If No, What did you do to prevent it from affecting your livelihood?
5. Are you notified of the flood before it happens?
 - If Yes, How do you get notified?
 - If No, what is the reason?
6. How do you cope with the flood when it occurs? Elaborate on the strategy you used
7. Do you receive assistance from the government to deal with the flood?
 - If yes, how often do you receive assistance?
 - If yes, what do you receive?
 - If No, what is the reason?
8. Do you receive assistance from any other NGO (non-governmental organisation) that aid in your recovery?
 - If yes, what is the name of the organisation?
 - If yes, how often do you receive assistance?
 - If yes, what do you receive?
 - If No, what is the reason?
9. Do you have any requests for what would help you deal with or become resilient to the floods?
10. Are you a part of a farmer's cooperative union or money-saving scheme?
 - If yes, what are the benefits?
 - If No, what is the reason?
11. Do you have any information on smallholder farmers who left Sagbama because of flooding?
If yes, how many do you know?

APPENDIX 2. QUESTIONS FOR KEY INFORMANTS FROM GOVERNMENTAL (COMMUNITY OR LOCAL) STRUCTURES

My name is *Harrison O. Imugba*. I am currently doing my Master's in Management of Development, with a specialization in Disaster Risk Management at Van Hall Larenstein University of Applied sciences in the Netherlands. As part of my studies, I am required to do a research study on building Community resilience to Perennial floods in Nigeria. My research is specifically aimed at investigating ways to increase smallholder farmer's resilience to the perennial floods in Sagbama community, Nigeria.

Could you kindly assist me by answering questions related to my research? Your participation is voluntary and all information provided will be kept confidential.

I guarantee you that the discussion will be short, between 35-50 minutes and you can stop at any time you want. If you do agree, we can start.

1. What is your name?
2. What is your occupation?
3. What is your designation or position within your organisation? (Key Informants from Government structures).
4. What knowledge do you have about the effects of perennial floods in Sagbama community?
 - How often is Sagbama community exposed to perennial floods?
 - What is the recorded loss caused by the perennial floods?
5. Is there an existing plan for mitigating this perennial flood?
 - If Yes, Can you describe what the plan is?
 - If No, what is the reason?
6. If Yes to Q5, How is the community involved in the plan for mitigating this flood?
7. If Yes to Q5, Who are those involved in the making of this plan?
8. If Yes to Q5, How is this plan executed?
9. How does this plan cater to the needs of smallholder farmers in Sagbama community?
10. Do you have any request for what would assist you in mitigating this hazard?

APPENDIX 3: Methods of data collection and the tool used

Table 3. Data collection methods and tools used

Sub question	Data collection method	Tool used	Retrieved from	Data Processing
1. Why are smallholder farmers in Sagbama community vulnerable to perennial floods?	Smallholder farmer interview	Semi-structured questionnaire ArcGis	Smallholder farmer Google Earth	Coded response Generating themes
2. What kind of coping strategies do smallholder farmers currently use when they are affected by perennial floods?	Smallholder farmer interview	Semi-structured questionnaire	Smallholder farmer	Coded Response Generating themes
3. What capacities are there for improving smallholder farmer's adaptability to perennial floods?	Smallholder farmer interview	Semi-structured questionnaire	Smallholder farmer	Coded Response Generating themes
4. What are the flood management plans made by the government or other stakeholders for smallholder farmers in Sagbama community?	Key Informant interview	Semi-structured questionnaire	Key informants from Community and local government structure.	Generating themes

APPENDIX 4: DEMOGRAPHY OF SMALLHOLDER FARMER

Table 4: Demographic profile of respondents

Sr.N	Age	Sex	Education	Type of HH	Household size	Land size (sq.m)	Crop type
1	46	M	Completed secondary school	Male headed	5	Above 5000	Cassava, Plantain
2	50	F	Completed primary school	Male headed	8	2501 - 5000	Cassava, Yam & Potato
3	30	F	Completed University	Female headed	15	2501 – 5000	Yam, Pepper and Potato
4	58	F	No Education	Female headed	10	Above 5000	Cassava
5	40	F	No Education	Male headed	4	501 - 2500	Cassava, Yam
6	28	M	Completed University	Male headed	4	500	Cassava
7	40	F	Completed Primary school	Male headed	5	501 - 2500	Plantain, Cassava
8	50	M	Completed secondary school	Male headed	5	2501 – 5000	Cassava, Plantain & Pepper
9	35	F	Not Completed Secondary Education	Male headed	4	501 - 2500	Cassava & Sweet Potato
10	38	M	Didn't complete secondary school	Male headed	18, 3 wives	1 - 500	Yam, Cassava & Sweet Potato. Looking to plant Onions & Pepper next year
11	56	F	Completed Primary school	Female Headed	3	501 - 2500	Yam & Cassava
12	61	F	No education	Female Headed	6	Above 5000	Plantain, Yam & Cassava
13	48	F	Not Completed Secondary Education	Male headed	6	501 - 2500	Yam, Plantain, Potato
14	45	F	Not Completed Secondary Education	Female Headed	8	501 - 2500	Yam, Plantain, Pepper & potato
15	20	F	Completed Secondary Education	Male headed	5	501 - 2500	Cassava & Corn

16	29	F	Completed University	Female Headed	4	500	Yam, Cassava, Groundnut, Cocoa yam, Pumpkin Leaf, Sugar Cane
17	33	M	Completed University & Holds an MSc.	Male Headed	7	Above 5000	Plantain, Cassava