FLOOD RISK MANAGEMENT FOR SOCIO-ECONOMIC DEVELOPMENT IN LOKO COMMUNITY, ADAMAWA STATE, NIGERIA

BY

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DECLARATION

I declare that this thesis is my original work and has not been presented for a degree or award in any other university.

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We confirm that this thesis has been submitted for examination with my (our) approval as the University Supervisors.

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DEDICATION

This work is dedicated to God Almighty and to the memory of my Late Mother, Prof. J.M Ndagana, who desired, but couldn't see me bag this degree.

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TABLE OF CONTENTS

DECLARATION ..... **ii**

DEDICATION ..... **iii**

ACKNOWLEDGEMENT ..... **iv**

LIST OF TABLES ..... **x**

LIST OF FIGURES ..... **xi**

LIST OF ACRONYMS ..... **xiii**

ABSTRACT ..... **xiii**

CHAPTER ONE: INTRODUCTION ..... **xiii**

1.1 Background to the Study 1

1.2 Statement of the Problem 2

1.3 Objectives of the Study 3

1.3.1 General Objective of the Study 3

1.3.2 Specific Objectives of the Study 3

1.4 Research Questions 3

1.5 Hypotheses of the Study 4

1.6 Justification and Significance 4

1.7 Scope and Limitations 5

1.8 Conceptual Framework 5

CHAPTER TWO: LITERATURE REVIEW **7**

2.0 Introduction 7

2.1 Theoretical Review 7

2.1.1 Empowerment Theory 7

2.2 Empirical Review 8

2.2.1 Geography of disasters in Nigeria 8

2.2.2 Disaster Management Policies in Nigeria 9
2.2.3 Socio-demographic characteristics of Disaster Prone Communities 10
2.2.3.1 Specific SDGs that affected by the floods and how they are affected 10
2.2.3.2 Flooding and SDG 1 10
2.2.3.3 Flooding and SDG 2 10
2.2.3.4 Flooding and SDG 3 10
2.2.3.5 Flooding and SDG 4 10
2.2.3.6 Flooding and SDG 6 10
2.2.3.7 Flooding and SDG 8 10
2.2.3.8 Flooding and SDG 11 10
2.2.3.9 Flooding and SDG 14 15
2.2.3.10 Flooding and SDG 15 15
2.2.4 Compliance to Disaster Risk Management Policies in Developing Countries 16
2.2.5 Effectiveness of Disaster Risk Management on Socio-Economic Development in Developing Countries 19
2.3 Summary of Literature Review gaps 22
CHAPTER THREE: RESEARCH METHODOLOGY 24
3.0 Introduction 24
3.1 Research Design 24
3.2 Study Area 24
3.3 Sample Size and Sampling Procedure 24
3.4 Data Collection Procedures 26
3.5 Pilot Study 27
3.6 Validity and Reliability 27
3.7 Data Analysis Procedures 28
3.8 Ethical Considerations 29

CHAPTER FOUR: RESULTS AND DISCUSSIONS..... 30

4.0 Introduction..... 30

4.1 Response Rate 30

4.2 Socio-Demographic Characteristics of Participants 30

4.2.1 Gender Distribution..... 31

4.2.2 Age Distribution..... 31

4.2.3 Level of Education 32

4.2.4 Nature of employment..... 33

4.2.5 Participants Employment 34

4.2.6 Socio-Demographic Characteristics of Persons Living in Flood Prone Areas38

4.3 Level of Compliance to Flood Risk Management Policies 37

4.3.1 Community Engagement and Compliance to Flood Risk Management Policies ……39

4.3.2 Policies of Flood Risk Management 40

4.3.3 Public Enlightenment and Education 40

4.3.4 Communication 41

4.3.5 Increased Community Participation 41

4.3.6 Early Warning Sensitization..... 42

4.3.7 Operation Clear your Drainage 43

4.3.8 Resettlement..... 44

4.3.9 Flood Risk Reduction Programmes 45

4.4 Challenges Experienced in complying with flood risk management..... 46

4.4.1 Inadequate Funding..... 47

4.4.2 No land for Farming Purposes 47

4.4.3 Poor Level of Community Participation 47

4.4.4 Illiteracy 48

4.4.5 Stereotype 48
4.4.6 Factors that hinder adherence to FRM Policies 48
4.5 Measures to Improve Flood Risk Management 48
4.5.1 Adequate Machineries to Enforce Compliance 49
4.5.2 Monitoring and Evaluation 51
4.5.3 Periodic Clearing of Drainages 52
4.5.4 Community Participation 52
4.5.5 Value Reorientation 52
4.5.6 Ways of Improving Adherence to FRM Policies 53
4.6 Flood Risk Management on Socio-Economic development 55
4.6.1 Urban Planning and Land Use Control 56
4.6.2 Building Capacity of Stakeholders 57
4.6.3 Active involvement of stakeholders 58
4.6.4 Preparation for Emergency Response 58
4.6.5 Forecasting and Early Warning Systems for Flood Disaster 59
4.6.6 Inter-agency Collaboration towards Disaster management 60
4.6.7 Adoption of Insurance Scheme 61
4.6.8 Enhancement of Flood resilience 62
4.6.9 Flood Preparedness 64
4.6.10 FEstablishment of Single Agency 65
4.6.11 Transfer of Risk to Third Parties 65
4.6.12 Educate Community through Public Awareness 66
4.6.13 Availability of Food Security 66
4.6.14 Sustained Economic Systems even after Flood Occurrence 67
4.6.15 Sustained Socio-Demographic Status 68
4.7 Impact of Flood on Socio-Economic Development of the Area 69

4.7.1 Impact of FRM on Economic Systems 69

4.7.2 Impact of FRM on Social Systems..... 70

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS..... 72

5.0 Introduction..... 72

5.1 Summary of Findings..... 72

5.2 Conclusions of the Study 73

5.3 Recommendations of the Study 74

5.4 Suggestion for Further Research..... 75

REFERENCES..... 77

APPENDICES..... 93

Appendix I: Questionnaire..... 93

Appendix II: Focus Group Discussion topics 98

Appendix III: Toolkit for Key Informants 99

Appendix IV: Approval of Research Proposal 100

Appendix V: Research Authorization..... 101

Appendix VI: Map of Nigeria Showing Flood-prone Areas 102

LIST OF TABLES

Table 3.1: Sample distribution of the respondents..... 26

Table 4.1: Response Rate of Participants 30

Table 4.2: Gender Distribution 31

Table 4.3: Education Attainment of Participants..... 33

Table 4.4: Participants Employment..... 34

Table 4.5: ANOVA Test on Socio-Demographic Characteristics of Participants.... 35

Table 4.6: Response Distribution on Flood Risk Management Polices..... 40

Table 4.7: Distribution of measures to improve Flood Risk Management..... 49

Table 4.8: ANOVA Test on Level of Compliance to Flood Risk Management..... 54

Table 4.9: Response Distribution on FRM on socio economic Development..... 55

Table 4.10: ANOVA Test on FRM on Socio-Economic Development 71

LIST OF FIGURES

Figure 1.1 Conceptual Framework of the Study 6

Figure 2.1 Map of Adamawa State showing the study area 25

Figure 4.1 Age Distribution of Participants 32

Figure 4.2 Line graph showing Nature of employment of participants. 34

Figure 4.3 Graphical presentation on the level of agreement on Avaialability of Policies to guide FRM ..... ……39

Figure 4.4 Graphical presentation of Data on Challenges Experienced in complying with FRM Polices ..... ……46

LIST OF ABBREVIATIONS

ADSEMA:	Adamawa State Emergency Management Agency
ANOVA:	Analysis of Variance
DRM:	Disaster Risk Management
ECLAC:	Economic Commission for Latin America and the Caribbean
FRDM:	Flood Risk Disaster Management
FRM:	Flood Risk Management
IFM:	Integrated Flood Management
IMF:	International Monetary Fund
MDA's:	Ministries, Departments and Agencies
NDMF:	National Disaster Management Framework
NDRM:	National Disaster Risk Management
NEMA:	National Emergency Management Agency
NERA:	National Emergency Relief Agency
NGO:	Non-Governmental Organization
NMA:	Nigerian Meteorological Agency
UNDP:	United Nations Development Programme

ABSTRACT

The goal of flood risk management is to reduce the socio-economic impact and loss of human resources that is caused by floods. Previous researches paid attention to the socio-demographic effects of disasters in general and not on the general flood risk assessment, such as; factors responsible among many others. This study investigates flood risk management for the socio-economic development of Loko Community in Song local government area in Adamawa State, Nigeria. Three main objectives proposed by the study are; to assess the socio-demographic characteristics of Loko Community, examine the level of compliance to flood risk management policies, and evaluate the effectiveness of flood risk management in influencing socio-economic development in Adamawa state. The study investigated the following hypotheses. (i) There are no distinctive socio-demographic characteristics that distinguish people in flood-prone areas from others not affected. (ii) There is no compliance to flood risk management policies in Loko community, Adamawa state, Nigeria. (iii) Flood risk management is not effective in promoting socio-economic development in Loko Community of Song Local Area Government. The study adopted a case study research design and targeted a population of (N=4,200) inhabitants, 800 households, 20 NEMA staff and 40 ADSEMA staff. Paper questionnaire was the main survey tool adopted for collection of data. The study also obtained information through Focus Group Discussions and key informant interviews. For data analysis, the study employed descriptive (descriptive statistics; frequencies and percentages) and inferential (ANOVA) analysis using SPSS version 22. The study found that flood significantly affects the socio-economic condition and livelihoods of the people. The study also found that there is some level of compliance to disaster management and control policy in the community. The study revealed that the main flood challenges in the study community include; inadequate funding for flood risk management, poor community participation, high illiteracy levels and stereotypes within the community. The study recommends that houses should be built using durable materials and away from flood paths. It is essential that houses outside of flood plains will lessen the consequences of flooding. Also, the Ministry of Agriculture and Cooperatives should encourage communities to cultivate more on upland by providing financing through the Extension Services to improve food security for households. The number of assistance programs for the impacted should be increased, and the support programs should give priority to viable farmers. The study finds that better and more effective strategies must be created to prepare for and lessen the effects of floods. This is attainable through an inclusive programme that involves all the players of the community. To encourage community engagement in flood risk planning, as well as the creation and application of risk assessment strategies. Furthermore, it is important to address socio-economic issues like poverty, livelihood profile, cultural perspectives, the status of marginalized social groups, and the rights of racial and ethnic minorities immediately.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The goal of flood risk management is to lessen the socio-economic impact and loss of human resources that is caused by floods. Even though floods have their benefits particularly in the agricultural sector, their associated consequences can result in significant socio-demographic losses that result in long-term negative impact on the affected community (Morrison et. al. 2018). Flood Risk Management (FRM) focuses on analyzing relationships between socio-demographic environment, physical systems and the institutional frameworks in place (Idris & Dharmasiri, 2015).

Evidences indicate that occurrence of natural disasters in many countries has been on the increase, mainly due to environmental degradation (World Bank 2002; Loayza, et. al. 2012; World Bank, 2017). Africa is prone to many disasters which have resulted in significant negative socio-demographic impacts on the affected countries. Issues like inadequate funding, high levels of poverty, inadequate disaster management expertise have led to poor disaster preparedness and poor response to disasters that follow (Van Niekerk, 2015). Inadequate funding for disaster management in Africa leads to other secondary problems including stunted socio-economic development since affected people have to start afresh from statuses far below where they were before the disaster occurrence.

The UN general assembly establishment of the National Disaster Risk Management (NDRM) boosted international consciousness concerning Flood Risk Management (FRM) in the 1990s. Likewise, the National Disaster Management Framework (NDMF) offers a framework that acts as a regulated entity for attaining efficient management of disasters in Nigeria and gives a new perception on ways of dealing with disaster hazards risks and vulnerabilities which could be used in averting future disasters in the country (NEMA, 2012). The NDMF is a fine piece of legislation that serves in federal and state government organs and other public entities. It demands that plans, institutions, and strategies be developed that apply to all levels of government (NDMF, 2010). The NDMF is a multi-sectoral, integrated, multi-disciplinary approach that serves to mitigate hazards and vulnerabilities, but also

needs to be integrated in development planning to achieve success (Bariweni et.al. 2012).

The absence of a budgetary framework leads to a need to consolidate all Disaster Risk Management (DRM) activities including funding, disaster reduction and response into one pool to promote efficiency in disaster management. However, despite the benefits of such approach, the current Nigerian public financial infrastructure does not support its effective implementation due to the existence of numerous bureaucracies. It is as a result of this situation that the study is undertaken with primary focus on Loko community and the influence of flood risk management on their socioeconomic well-being.

1.2 Statement of the Problem

Nigeria's National Emergency Management Agency (NEMA) was formed by Act 12 of 1999. This was modified by Act 50 of 1999 which give mechanisms for funding post-disaster recovery measures and rehabilitation of affected areas and communities. It also mandates the creation of a disaster management strategy in the individual states and be a key part of their development plans (NEMA, 2012). NEMA also formulated the disaster management plan to highlight approaches to be used in reducing vulnerability of people in disaster prone areas together with measures to prevent and mitigate flooding disasters. “Nigeria Vision 20:20:20” mentions, very briefly, disaster emergency needs and made no mention of FRM or disaster prevention.

Although NEMA is working hard, flood risk management is not yet acknowledged as a national priority, and decision-makers are unaware of or have little understanding of disaster reduction issues. Most of the flood risk interventions made at the three levels of government are mostly responsive, as they only focus on helping affected communities cope with the disaster by providing them with emergency services such as make-shift housing, food and medical supply. Nigeria currently does not have an effective flood risk management framework since more of the interventions are curative and not preventive, a factor that negatively affects communities in flood prone areas.

A true measure of socio-economic development is critical in advising the relevant authorities responsible for flood risk management to make informed decisions regarding the need to adopt interventions that will be sustainable in mitigating the impact of flooding on communities, especially Loko community lying on a relatively low elevation that has made it vulnerable to seasonal flooding which this study focuses on. There are limited studies that asses the socio-economic impacts of flood risk management. On that note, this study focused on exploring the effectiveness, levels of compliance and the influence of flood risk management on socio-economic development of Loko community of Song LGA Adamawa state.

1.3 Objectives of the Study

The objectives are divided into two; the general objective and the specific objectives.

1.3.1 General Objective of the Study

The general objective of this study is to assess flood risk management for socio-economic development in Loko community of Adamawa state, Nigeria.

1.3.2 Specific Objectives of the Study

The specific objectives are;

i. To assess the socio-demographic characteristics of Loko community of Song LGA Adamawa state, Nigeria;
ii. To examine the level of compliance to flood risk management policies in Loko community, Adamawa state, Nigeria; and
iii. To evaluate the effectiveness of flood risk management on socio-economic development in Adamawa State, Nigeria.

1.4 Research Questions

The following research questions guide this study:

i. How is Loko community in Song LGA Adamawa state, Nigeria socio-demographically characterized?
ii. What is the measure of the level of compliance to flood risk management policies in Adamawa state, Nigeria?

iii. How effective is flood risk management on socio economic development in Loko community of Adamawa State Nigeria?

1.5 Hypotheses of the Study

The following three null hypotheses were tested in response to the specific objectives and research questions stated above:

H_{01}: There are no distinctive socio-demographic characteristics that distinguish people in flood-prone areas from others not affected.

H_{02}: There is no compliance to flood risk management policies in Loko community, Adamawa state, Nigeria

H_{03}: Flood risk management is not effective in promoting socio- economic development in Loko Community of Song Local Area Government.

1.6 Justification and Significance

Despite the disaster management plan that was developed to indicate measures of reducing vulnerability in disaster prone areas, communities in Adamawa State still face countless challenges (Bariweni et.al. 2002). This major gap exists because there are not many researches done on this topic in Adamawa State, Nigeria. According to Olanrewaju et.al. (2019) limited information regarding the aftermath effect of flooding on socio-economic development is responsible for the formulation of ineffective disaster risks management policies. Therefore, it is necessary to do research in order to understand the significance of flood risk management on socio-economic development in Adamawa State.

This study focused on assessing the level of influence flood risk management has on socio-economic development in order to shed light on basic strategies that could enhance the effectiveness of disaster risk management on socio economic development. Scholars will find this research beneficial and it will serve as a basis to undertake further research and for students who may wish to use the reports gotten from the research, a good material of reference. This study will also be applied by the three tiers of government (Federal, State & Local) also as a baseline survey for

formulating policies on disaster management together with adding to existing knowledge.

1.7 Scope and Limitation

This study was limited to flood risk management on socio-economic development in Adamawa State, Nigeria. As such, the boundary of this study is limited to an investigation of how flood risk management has an effect on socio- economic development in Adamawa State. In assessing the effectiveness of flood risk management frameworks and compliance to flood risk management policies, the assessment scope was also defined by the socio-demographic characteristics of the study's participants. Furthermore, based on the objectives, the study focused on flood risk management.

1.8 Conceptual Framework

A conceptual framework is a depiction of the connection between independent, intervening and dependent variables. The concept in this study is to however, assess flood risk management on socio- economic development in Loko community.

In Figure 1.1, the conceptual framework is presented pictorially. As shown, there are three main variables of interest; the dependent variable which is the variable of interest to be estimated or studied is the social economic development. The explanatory or independent variables are demographic factors (such as education, age, gender, occupation). The intervening variables are risk avoidance, risk reduction and risk transfer which are seen as the community resilience to the flood shocks and government functionality. The goal is to study how these variables (independent and intervening) influence socio- economic development of the community under consideration.

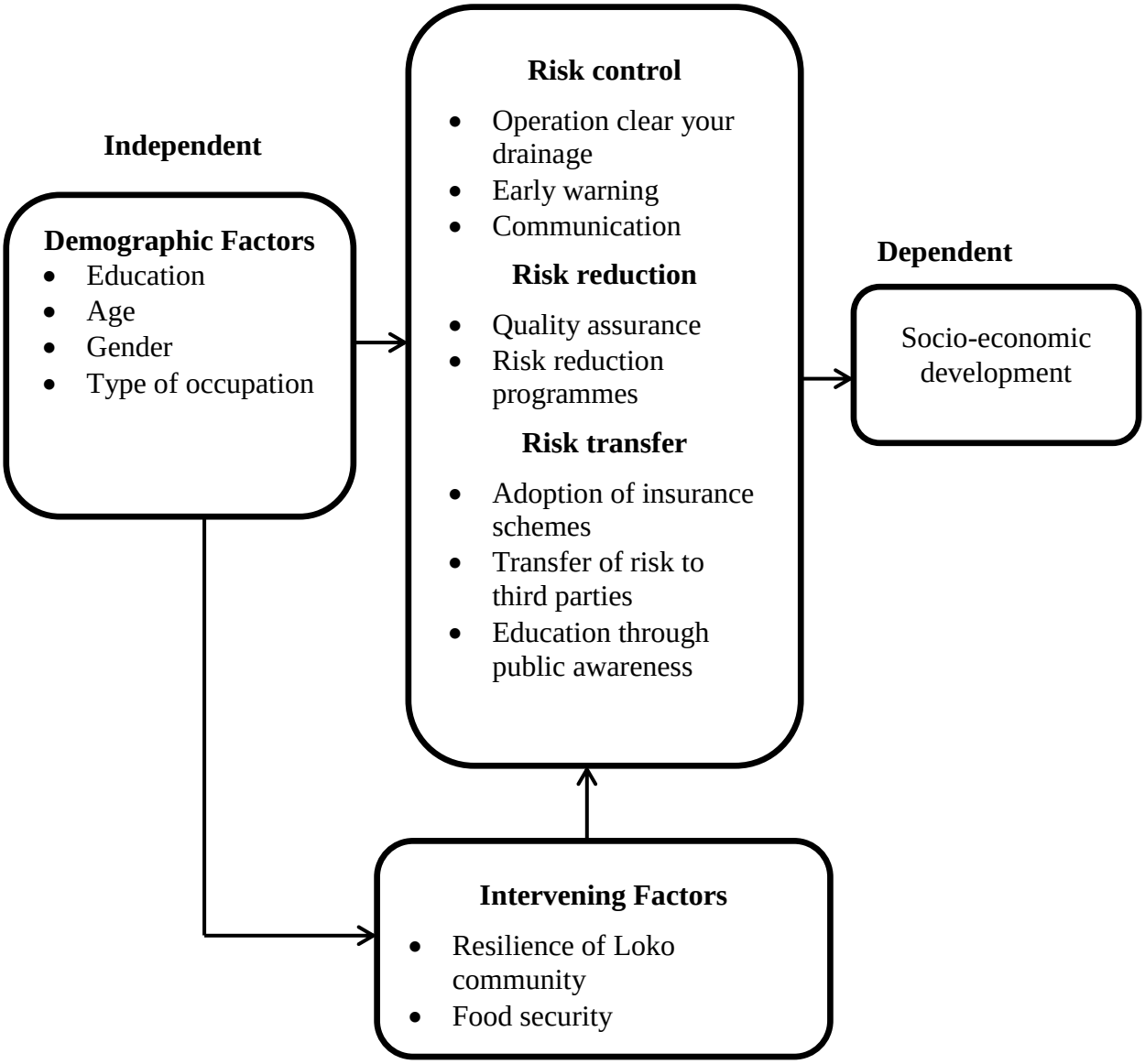


Figure 1.1: Conceptual Framework of the Study

Source: Developed by the researcher from a review of literature

From literature, flood risk management has a positive impact on socio-economic development of the community. Thieken et.al. (2016) affirmed that flood risk management is a lessening process that involves reducing the level of negative impact floods have on a community and in the process helping it to get the best out of the disaster through adjustments.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter comprises of review of literature relevant to flood risk management for socio-economic development in Loko community. The review focused on identification of research gaps which this study intends to fill in the findings sections. The chapter comprised of two sections namely the theoretical and empirical review and concluded with a summary of literature review highlighting the research gap that the findings of the study filled.

2.1 Theoretical Review

2.1.1 Empowerment Theory

The theory was postulated by Zimmerman (2000). According to this theory, the development of proficiencies and capabilities contributes to the improvement of self-definition and personal growth among beneficiary community members. It also argues that a combination of personal effort, development and the existence of natural or man-made support structures is the product of change. The theory is largely focused on the premise that recipients have individual capacities that they can use to socially and economically construct themselves and thus only need to be provided with a forum that they can use to achieve their objectives. Empowerment is an evolving process that reflects on the environment and requires all stakeholders' awareness of the underlying problems (Kenny, 2016).

In addition, it is a collaborative process that requires fair involvement by all stakeholders, but focuses on increasing acceptance by the recipients. Loko community members are the primary beneficiaries who need a voice to help mitigate the effects floods have on their livelihoods.

Both the community and the local government at large know that flooding is the community's greatest issue, so services such as flood risk control help to alleviate the problem. Based on the empowerment theory, alleviating the flooding issue would encourage members of the Loko community to participate in socio-demographic activities that will empower them to improve their living standards.

2.2 Empirical Review

2.2.1 Geography of disasters in Nigeria

Nigeria has a population of more than 120 million people and covers an area of 923,767 km2, with an average length of 1050 km north to south and a width of 1200 km east to west, between longitude 2 ° 40' to 14 ° 45' east of the Greenwich Meridian and latitude 4 ° 15' to 13 ° 55' north of the equator. Nigeria, has all of the tropics' ecological zones. They include the Mangrove swamps (9723 km²), the Tropical Rainforest, the Freshwater Swamp Forest (21,135 km²) and the Lowland Rainforest (190,053 km²) (latitude 6° 30 'to 7° 45') in the extreme southern region (latitude 40 and 60 301 N). The Guinea Savannah belt (latitude 7° 45'N to 10° 30' N) covers around 175,000 km², the Sudan Savannah belt (latitude 10° 30'N to 12° 00' N) covers about 192,000 km², and the Sahel Savannah (above latitude 12° N) covers about 67,000 km². (IFRC [International Federation of Red Cross and Red Crescent], 2011). There is great vulnerability to disasters in Nigeria, as Nigeria is also affected by many of the natural disasters frequent in the tropics. Therefore, very good courses of action are needed to ensure that these disasters are still handled effectively. Varying clearly along geographical lines, natural disasters are generally distributed in the country. The North-Eastern states are particularly subject to desertification, drought, dust storms, and windstorms due to the effects of the dry and hot northeast trade winds that blow for most of the year. States in the South-West are more prone to rainstorms, coastline erosion, and windstorms due to the effect of cool and damp South-West trade winds which dominates the region almost throughout the year. (Olorunfemi, 2008). The South-Eastern areas of the state are particularly vulnerable to landslides and gully erosion because of high rainfall levels, loose soils, and mountainous topography. The south-southern states, on the other hand, are more prone to coastal and gully erosion, owing to the loose character of the soils, excessive rainfall levels, and surging ocean waves (Obeta, 2014).

However, the country has had countless ethnic, political, and religious wars, leaving the environment vulnerable to both natural and human-caused calamities (Echendu, 2020). Furthermore, issues of governance have largely affected in limiting resources for disaster management despite the fact that it is Africa's leading oil producer and in turn has the continent's largest economy. Floods, droughts, landslides, erosion,

desertification, and catastrophic storms, which afflict people in various parts of the country, have been increasing in frequency and intensity over time (Olorunfemi, 2008; Adeloye & Rustum, 2011; IFRC (International Federation of Red Cross and Red Crescent), 2011; Ajibola, 2012).

The economic losses from these calamities and their emergency procedures cost millions of dollars every year, putting a strain on the country's budget. For example, disasters claimed roughly $30.6 billion in economic damage in 2017, nearly tripling the loss of $18.8 billion in 2016. This is partly due to inefficient development management systems, an ever-growing population, and a growing number of people who continue to reside in disaster-prone areas of the country, putting them at high dangers of both manmade and natural disasters (Ajibola, 2012).

2.2.2 Disaster Management Policies in Nigeria

Countries employ legislation to solve concerns such as natural catastrophes. Disaster prevention, risk reduction, response, and management are all aided by such legislation. In Nigeria, disaster management began with the founding of the National Emergency Relief Agency (NERA) by Decree No. 48 of 1976, popularly referred to as the NERA Act. The agency was created to collaborate with a group of organizations such as the Nigerian Red Cross Society, the Nigerian Armed Forces, and the Nigerian Police Force, whose duties and responsibilities all overlap, to plan, provide, and coordinate emergency aid for natural disaster victims across the country (Obeta, 2014).

As a result, the National Emergency Management Agency (NEMA) Act replaced the NERA Act in March 1999 and became known as the NEMA Act. For each of the 36 states in the nation, the Act established a State Emergency Management Committee and a National Emergency Management Agency, along with planning for further disaster-related challenges. The NEMA Act expanded NERA's mandate and improved the nation's financial resources for disaster recovery. More importantly, the Act created significant novelties, such as the creation of the Agency's Governing Council, term of office, and membership termination, among other things, that were not previously addressed by the abolished NERA Act. However, disaster management researchers such as (Larrauri and Receveur (2018); Obeta (2014); Manyena et al. (2013); Farber et al., (2009)) have repeatedly demanded that disaster legislation be

critically examined in order to provide solutions to problems about disaster management, particularly those pertaining to risk, vulnerability, resilience, adaptation, and mitigation. Disaster management in Nigeria is mostly reactive rather than proactive, as stipulated by the NEMA Act, and it exclusively employs the emergency response strategy (Receveur, 2018).

2.2.3 Socio-demographic characteristics of Disaster Prone Communities

Damage to the available infrastructure, food supply and other economic systems is a key evidence of disasters (Lal et.al, 2009). In a similar study, Mata-Lima et.al, (2013) noted that the destruction of available primary and supportive resources contributes to a decline in income levels that ultimately lead to poverty. Poverty is a serious social issue that limits an individual's economic reach to basic things like food, quality healthcare and education for children. Consequently, this inhibits the willingness of affected people to contribute positively to the community's social growth. Study results from Mata-Lima et.al. (2013) further suggested that poverty is due to high unemployment structures in disaster-prone areas because certain economic systems such as businesses cannot work under flooded conditions. Despite giving an in-depth viewpoint on how disasters lead to poverty among community members, all kinds of disasters contribute to poverty in the same way.

Tirivangasi, (2018) undertook a study to investigate the influence disaster risk management had on food security. Findings indicated that disasters destroyed available food stocks, crops, and infrastructure such as roads necessary for ensuring supply of food to disaster prone areas. According to the study, destruction of food and systems that influences its supply contribute to the occurrence of hunger which has other serious ramifications on the stability of families and the society. Ainehvand et.al. (2019) added that disasters are a major challenge in achieving food security response measures since they destroy available systems meant to ensure food self-reliance. Nonetheless, the findings did not provide a detailed perspective regarding how specific disasters such as flooding contribute to hunger as a social problem.

Other studies have established that flooding causes severe effects on economic growth and by promoting hunger, poverty and other social vices among many others (Chapaign and Raizada, 2017; Jongman, 2018; Matemilola and Elegbede, 2017;

Mwape, 2019; Olanrewaju et.al. 2019). To buttress the social impact of flooding in Nigeria, Aja and Olaore (2014) asserted that most states in Nigeria suffer from annual flooding during the rainy seasons due to increased precipitation connected with climate change and other human neglected activities, most states in Nigeria experience annual floods during the rainy seasons. As a result, floods are considered a danger to sustainability since they have a negative impact on the economy, social life, the environment, and human health (Ludwig et. al. 2007). In Nigeria, Echendu (2020) reported a clear link between floods and the Sustainable Development Goals (SDGs). This affirms that the social effect of flooding can promote poverty, food insecurity, loss of properties among many other aftermath experiences.

2.2.3.1 Specific SDGs that are affected by the floods and how they are affected

Sustainable Development is; "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The most popular and widely-accepted definition of sustainable development is the one that was taken from the UN Report of the World Commission on Environment and Development: Our Common Future, known as the Brundtland Report named after the Chair person, Gro Harlem Brundtland (Brundtland Report, 1987).

The Millennium Development Goals were repealed in 2015 and replaced by the Sustainable Development Goals of the United Nation. By attempting to address the problems that affect the planet as a whole, it serves as a roadmap for attaining sustainable development and a brighter future for everybody. By 2030, the objectives are to change the world by tackling various human-related challenges in order to guarantee economic development, wellbeing, and environmental protection for both developed and developing nations (UN, 2016). This is to be done through global cooperation among all nations, irrespective of their level of development. People all throughout the world are disproportionately affected by floods. The variations in impact are attributable to the fact that the world's nations are at various stages of development and do not share the same difficulties. (Reckien et al. 2017; Mata-Lima et al. 2013). Floods interrupt many aspects of daily life, and the SDGs that are impacted may be the same across Africa and other developing countries.

2.2.3.2 Flooding and SDG 1

By 2030, SDG 1 intends to end poverty. Poverty is the largest global obstacle to attaining sustainable development. Therefore, eradicating poverty is essential for the SDGs to be a success (Roy et al. 2018). Floods worsens existing poverty, and poverty makes the impact of flooding rather serious by increasing vulnerability, so there is a two-way mutually advantageous beneficial link between the two. Both of these effects degrade the living standards of the impacted communities and impede development, especially for the least fortunate members of society (Dube, Mtapuri, and Matunhu 2018).

2.2.3.3 Flooding and SDG 2

By 2030, SDG 2 seeks to eradicate hunger (Gil et al. 2019). In order to eradicate hunger, food production and agriculture are essential, but flooding in Nigeria has a severe influence on these key sectors (Osabohien, Osabuohien, and Urhie 2018). Nigeria is far from reaching food security, which requires making food accessible and readily available, especially the staple foods. Food security is the only sure solution to end hunger. Nigeria is a long way from achieving food security, which requires making food accessible and readily available. It is true that despite the vast amount of arable land, Nigeria continues to be Africa's largest food importer (Matemilola and Elegbede 2017; Osabohien, Osabuohien, and Urhie 2018).

Controlling and eliminating the human causes of flooding in Nigeria is necessary to address the close connection between flooding and food security in the country and reduce hunger.

2.2.3.4 Flooding and SDG 3

To ensure wellbeing and healthy lives for all, the SDG 3 was established. Flooding, has a variety of negative consequences on health and lasting repercussions that prevents from achieving this goal (Aliyu 2015; Olanrewaju et al. 2019). Similar to how the SDGs are connected and interconnected with one another, the consequences of flooding on health are connected to other SDGs like eradicating poverty and hunger. There is greater poverty and hunger because unhealthy people are less productive. Flooding has a direct effect on poverty and makes people more

susceptible to hunger, while, among other things, weaker immune systems are a predictor of disease epidemics. Flooding has both immediate and long-term health effects (Okaka and Odhiambo 2018).

Due to yearly flooding disasters, Nigeria's developing health sector experiences obstacles. Flooding is a usual time for outbreaks of water-borne diseases with a high mortality rate, such as typhoid, cholera, and dysentery.

2.2.3.5 Flooding and SDG 4

SDG 4 aspires to provide all people with equitable access to high-quality education and more possibilities for lifelong learning (UN 2016). The significance of education in attaining sustainable development cannot be over emphasized (Oghenekohwo and Frank-Oputu 2017). Numerous initiatives advocate for universal basic education for everyone, especially for young children, yet flood disasters undermine children's right to education (Mudavanhu 2014). Children in disaster areas who have been displaced by flooding are at a disadvantage academically when they are in the critical school years, which puts them at risk for future economic disadvantage and opportunity (Erica, Jessie, and Stephanie 2018).

2.2.3.6 Flooding and SDG 6

The SDG 6 strives to guarantee everyone has access to water and hygiene services and that they are managed sustainably. Water for household and personal use that is sufficient, clean, affordable, and easily accessible, as well as good sanitation, should be available to everyone (UN 2016). Floods have an effect on these fundamental rights by polluting water in various ways and destroying sanitary infrastructure, both of which have an effect on the population's health. Up to 80% of diseases are connected to poor sanitation and tainted water on a global level, while in Nigeria, 100 million people lack access to basic sanitation facilities and 63 million do not have access to drinkable water (Raimi et al. 2018).

2.2.3.7 Flooding and SDG 8

The SDG goal 8 seeks to improve full and productive employment, sustained economic growth that is inclusive and sustainable, and balanced employment for all (UN 2016). Flooding, which obliterates people's sources of income, undermines this

objective. It is generally known how flooding affects economic development (Chapagain and Raizada 2017; Jongman 2018; Matemilola and Elegbede 2017; Mwape 2019; Olanrewaju et al. 2019). An unhealthy person cannot participate in the labor force, so the availability of labor is also constrained due to the disease incidence related with flooding. As a result of the damage to their sources of livelihood that provide for their households, flood victims experience a loss of income (Kwari, Paul, and Shekarau 2015; Mwape 2019). The most noticeable financial impact of floods is property damage (Sardar, Javed, and Amir-ud-Din 2016). The use of resources for operations like redevelopment and rehabilitation also slows down economic progress. Flooding has a long-term economic consequence that goes beyond the immediate area that is impacted (Jongman 2018). The 2012 Nigerian floods costed the country $10 billion (Olalekan, 2018).

2.2.3.8 Flooding and SDG 11

SDG 11 aims to build human settlements and cities that are inclusive, safe, resilient, and sustainable (UN 2016). The goal is to reduce to the barest minimum the number of persons affected by disasters and the death toll, especially those connected to water, and the immediate financial losses as a percentage of disaster-related global GDP by 2030. Goal 11 aims to maintain human settlements to an optimal condition for inhabitants while having the least adverse impact on the environment or communities nearby. In light of the current risks posed by climate change, it is primarily concerned with meeting the needs of the community's deprived and most vulnerable individual, who are primarily women and children, as well as protecting human settlements' safety and integrity (UNDP. 2016).

SDG 11 is seriously threatened by flooding. Because they lack social security and can't recoup from the effects of flooding, Nigeria's urban poor are especially vulnerable (Salami, von Meding, and Giggins 2017). In order to create sustainable cities and settlements, it is imperative that the rate of urbanization and population growth in Nigeria be taken into consideration. Flooding is the country's most frequent and major environmental concern. Managing and preventing floods effectively will aid in promoting sustainable communities (Kiedrzyńska, Kiedrzyński, and Zalewski 2015).

2.2.3.9 Flooding and SDG 14

For sustainable development, the SDG 14 strives to protect and sustainably use the seas, marine resources and oceans (UN 2016). Given that water comprises up 97% of the surface of the world and it is essential to the livelihood of 3 billion people, the importance of water in issues of sustainable development cannot be overemphasized (Chukwu, Wekpe, and Ikebude 2018).

Flooding affects how effectively water resources are used for sustainable development. It interferes with and has an effect on aquatic ecosystems and the functions they perform. Because they are less obvious than the effects on land or on densely populated urban areas, and also because they are harder to measure, the effects of flooding on aquatic ecosystems are frequently ignored (Talbot et al. 2018). Flooding has an impact on water quality because it causes waste, contaminated sediments, and nutrients from farmlands to seep into the oceans. (Bariweni, Tawari, and Abowei 2012). Aquatic life is killed as a result of the pollution of the aquatic ecosystem. The remaining marine life's ability to reproduce is impacted. Because species go extinct if they can't reproduce, this affects how long aquatic life can survive. Because decomposing marine life produces nitrates as a byproduct, dead aquatic life increases the amount of nitrates in the water. While newborns are more susceptible to nitrate poisoning, increased nitrate levels in water can impair the ability of red blood cells to transport oxygen.

2.2.3.10 Flooding and SDG 15

Goal 15's objectives are to safeguard terrestrial ecosystems, restore them, and encourage their sustainable use (UN 2016). A number of interrelated phenomena, including flooding, are contributing to the destruction of Nigeria's ecosystem (Izah, 2018). Flooding kills human and animal life as well as the native flora and fauna of an ecosystem. Flood waters damage land by stripping soils and eroding shorelines, eliminating any naturally occurring vegetation in their path (Smith 2017). Every kind of life, including plants and animals, is threatened by the harmful conditions it creates. Flooding also has the effect of dispersing weed species. In locations that frequently flood, invasive species are propagated and native plant populations are less threatened

by competition. Therefore, floods encourage invasive species while having an adverse effect on the sustainability of natural species (Čuda et al. 2017).

2.2.4 Compliance to Disaster Risk Management Policies in Developing Countries

There are five areas which all governments are required to base on in formulating policies to achieve compliance to disaster risk management; preparedness, identification of risks, mitigation of such risks, and resilience reconstruction (World Bank, 2014). Countries are required to invest in measures to facilitate the identification of disaster related risks by anticipating when they will occur to give ample time to local governments, businesses, communities and individuals to make informed decisions regarding mitigation measures. McDermott, (2016) further adds that Word Bank requires every country to formulate disaster risk management policies aimed at reducing the extent of damage inflicted when disasters occur.

However, even though identification of the potential risk is critical to disaster management, availability of resources and infrastructure to deal with disasters ascertains the effectiveness of the policies in place. Developing countries are particularly affected by this since most of the governments are cash-strapped hence limited budget allocation for risk identification initiatives. World Bank (2014) further adds that risk identification paves a way for implementing other policy areas since the information provided serves as a basis for formulating mitigation strategies. World Bank asserts that significant effort on policies should be made on risk identification to enable respective governments to plan accordingly to minimize the level of damage inflicted on communities in disaster prone areas.

In a study, by Olu et.al. (2016) to investigate ways of strengthening disaster management in Africa, the findings showed that inadequate financing of disaster management programmes is the biggest challenge to compliance to DRM policies. Olu et.al further added that most developing countries are still developing hence prioritize available limited resources on critical issues such as fighting diseases, illiteracy and poverty. For this reason, they rely on donor aid to bridge the funding gap in disaster risk management. Iloka (2016) affirms Olu et.al.'s findings by arguing that disaster risk management is a capital intensive engagement thus causing developing counties to shy away from it since the economic costs are higher than the

benefits. Therefore, such governments employ passive measures of helping disaster victims to rebuild their lives as an economically viable option. Other studies have shown that there exist other challenges that curtail compliance to DRM policies including political instability, unpredictability of some disasters and lack of supportive infrastructure and expertise to mitigate influence of the disasters (Wilkinson, 2012; Jones, et.al. 2014 and Mall et.al. 2019). All the scholars concur that there exist challenges that negatively affect the ability of developing countries particularly in Africa to comply to disaster risk management policies. However, they have not provided an assessment of the actual measurement of economic costs of complying with DRM policies with respect to the expected outcomes. That is, they only focused on the economic costs and benefits of being compliant while ignoring the social benefits associated with disaster risk management.

Consequently, numerous studies have revealed that while global flooding has increased due to climate change, Human activity is the main cause and aggravating factor of floods in Nigeria (Aderogba, 2012). The human-nature interactions such as poor or non-existent drainage infrastructure in most areas is a key human-induced exacerbation of Nigeria's flooding (Ogundele and Jegede 2011). In Nigeria, a large number of housing areas either lack drainage systems, are built on flood plains, or rely on natural drainage systems. Buildings and other infrastructure are frequently built in some communities in such a way as to obstruct drainage channels, which causes flooding during the rainy season (Nabegu, 2014). Increased urbanization has also resulted in increased concrete surfaces, preventing water from percolating and preventing surface runoff (Adeloye and Rustum, 2011). One of the primary causes of flooding in urban areas is a lack of flood planning or proper drainage. Therefore, it is imperative to create drainage systems in order to handle the flooding issue (Etuonovbe, 2011).

Another significant issue is ineffective waste management system. One of the main causes contributing to, and exacerbating, the already severe flooding situation in most developing nations is poor waste management (Ojo and Adejugbagbe, 2017). Citizens' negative attitudes about trash disposal have been widely explored in a number of researches (Eneji et.al., 2016; Ojo and Adejugbagbe, 2017; Olukanni, Adebayo, and Tenebe 2014; Sridhar and Ojediran 1983). People were more likely to

dump garbage on waterways due to lack of suitable waste disposal systems, resulting in drainage obstructions and poor sanitation practices in densely populated metropolitan areas (Echendu, 2020). According to Onwuemele (2012), a substantial fraction of the population engages in improper trash disposal practices such as roadside dumping, canal dumping, and dumping during rainstorms, causing waterways to get clogged, resulting in floods.

Similar to how flooding and urbanization are intertwined, city planning has a significant impact on the social structure that contributes to flooding in both developing and developed countries (Echendu, 2020). Over 50% of Nigerians now live in cities (Farrell, 2018). Flooding is more likely as a result of high urbanization rates without matching supply of urban infrastructure and facilities (Aderogba, 2012). In order to accommodate housing demand and development, agricultural fields are also being turned into residential areas quickly. This is done without proper controls or drainage infrastructure, which exacerbates the flooding issue (Dan-Jumbo, Metzger, and Clark, 2018). Poor urban and regional planning compounded by other numerous noncompliance issues are the major causes of the floods in Nigeria (Echendu, 2020). As a result, occurrence of floods in Nigeria's is directly connected to bad urban planning (Omoboye and Festus, 2014).

However, where there is layout structural urban and regional planning, corruption and a lack of effective execution of planning rules make it impossible to build a viable FRM (Echendu, 2020). According to Nnaemeka-Okeke (2016), Nigeria now has traditional planning laws, however they are not sufficiently regulated during their formulation and implementation. Understaffing, a lack of functional equipment, and political interference in city planning are all issues that make it difficult for planners to do their jobs effectively (Nnaemeka-Okeke 2016; Oluwaseyi 2019). The licensing of development projects on natural floodplains and storm water channels due to inadequate application of planning rules exacerbates the flooding problem and has negative consequences for long-term sustainability (Nnaemeka-Okeke, 2016; Oluwaseyi 2019; and Echendu, 2020). Corruption is also a factor, since accepting bribes and ignoring concerns is a widespread practice among city planners. A few instances of corrupt activities include the approval of land use that is illegal, the revision of approved building designs in areas where they obstruct drains and natural

waterways, and the installation of insufficient infrastructure, such as bridges that collapse during heavy rain (Oladokun and Proverbs 2016).

Additionally, individuals regularly expand their structures beyond the permitted limits and even go so far as to build over drainage systems because of the lax development control gap (Oladokun and Proverbs 2016). Long-term urban development is impossible to achieve due to, among other things, the non-implementation of legislation and the unscrupulous behavior of planning officials. Reckless developments, which have a variety of negative repercussions, are the result of poor planning and a lack of building permits (Adeloye and Rustum 2011).

2.2.5 Effectiveness of Disaster Risk Management on Socio-demographic Development in Developing Countries

Disaster management in most developing countries is ineffective such that it has limited positive outcomes in terms of mitigating the effect of disasters (Al-Nammari and Alzaghal, 2015; Baytiyeh, 2018 and Aghaei, Seyedin and Sanaeinasab, 2018). According to Al-Nammari and Alzaghal, (2015), most developing countries face the challenge of unavailability of adequate capital to fund disaster risk management programs. Such countries are characterized by high poverty levels and a smaller tax-base signifying that disaster risk management programs get limited funding, which explains why a significant proportion of DRM program budgets come from donor funding. Aghaei, Seyedin and Sanaeinasab, (2018) add that what worsens the situation is that such countries face numerous disasters including flooding, drought and hunger and disease epidemics that limits ability of governments in developing countries to develop effective disaster risk management frameworks.

The scholars have singled out inadequate funds for disaster management program as the leading cause of their ineffectiveness. However, it is worthy to note that some of these countries are specialized in dealing with some kinds of disasters while they lag behind in others. Therefore, this study will focus on flood risk management on Song local government area in Adamawa State, Nigeria. Scholars such as Van Niekerk, (2015) and Peters and Peters, (2018) in their studies found that developing countries particularly in Africa were making steady progress though poor governance was found to influence the effectiveness of disaster risk management programmes.

According to Van Niekerk, (2015) lack of political goodwill to invest in disaster management programs and civil strife had negative influence on the ability of such governments to formulate effective disaster management frameworks.

Unrest in some developing countries such as South Sudan and Somalia prevent formulation of DRM framework due to insecurity and lack of general stability needed to formulate sound strategies. For instance, in a study by Gostin et.al. (2019) on disaster management findings show that political instability in Eastern Democratic Republic of the Congo are curtailing efforts to control the Ebola epidemic. Even though the scholars have provided a detailed description regarding how poor governance impedes effectiveness of disaster risk management, Peters and Peters, (2018) generalized disaster management in Africa and Arab countries while Gostin et.al. (2019) focused on Democratic Republic of Congo. None of the studies focused on flooding as a single type of disaster experienced in Nigeria which this study focused on.

Many nations have recognized the necessity to develop a particular regulatory agenda focused on catastrophe prevention, management, and mitigation. If a number of measures in the correct direction are made, countries' ability to cope with most natural catastrophes, such as floods, would be strengthened, whereby individual, institutional, and systemic capacity growth are all possible. Individual capacity is determined by human resource availability, knowledge, and skills, as well as their performance. The capacity question at the individual level focuses on all components of the emergency management system at the national and local levels, as well as the evaluation of the political, cultural, social, economic, and environmental factors that impact catastrophe susceptibility. Capacity is focused on overall organizational performance and managerial capacities at the institutional level. For example, the existence of an entity with a specialized flood control mandate is one of them. The other hand that the systemic level concentrates on is the establishment of an enabling environment, such as general policy, economic, regulatory, and accountability frameworks within which organizations and individuals function. Olowu (2010) noted that many developing nations, particularly in Africa, lack proper legal and regulatory frameworks, as well as the inadequacy of most governmental infrastructures and, in certain circumstances,

insufficient resources, making them more vulnerable to the gruesome aftermaths of large-scale catastrophes.

With the establishment of the Police Fire Brigade (now Federal Fire Services) in 1906, Nigeria made its first efforts at disaster management, with functions that extended beyond firefighting to saving people's lives, property, and providing humanitarian services during emergencies. Nigeria, however, is still in its infancy in disaster management. Act 12 of 1999, as modified by Act 50 of 1999, created the National Emergency Management Agency (NEMA) to manage disasters in Nigeria. The Agency has put in place mechanisms at various levels of operation to enable it to recognize, respond to, and deal with disasters in a timely way. NEMA utilizes public education to promote public awareness and decrease disaster consequences in Nigeria, since it was established to address disaster-related concerns via the development of tangible structures and measures. State governments in Nigeria have been urged to create their own Emergency Management Agencies (SEMAs) to supplement the federal agency's function in their territories. Only a few states have responded favorably in this respect, despite the fact that states would be regarded as more important in disaster management concerns through State Emergency Management Agencies (SEMAs) since they are supposed to assist in disaster preparedness. Similarly, several of these states' SEMAs have not been sufficiently equipped to be operationally autonomous and aggressive in carrying out their obligations.

Researchers have discovered that creating a flood scale or flood risk map is one approach to investigate and understand flood behavior, since such maps can subsequently be utilized for strategic planning and land management. There is also numerous researches on GIS-based integrated evaluations of population vulnerability to famine, agricultural drought vulnerability, and household economic vulnerability (Wilhelmi and Wilhite, 2002). Because most catastrophes are spatially spread out, and disaster relief work involves a large number of diverse groups working in different locations and a thorough understanding of geography is critical for making key judgments. This enables for real-time data exchange, reducing the amount of time needed to acquire these resources.

Disaster losses might reach trillions of dollars in a single year, thus calamities like floods present difficulties for the financial industry. From the standpoint of sustainable development, insurance policies are viewed as helpful for many advanced economies to move risk away from natural or man-made calamities. In industrialized nations, only a small percentage of individuals are insured, and the poor are sometimes left out altogether, even when they are most vulnerable. While a flood may be associated with a certain type of occurrence, a variety of other natural catastrophes, such as hurricanes, hailstorms, and earthquakes, may have happened on several occasions. Insurance coverage difficulties may arise in these situations if certain incidents are covered while others are not. (Olowu, 2010).

2.3 Summary of Literature Review gaps

Global warming has caused some areas to receive less rainfall, while others receive more than usual resulting in flooding which has become a serious disaster. Meanwhile, flooding in many developing countries (as reviewed) is human-induced menace. The majority of literature focused on flood risk control with focus on management of flood disasters, factors motivating flood occurrences. Some recent works analyze the effect of flooding in achieving SDGs in developing worlds. Some have observed intricate linkages of flooding to national development and sustainability. Under the SDGs, poverty among others are issues raised. However, no literature has directly investigated the negative influence of flooding on the population or residents.

Meanwhile, while socio-demographic characteristics are often analyzed, there is no literature on Loko community of Song LGA of Adamawa State, Nigeria. It is also evident from literature that floods can have a severe negative impact on a community with the worst cases involving death. None of these studies have dwelt deeper on the linkages between flood risk management and socio-economic progress of people living in flood prone areas. More so, study on compliance of FRM policies are limited and focused on urban areas. This study is the first to investigate this factor in any Northern State community in Nigeria. Furthermore, while numerous studies have looked at flood risk management from a variety of perspectives, only a few have evaluated the impact of successful flood risk management on socio-economic

development. This study is the first to conduct the linkages between this two factors in any Northern State in Nigeria.

For this reason, this study investigated the socio-demographic characteristics of Loko community, Investigates the level of compliance to flood risk management policies and the effectiveness of disaster risk management on socio-demographic development in Adamawa state.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter covers the research design, variables, area of study, target population, sampling technique and sample size, research instruments, piloting of research instruments, pilot study, validity and reliability, data collection procedure, data analysis procedure as well as data management and the ethical considerations.

3.1 Research Design

Since the study was conducted in a single location; Loko community in Song Local Government Area, the whole research process was guided by the case study research design. Case study design was important to this study since it gave comprehensive use of tools/methods such as observations and interviews and reduces bias through adopting a diversity of perspectives (Alpi & Evans, 2019). Data analysis took a descriptive approach, because of the research questions' nature. The study aimed at finding information regarding the role of flood risk management for socio-economic development considering that this aspect of flood risk management in Nigeria has been extensively studied with limited focus on socio-economic development.

The study tested the hypotheses that there is no distinctive socio-demographic characteristics that distinguish people in flood-prone area from those not affected by floods. Similarly, that there is no compliance to flood risk management policies in the Loko Community in Adamawa state, and that flood risk control is not effective in promoting socio- economic development in the Loko Community. All these hypotheses were tested to know whether they are true or not.

3.2 Study Area

Loko is a settlement located on the southern bank of River Loko of Song Local Government Area (LGA) of Adamawa State. Lying on latitude 9°45’ N and Longitude 12°36’E. Loko basin is characterized by a broken relief of alternating hills and valleys (Tukur & Ray, 1994) and occupies an area of about 55,000 hectares. Loko also lies on a relatively low elevation which has made it vulnerable to seasonal flooding. It is made up of 6 wards namely; Jauro Hali, Jauro Umaru, Loko Arewa, Loko Central, Loko Yamma, and Sarkin Hausawa.

However, all the wards excluding Jauro Hali and Jauro Umaru are flood prone.

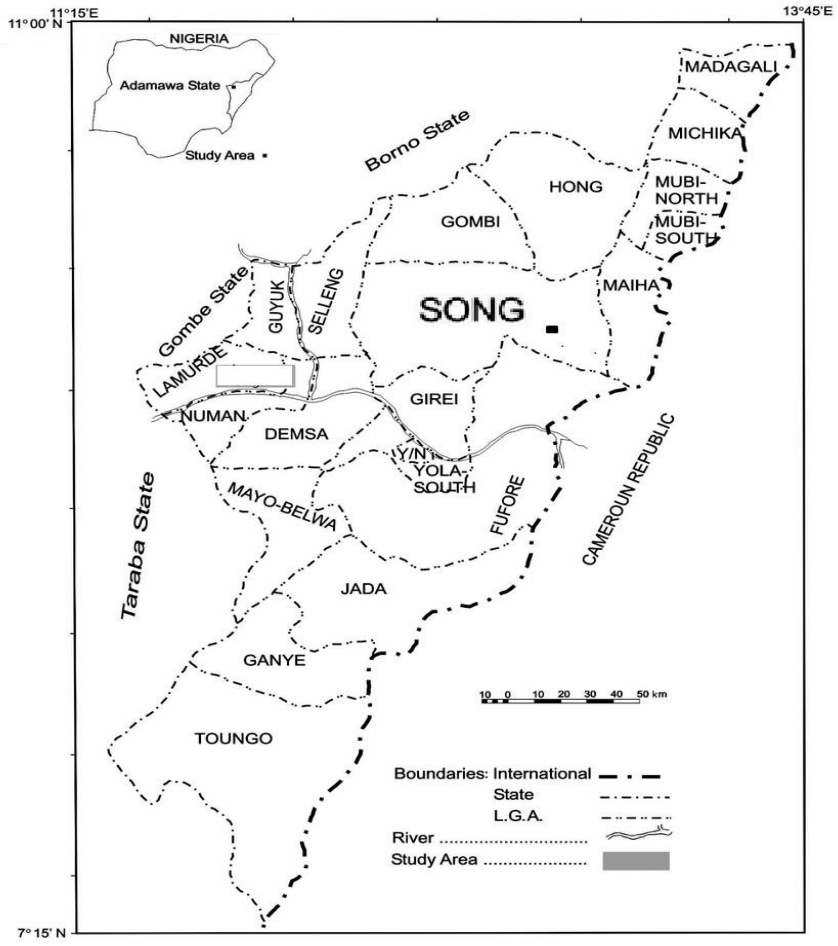


Figure 2.1: Map of Adamawa State showing the study area

Source: Modified from Aminu (2012)

3.3 Sample Size and Sampling Procedure

The target population for this study included residents of Loko community, staff of National Emergency Management Agency (NEMA) and staff of Adamawa State Emergency Management Agency (ADSEMA). Participants in this study were sampled from the target population of 4,200 inhabitants of Loko community, 20 NEMA staff and 48 ADSEMA staff. This figure constitutes the total number of staff in both agencies in Adamawa state.

NEMA which is the National Emergency Management Agency is the federal government agency saddled with the responsibility of disaster risk management at the federal level was a target agency for the study as well as staff of ADSEMA which is the state agency saddled with same responsibility. There are about 17 and 48 NEMA

and ADSEMA staff respectively in Adamawa state, from which a sample was drawn using simple random sampling. These staff served as key informants since they had in-depth understanding of the flooding situation in Adamawa state as a whole.

To get the sample size of the community members to participate in the study, the Yamane (1967) formula was used to calculate sample size from the population.

$$\mathrm{n} = \frac{\mathrm{N}}{1 + \mathrm{N}(\mathrm{e})^2}$$

$$n = \frac{4200}{1 + 4200(0.05)^2}$$

$$n = \frac{4200}{11.5}$$

$$n = 365.22$$

$$n = 365$$

Where:

n = sample size

N = population size

e = the level of precision

This formula assumes a degree of variability of 0.5 and a confidence level of 95%.

Table 3.1: Sample Distribution of the Respondents

Respondent group	**Target population**	**Sample**
Inhabitants	4200	365
NEMA	20	10
ADSEMA	48	20
Total	**4268**	**395**

Source: Author (2020)

3.4 Data Collection Procedures

A questionnaire, semi structured, with closed and open-ended Likert questions was the key instrument used for data collection. The instrument was used to gather data from the three segments of the target population, which included the households in

Loko community, NEMA staff, and ADSEMA staff. The instruments were administered using face-face administration for the participants, an approach associated with high response rate (Russell, 2006). Two research assistants assisted in administering and retrieving of the questionnaires from household heads who were chosen to take part in the research.

After questionnaire retrieval, the principal researcher moderated focused group discussions in two groups namely, FGD 1 and FGD 2, comprising 13 and 12 participants respectively which was adopted for data collection from community members who seemed more informed around the topic of discourse and their perspectives regarding how they can benefit both socially and economically from flood risk management measures was sought. Key informant interviews were conducted as well, and professional information sought. The target population for this was heads of the different departments in NEMA and ADSEMA in Adamawa state. The departments include; Finance and administration, Planning Research and forecasting, Relief and Rehabilitation, Search and Rescue.

3.5 Pilot Study

A pilot research is required to ensure that the study follows a plan and technique that will considerably assure the investigation's goal (Mahul, & Gurenko, 2006). Before beginning data collection, a pilot study was conducted in Song main town of Song local government region to determine the appropriateness of the data collection instruments. The pilot research enabled for the instrument to be reformatted in order to meet the study's objectives. This also verified the instrument's structural and content validity.

3.6 Validity and Reliability

The instrument was scrutinized by two specialists from the Department of Environmental studies and Community Development, Kenyatta University. The experts scrutinized the items for clarity and appropriateness in relation to the purpose of the study, research questions and overall adequacy of the questionnaire. Their suggestions were integrated into the final draft of the instruments. After restructuring of the items from the pilot test, the instruments were then administered to a few from

the target population. This process was supervised all through by the researcher to ensure accuracy, consistency, and most importantly reliability of data collected.

3.7 Data Analysis Procedures

Quantitative data was cleaned, coded, entered and analyzed using the Statistical Package for Social Sciences (SPSS**)** version 22. ANOVA test and descriptive statistics was used in analyzing data in objective one in terms of frequencies and mean. ANOVA test and descriptive statistics was also used in objective two to ascertain the level of compliance to flood risk management policies. Pearson correlation analysis was employed in objective three and ANOVA test, to assess the effectiveness of disaster risk control on socio- economic development. On the other hand, qualitative data was generated for the study from focus group discussions and structured questions.

The qualitative data obtained from focus group discussions and key informant interviews were recorded using audio devices and later transcribed. The data collected and transcribed was labelled and anchor codes were assigned based on the research questions. Relevant statements from the participants were then coded putting under the respective anchor codes by using endnote function in Microsoft. Structure, magnitude, assessment, emotion, in vivo, and process coding were all employed in this study. The lists of the initial codes were compiled and grouped in their respective anchor codes. Frequency for each codes were tallied. Categorization was generated from the codes. The study also examined the categorization, and generated themes which the study used in addressing the research questions. The data collected and transcribed was coded into the following themes; socio-demographic characteristics of persons living in areas prone to floods, community engagement and compliance to flood risk control policies, effect of flood on socio-economic development of the area, flood risk reduction programmes, factors that hinder adherence to FRM policies, ways of improving adherence to FRM policies, effect of FRM on economic systems and influence of FRM on social systems and analyzed to support and strengthen the quantitative data generated from the questionnaire for purposes of providing clearer and better findings in line with the study objectives.

3.8 Ethical Considerations

The researcher requested approval to conduct the study from the Kenyatta University Graduate School as authorization to conduct the study. The second stage of approval was from Song Local Area Government where the researcher got permission to conduct the study in the area. Permission was also gotten from NEMA and ADSEMA to conduct the study in their premises and on their study. The last approval was participant consent from all the respondents who participated in the study including Loko Community, NEMA and ADSEMA staff. All the permissions were to solicit cooperation from respondents to participate in the study and to also encourage sampled personnel to respond to the instruments. Other ethical considerations the researcher observed during the study in its entirety included confidentiality of the respondents that took part in the study, which served as a means of protecting the privacy of the respondents as well as building trust and rapport with them and maintaining ethical standard as well as the integrity of the research. Participation in the whole process was by free will. No respondent was coerced and collected data was used only for the purpose of research. In all, selection of the respondents was done randomly to avoid bias.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0 Introduction

The results of the study conducted at Loko community in Song local government area of Adamawa state, Nigeria, are presented and discussed in this chapter. The findings and results of the research questions and null hypotheses are presented in relation to the data collected from the respondents. Six (6) sections make up the chapter.

4.1 Response Rate

The number of respondents who completely engaged in a research and gave their replies as individual respondent groups is known as the response rate. The average response rate of the participants was 84.27%. The figure is above Mugenda and Mugenda's (2003) recommended minimum response rate of 60%. Therefore, the study met the minimum threshold for validity of the findings (see Table 4.1 below).

Table 4.1: Response Rate of Participants

Respondent group	**Expected number**	**Completed filling research instruments**	**Response rate**
Households	365	297	81.37%
NEMA Staff	10	10	100%
ADSEMA Staff	21	15	71.43%
Total	**396**	**322**	**84.27%**

Source: Field Data (2020)

4.1 Socio-Demographic Characteristics of Participants

This section provides the descriptive analysis on the following issues: response rate of participants, gender, level of education, nature of employment, participants' employers, level of compliance to flood risk management policies and effectiveness of flood risk management on socio-economic development in Adamawa State, Nigeria. The data was obtained using both open and closed ended questionnaire and descriptively analyzed using frequency and percentages and results presented in tables and graphs as follows.

4.1.1 Gender Distribution

Male participants comprised the largest proportion of participants 194 (60.2%) while females were 128 representing 39.8% (Table 4.2).

Table 4.2: Gender Distribution

Gender	Frequency (*f*)	Percentages (%)
Male	194	60.2
Female	128	39.8
Total	322	100

Source: Field Data (2020)

These findings agreed with those of Watkins, Zimmermann and Poling, (2014) who found that, men are more willing to participate in community based studies based on the traditional roles where they are the heads of the family. This study also aligned with Agricultural Sector Development Support Programme (2014) household survey results in Kisii County, which indicated that males made up 64% of households, while females and youth made up 11% and 26% of households, respectively.

4.1.2 Age Distribution

In this subsection, the study's goal was to present how the participants were distributed based on their age groups. A significant portion of the respondents were between the ages of 28 and 37 years 148 (45.9%), then those between 18 and 27 years 85 (25.8%), and 38-47 year olds 56 (17.4%). Conversely, the least represented groups were those aged between 48-57 years 23 (7.1%) and those over 57 years were 10 representing 3.7% of the total sampled respondents (See figure 4.3). Although previous research had identified older people to be more knowledgeable (Rengalakshmi, 2002) and capable of providing more information on flood risk disaster management with a higher reliability rate, the input of younger community members was equally impactful and significant in assessing the role of flood risk management for socio-economic development.

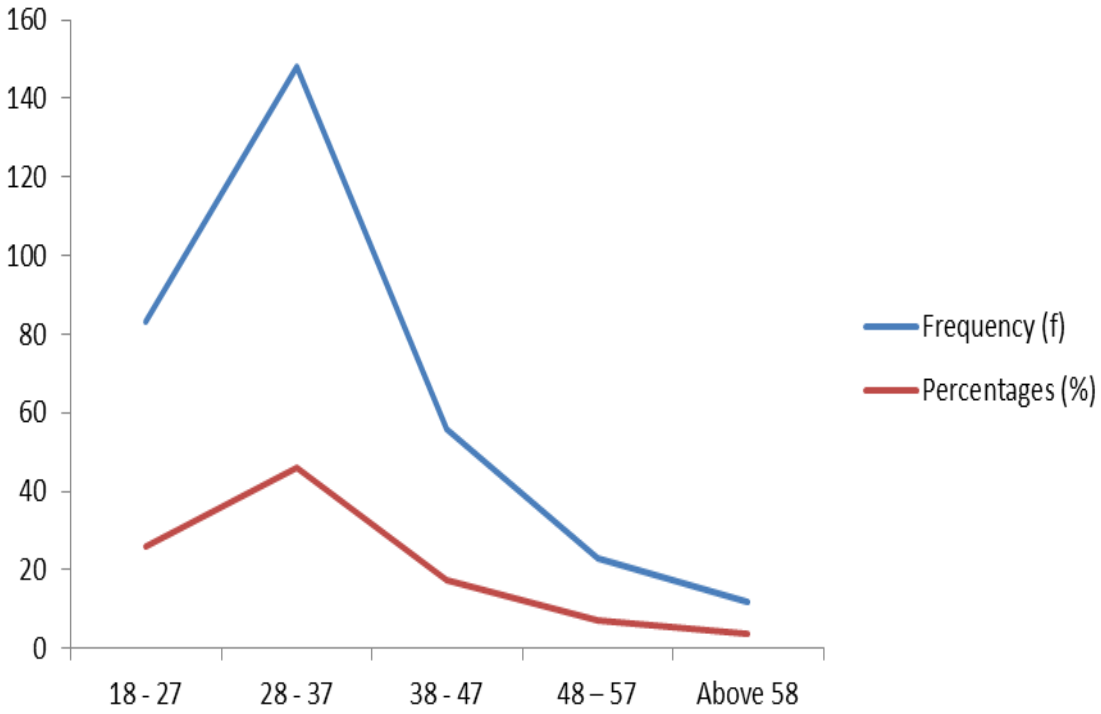


Figure: 4.1: Age Distribution of Participants

Source: Field Data (2020)

The findings of this study in this subsection correspond with those of another research by McElfish et.al. (2018) where younger individuals were more willing to participate in community surveys than their older counterparts but in disagreement with that of Murage et al. (2013), who discovered that there were younger individual in suburban areas who were willing to participate in community development as a result of decline in household population of younger individuals due to population mobility to cities in search of greener pasture because agriculture remains unattractive to youths (UNDP, 2011).

4.1.3 Level of Education

This section presents education levels of participants. A larger proportion of the participants had attained senior education 154 (47.8%) followed by those with tertiary 89 (27.6%). The least represented group was those with basic education 79 (24.5%) (See table 4.3). The majority of responders in this group were high school graduates, according to the research. This pattern might be explained by the fact that many of the

participants were farmers who were unwilling to upgrade their academic credentials in order to compete in today's competitive employment market.

Table 4.3: Education attainment of Participants

Education	Frequency	Percentages (%)
Basic	79	24.5
Senior	154	47.8
Tertiary	89	27.6

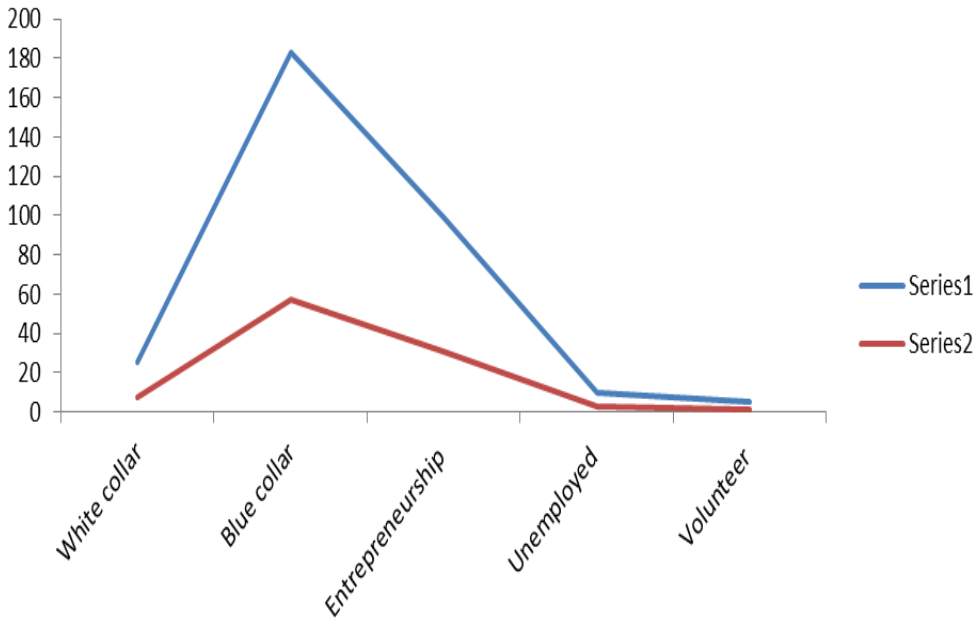
Source: Field Data (2020)

The findings also revealed that the majority of participants in the research region had adequate capacity to comprehend and implement environmental concepts, making them capable of adopting and adhering to flood risk management policies. This finding coincided with those of another study by Garba (2012) who found that the average education attainment in Nigeria is senior level.

4.1.4 Nature of employment

Most of the participants in this study had blue collar jobs 56.8%. They comprised the group that provides manual labor in the agricultural fields and local industries. They were followed by local entrepreneurs 30.7%, those with white collar jobs were 7.8% and the unemployed 3.1% while 1.6% were volunteers (see figure 4.2)

The least represented were volunteers engaging in community development initiative such as health and agricultural extension services.



Note: Series 1 (Frequency-f), Series 2 (Percentage- %)

Figure 4.2: Line graph showing Nature of employment of participants.

Source: Field Data (2020)

4.1.5 Participants Employment

Most of the participants in this study were household employees 92.2%. They comprised the group that provides manual labour in the agricultural fields and local industries (Table 4.4).

Table 4.4: Participants Employment

Employee	Frequency (*f*)	Percentages (%)
Household	297	92.2
NEMA	10	3.1
ADSEMA	15	4.7

Source: Field Data (2020)

They were followed by ADSEMA 4.7%, and NEMA 3.1%. The least represented were the NEMA staff. This trend could be due to non-upgrading and an absence of the quest for tertiary education as previously seen on the level of educational attainment of participants in the community under study.

To test for significance on socio-demographic characteristics that distinguish people in flood prone areas from others not affected, ANOVA test was applied and the results displayed in table 4.5 revealed that at a confidence level of 95%, there was a notable distinction p=0.000 that exists between socio-demographic attributes of people in flood prone areas and those not affected in Loko community of Adamawa state at degree of freedom 4; 75. Therefore H_{01} which state that; there are distinctive socio-demographic characteristics that distinguish people in flood-prone areas from others not affected was rejected as p=0.000 > p=0.05

Table 4.5: ANOVA Test on Socio-Demographic Characteristics of Participants

Source of variation	**Df**	**Sum of Squares**	**MS**	**F**	**$F_{0.05,4,75}$**	**P**
Group	4	53313.35	13328.3375	4.71	2.49	0.05
Error	75	212376.6	2831.688			
Total	79	265689.95				

Source: Field Data (2020)

This was decided using critical value rejection region of $F_{0.05,\ 4,75}$ = 2.49, and $F_{statistics}$ = 4.71 with a *p*-value = 0.05. These results supported hypothesis one which states that persons living in flood-prone areas are different from those living in non-affected areas in terms of gender, age, educational attainment, employment type and also categories of employees. The findings of this study however, do not conform to those of Howley et.al. (2012) and Okuthe et.al. (2013) that had shown negative correlation between socio-demographic characteristics and adoption of environmental policies for sustainable development. This also corroborated with the key informant information that, those individuals living in the flood paths have distinct socio-demographic attributes compared to those living in less-prone area. This can be inferred that, the majority of individuals living in the flood paths are of lower socio-demographic class and might not be able to relocate due to their socio-economic condition and other environmental and cultural factors.

A natural disaster such as flood is a major threat to socio-demographic structure of affected areas and can easily damage the accumulated wealth of residence. Flooding is expected to become more common in many parts of the world as a result of climate

change, population growth, and economic development (Adekola and Lamond 2018). Besides, the frequency of flood occurrence appears to be increasing recently, and has increased economic losses and poses serious threat to sustainable development and has remained the most devastating natural hazard globally and efforts have been put in place to reduce the risk and damage (World Bank, 2017).

Generally, socio-demographic structure of flood prone areas played significant role to the extent of flood vulnerability as it deals with people's ideas, opinions, judgments and feelings towards events. Researchers suggested countless times that flood risk management is the major source of flood risk prevention awareness and responsive behaviors (Peacock, et. al. 2005; Ho et.al. 2008).

The research of the study area's socio-demographic structure opened the way for a better understanding of the link between flood and demographic structure in terms of risk perception, which is important for the implementation of efficient flood risk management and disaster reduction strategies (Zorn, 2018; Botzen, et.al. 2009). This is because people's actions are influenced by their risk attitudes regarding flood events, as well as differences in demographic factors that are linked to various attitudes and beliefs about the same type of occurrence, and this variation can be significant for improving flood risk control and management, existing flood control technical solutions can lower the true flood danger, but human conduct is illogical, and their knowledge of things is insufficient, which can easily lead to behavioral deviation.. Residents are both victims of catastrophes and executors of flood disaster prevention and mitigation strategies, making it difficult to accomplish the intended result by solely using technological measures to minimize flood risk.

Studying the dynamics of socio-demographic structure is helpful to understand the attitudes of resident of flood prone areas towards policies and possible behaviors. Considering the socio-demographic structure of the study location as described above in respect to gender, age, educational background, employment status which defines the socio-demographic activities inhabitant engage in as a source of livelihood one could categorically state that, the data supplied showed that achieving total compliance to flood risk management cannot be totally achieve considering the dynamic nature of the population. Increase in demographic characteristics based on how it is as at the time of this study especially the population will pose more danger

and flood damage as the changes in demographic structure occur though there have been large variations among communities within the study area, and this must be considered in the planning of flood disaster prevention (Reckien et.al. 2017).

Demographic changes for all age groups in the study area which are comparable to the findings of several prior studies, is as a result of the fastest increase in birth rate and numerical upsurge in population mobility. Furthermore, the low birth rate and rapid population aging are projected to hasten demographic transition in the long run, and the most flood-vulnerable group is shifting from younger to elderly people. According to numerous studies, this shift will become more severe in the future (Reckien et.al. 2017).

Studying the demographic profile by age group and gender, the male proportion (60.2%) actively engaged in agricultural activities such as farming and fishing considering the location of the area bounded by undulating hills which makes the area prone to flood disaster alongside with so much pressure on the plane rich valley where the settlement dwell and carry out their socio-demographic activities making adherence to flood risk management difficult rather increase vulnerability. Female in the study area used as participants 39.8% showed a considerable percentage of deforestation for purposes of fuel wood that increases the risk factors. This postulation is centered on age distribution as children and the aged are few with 3.7% and the education status shows greater proportion of the population having only basic 24.5% and secondary 47.8% which is grossly inadequate to be equipped with environmental knowledge to ensure adherence to environmental best practices geared towards flood disaster management.

Flood knowledge was found to have a positive association with flood risk perception, which influences flood prevention and management (Bubeck et. al. 2017). Areas that received adequate knowledge of flood and well educated received more and vulnerability is less with negative impact and less damages. Majority of the vulnerable areas within the study location are crowded due to the striving economic activities of the areas and conducive climatic condition which may likely increase and pose more danger, as increase in population of young people (Reckien et.al. 2017).

Identifying challenges, defining targets, analyzing risks, appraising options, implementation, monitoring, and evaluation are all part of flood disaster risk

reduction management (Mwape 2019). Flood damage and demographic factors are continuously changing, necessitating ongoing monitoring and re-evaluation of flood-prone regions. The effectiveness of the suggested method and plan for each disaster-prone region must be monitored depending on the kind of catastrophe, as well as the goals and tactics that need to be adjusted as a consequence of the monitoring process. Within this monitoring system, evaluating flood-vulnerable regions is a cyclical process that includes the development and testing of optional measures. To effectively study all dynamics of demographic characteristics and flood vulnerability, Mwape (2019) proposed a monitoring system and explained as follow: Study and monitor flood susceptible areas by re-selecting and re-grouping according to trend dynamics, and monitor demographic data by monitoring and detecting the dynamics of flood damage and demographic census data, provide a strategic planning monitoring system by dividing the strategic plan into "existing" and "new" to monitor the strategic plan by location and type, adjusting and monitoring the strategy's effectiveness in a location, or reviewing the use of other strategies in other locations where implementation was successful.

4.2.6 Socio-demographic characteristics of persons living in flood prone areas

The study gathered data from interviewees on the socio-demographic characteristics of people that live in areas prone to floods to buttress on the dynamics of bio-demographic profile of the study participants. The study found that the socio-demographic characteristics of persons living in flood prone areas, varies from those living in non-flood areas within the study area. This could mean that some individuals living in the flood areas are used to it and give little attention to any warning with the mind-set that, flooding is part of their life and there’s nothing new about it. This has led to stereotype attitude towards flood and compliances to FRM policies.

4.1 Level of Compliance to Flood Risk Management Policies

The result obtained on the level of compliance to flood risk management as outlined in objective two is presented in Figure 4.3 below.

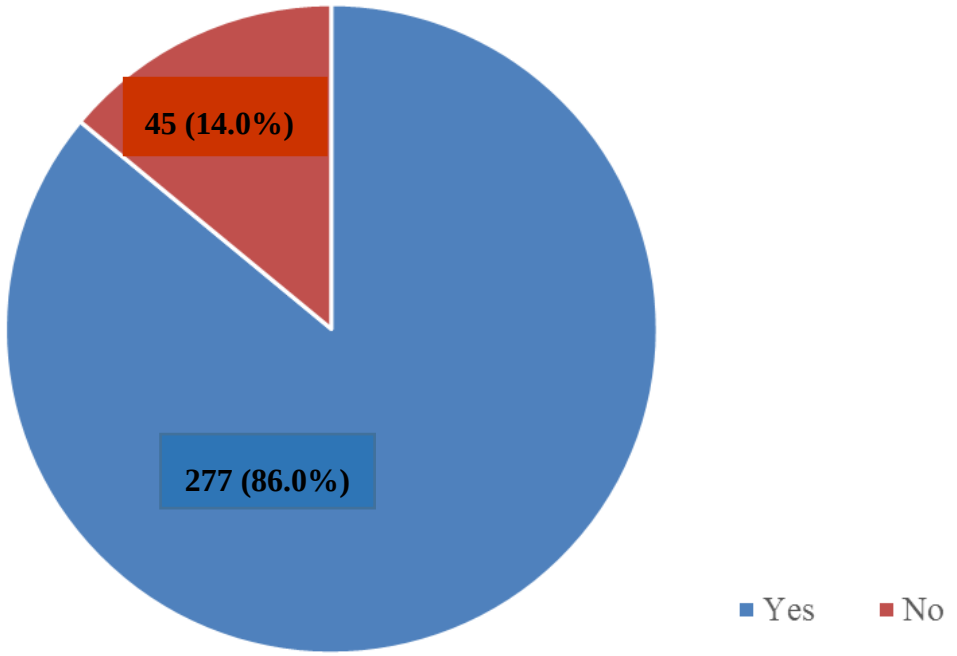


Fig: 4.3: Graphical presentation on the level of agreement on Availability of Polices to guide FRM

Source: Field Data (2020)

It was found that 86.0% of participants showed high level of conformity that, there is high level of compliance to flood risk management policies geared towards flood risk management in the community while 14.0% decline and submitted that, the level of compliance to flood risk management in the community is low.

4.3.1 Community engagement and Compliance to flood risk management policies

This study sought to understand community engagement and compliance to flood risk management policies. The community interviewees gave a number of reasons for and against effective compliance to flood risk management policies. Most of the community members were of the view that the level of compliance to flood risk disaster management is high though further explained that some persons are stereotyped and compliance might be neglected for whatever reason based on the individual perception or attitudes towards warnings or personal orientation. As observed, socio-demographic characteristics of persons living in the flood prone area varies significantly from those living in non-flood areas of the community. This could mean that some individuals living in the flood area are used to it and give little

attention to any warning with the mind-set that, flooding is part of their life and there's nothing new about it.

Also, it was gathered that, 277 representing 86% of the community are enlightened and are willing to comply with the flood warning and other policy information. This could be due to active participation in discussions as well as support rendered by disaster management stakeholders from all over Nigeria which the impact is extended to Loko community of Adamawa state (United Nations Economic Commission for Africa, 2015) alongside the achievements of the National Plan of Action on Flood Disaster Risk Reduction which was prepared in 2006.This trend could be as a result of the tremendous effort observed by the community on the role flood risk management played over time in terms of creating public awareness on the need for environmental best practices that focuses on sustainable development, provision of early warning flood systems, early preparation and displacement plans to ensure safety and provide food security.

4.3.2 Policies of Flood Risk Management

Having a better grasp of compliance to flood risk control, the study investigated the policies available for compliance to flood risk management. Respondent's perception about flood risk management policies was studied.

Table 4.6: Response Distribution on Flood Risk Control Polices

Responses	**Frequency (*f*)**	**Percentages (%)**
Public Enlightenment and Education	277	86
Communication	322	100
Increasing Community Participation	318	98.7
Early Warning/Sensitization	218	67.7
Operation clear your drainage	251	78
Resettlement plans/Arrangements	187	58.1

Source: Field Data (2020)

4.3.3 Public Enlightenment and Education

Table 4.6 revealed that one of the policies put in place by NEMA and ADSEMA for flood risk management is public enlightenment with a response rate of 86%, this

revealed that, flood risk management provides this policy effectively with focus on environmental best practices that will promote flood risk reduction and impact could be seen on the magnitudes and occurrence of flood events which since 2012 there was no major flood event as devastating as the later.

4.3.4 Communication

100% representing 322 participants agreed to the fact that communication is a key policy of the management of flood risks in Loko community (Table 4.6). Policy entails discussing with relevant stakeholders and members of the communities on flood disaster and possible occurrence and the need to ensure environmental best practices to minimize impact or completely averting possible occurrence.

Planning and preparation of flood emergency is first a local responsibility to be handled at grassroots level but needs interaction and coordination with others in a growing network of professional organizations that can be contacted as events unfold. To ensure flood risk control responses are appropriate for effective and reliable communication links to storms warning are required.

Expert groups must often converge to communicate and share ideas and be free to work together, and communication network connections stratified from the bottom upward must be done ahead of time. Information exchange should be equitable and reciprocal, with synchronization at all levels of government. The media and public collaboration will set the tone, as well as the connection between public officials and the general public. It will also assist in becoming familiar with the jargon used in risk alerts and predictions, as well as determining who to contact for additional information during a flood event.

4.3.5 Increased Community Participation

Also, the study in Table 4.6 revealed majority of participants 98% were in total agreement that NEMA and ADSEMA had increased community participation focusing on the participation in environmental programs with the aim of controlling possible flood risk through environmental sanitation, awareness through the activities of the government still remain at the federal and state level, therefore, intervention and compliance to policies at the local level becomes difficult but yet achievable with

so much stress. To a great extent the responses received from the study survey tool (questionnaire) give a true picture of the FRM situation of the community under study. The data gathered affirms the findings and promotes the integrity of the information obtained via questionnaire.

Agreement of NEMA and ADSEMA was activated during the 2012 flood disaster from the National Disaster Response Plan formulated in 2001 which required community participation in environmental activities geared towards flood disaster, which in 2001 was initially not captured in the plan leaving the communities with no specific role in flood risk management. Hence, channelling the initiative to the local community will promote significant level of compliance.

4.3.6 Early Warning Sensitization

The study identified provision of early warning sensitization on possible flood disaster, with 67.7% participants conforming to the availability and implementation of this policy as seen on Table 4.6. This is to ensure preparedness in terms of alternative measures towards reducing impact. The study also discovered that flood risk management provides detailed weather forecasts of a tropical storm's path and severity, as well as accurate predictions of flooding river stages (heights), allowing government officials and the general public to make decisions about whether or not to evacuate or move valuable property from high-hazard areas. Preparing emergency action and evacuation plans can also help to prevent or eliminate fatalities and large-scale property damage.

The most important aspect of the flood-loss mitigation suite of operations is awareness, preparation, and promptness, which flood risk management, appears to value highly. Responding to a natural disaster warning must be prompt, detailed, and follow a very clear script of instructions and reaction. In the event that local efforts are insufficient, a structure must be in place to quickly organize external resources given by government's top tiers or globally. Many nations have mechanisms in place that allow for the declaration of a provincial, state-wide, or national catastrophe to bring in the necessary resources. The only effective way emergency response is working disaster alert and promptness framework towards advance planning,

mobilization of adequate resources, and continuous examinations to identify weaknesses and problems.

Emergency response must be a coordination of the local community and upper levels. It should not be a collective responsibility. There should be existence of adequate understanding and coordination between all stakeholders. For instance, if a major flood incident is predicted in advance, several steps can be taken to improve promptness of action. These include building an artificial flood protection channel, alerting emergency personnel, distributing critical supplies like sandbags to flood-prone areas, and setting up alternate residences and medical facilities for those who might be impacted. The individual households at risk should be prompted of the event and of what is expected of them in the dawn of an extreme event. As the event becomes obvious, there must be evacuation plan for people, goods and movable properties or items. If the event is not as wide as envisaged, nothing would be put at the risk of flood and dangers to life and properties has been averted and if the event is greater than expected, the damage would be minimal.

4.3.7 Operation Clear your Drainage

The data collected and analysed showed that, 78% identified environmental sanitation through the operation clear your drainage so as to minimise possible flood disaster in the community as one of the decisions of flood risk control. This is done mostly based on the level of enlightenment and the quality of the population which occurrence and influence of flood over time in some communities in Loko zone has reduced. The policy includes provision of alternatives paths such as flood storage reservoirs, redirection of water channels, and redirection of flood paths to lead water to the protected area among other possibilities. The reworked options can be done at various levels based on necessities, often based on affordable resources at the disposal and with the optimum costs and benefits, so long it performs the goals.

Flood preventive framework is considered the most efficient preplanning for flood disaster. However, the cost of such preventive framework should be less than the cost of building a new one or existing structure.

This framework has a tendency to improve the level of progress in flood paths. The assumption is it is safe to build and invest in areas that are protected. However, it is noteworthy that the future design event may exceed the projected framework and unexpected damages resulted. Ridge and flood path dams are often dangerous when design entry exceeded pre-planned, hence, the unforeseen failure can lead to rapid rise in water level and make evacuation and emergency rescue extremely difficult. Flood paths are less prone to cataclysmic failure and the protection framework can temporarily improve by emergency plans if there is sufficient flood alert time.

Structural works require continuous and routine check, reformation and conservation programme to ensure that the design framework are sustained. For instance, levees may be subject to incapacitate due to flood storm during a past flood event, by the actions of excavate animals, or the construction of utility lines through the flood paths. Importantly, there must be adequate assessment programme and duty assigned for reformation and sustentation.

Construction such as levee should be subject to safety scheme, often at the nationwide level, to establish that the needed facility is available for the assessment of all flood paths. Levee safety strategy are carried out in many countries and standards or guidelines are readily accessible.

4.3.8 Resettlement

Resettlement according to 187 (58.1%) participants was identified in the study as a policy of flood risk management. As often times the impact of flooding lasts longer and render so many homeless and destroys sources of livelihood. NEMA functions in areas of resettling victims and providing relief materials. This is contained in the National Disaster Management Framework of 2001 established to provide regulatory guidelines for efficient disaster management in Nigeria. The framework also assigns key roles of disaster management from feedback and rehabilitation to disaster risk mitigation and rehabilitation.

The result obtained from the analysis showed clearly that, policies of flood risk control available in Loko community of Adamawa state are in accordance to the global standard policies for flood risk management adopted by the Nigerian

government aimed at flood disaster reduction and mitigation as follows; by raising public awareness on flood preparedness, measures of reaction and prevention; storage of disaster relief supplies (food, livestock feeds, emergency medicines, makeshift shelter), construction of a community-based early warning system to ensure that flood warnings are sent in a timely and efficient manner, migration to safe locations and/or evacuation centers, management of safe zones for the temporary evacuation of people and property, and availability of health and sanitary amenities (Adedeji, et. al. 2012).

4.3.9 Flood Risk Reduction Programmes

In strengthening the findings, the study further looked into some programmes geared towards flood reduction. The interviewees highly agreed that the populace in the community under study are aware of the National Disaster Management Framework as it concerns flood disaster and its mode of operation as well as the benefits of these policies toward flood mitigation and implication on sustainable development through public enlightenment and effective communication. There's willingness to comply among the community participants if the initiatives are properly channeled to the local communities. Only very little proportion of people are stereotyped about it. Other programmes includes enlightenment of the general public on how government coordinates flood disaster from federal, through state and down to local level, increased community participation, early warning sensitization, operation clear your drainage and resettlement.

FRM clearly defines roles and responsibilities and how MDA's, NGO's and other stakeholders contributes immensely in the coordination process. It also sets out the framework on how NEMA should handle the responsibility to manage disaster related activities as well as assign responsibilities to various stakeholders which include ministry of health, environment, fire service among other incidence managers who are the foot soldiers and stratify them based on their relevance and assess level of damage and act appropriately. National Disaster Management Framework has assisted through the coordination process because at the various levels, NEMA organizes community participation and involves actors to mitigate flood risk through building dams, early warning systems, building and clearing drainages. This has reduced the vulnerability of previously affected communities within the local government as people are warned

about impending disasters, though some people are stereotyped holding fixed and oversimplified idea about the floods that affect them and/or their community.

4.4 Challenges Experienced in Complying with flood Risk Management.

In order to determine the level of compliance to flood risk management, the study looked at some challenges experienced in complying with flood risk management. There were some constraints, which hindered full compliance to tackle various disasters especially flood in Nigeria; The most prevalent issue is a dispute between federal and state emergency response authorities about who has power at the location of an occurrence. The lack of decentralisation of function from federal to state causes significant inconsistencies and unnecessary systematic dysfunctional (Osaghae, 1992). To avoid future lawsuits and logger heads, this needs to be addressed correctly. The data was collected using open ended questionnaire and analysed descriptively using frequencies and percentages and presented in graph (Figure 4.3).

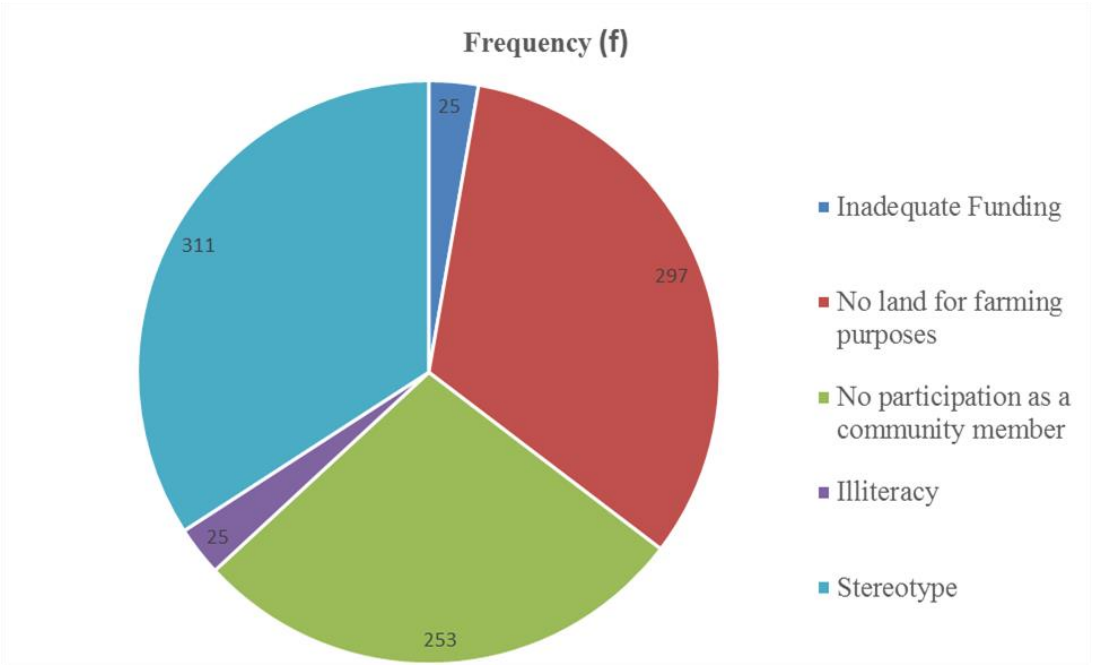


Figure 4.4: Graphical presentation of Data on Challenges Experienced in complying with FRM Polices

Source: Field Data (2020)

4.4.1. Inadequate Funding

The results in Figure 4. 3, showed that a very little proportion of participants 7.8% (25) indicated that, one of the challenges faced in complying to flood risk management is inadequate funding, this appeared to be the least challenge as government made all necessary provisions in terms of funding to cater for disaster management especially flood in the area of interest. This however, contradicts the fact that there is lack of coordination or power irregularities between the federal and state agencies. Thus, funding is quite inconsistent, inadequate or denied.

4.4.2 No land for Farming Purposes

The study gathered from 92.2% participants that lack of land for farming purposes was a challenge as a vast majority depends on farming and animal rearing as sources of livelihood. This corroborates the submission in 4.3.4 that, stereotyped behaviours are due to many factors in which unemployment and cultural attachment are part of. Thus unemployment rate in the country is a possible medium for escalating flood vulnerability and failure to comply with flood risk management guideline. As per the National Bureau of Statistics, from 19.1% in 2009, unemployment rate has increased to 21.1 per cent in 2010 and 23.9 per cent in 2011. This trend exacerbates poverty and creates an overdependence on agriculture, where optimal practices are not followed, increasing the country's susceptibility to flood disasters, particularly in Loko village in Adamawa state Nigeria.

4.4.3 Poor Level of Community Participation

On an average, 78.6% participants supported the statement that poor level of participation of community members, pose a greater challenge to the level of compliance of flood risk management. This may be traced back to the National Disaster Response Plan's option for community people to participate in disaster management. The DRP was formulated in 2001 and required community participation in environmental activities geared towards flood disaster, after the 2012 major flood event that happened in Nigeria and also the contention between federal and state emergency agencies leaving the local and community members with no idea of what roles and responsibilities are meant for them to play in reducing flood disaster.

4.4.4 Illiteracy

The data analysed showed that illiteracy was identified by 25 (7.8%) participants as a challenge to full compliance to flood risk management as community members are not environmental literate and this affected member's environmental knowledge which in turn created an environmental unconcern behaviour, non-adherence to environmental best sustainable development practices (Thornton et.al. 2009). This is capable of increasing flood risk vulnerability as well as flood event.

4.4.5 Stereotype

Stereotype was identified by majority 96.6% (311) of participants as a challenge faced in complying to flood risk management as members of the communities are often stereotyped on roles to play in flood reduction based on gender, age, level of education and economic background. This limits the level of participation in environmental programmes and compliance to flood risk management.

4.4.6 Factors that hinder adherence to FRM Policies

The study sought from community members about possible challenges that could hinder smooth adherence to FRM policies in order to buttress the findings of the study. The interviewees revealed lack of enforcement and implementation of FRM policies aimed at ensuring sustainability, obsolete FRM polices and insufficient monitoring and succession of laid out FRM plans, poor level of community participation, inadequate funding, lack of land for farming purposes, illiteracy and stereotype. FRM Policies are more reactive than proactive. Insufficient monitoring and succession of laid out FRM plans poses as greater challenges to adherence with FRM in the community.

4.5 Measures to Improve Flood Risk Management

The study further assessed measures to improve the management of flood risk, as flood risk increases proportionally due to increase in vulnerability. The study found that unless efforts and measures are put in place to reduce vulnerability and build capacity, flood disaster will continue to increase in Loko community of Adamawa state Nigeria (Table 4.7, item 2). Hence, to reduce vulnerability and improve adaptive

capacity, sustainable measures need to be put in place and incorporated into national development policies.

Table 4.7: Distribution of measures to improve Flood Risk Management

Responses	Frequency (*f*)	Percentages (%)
Adequate machineries by the authority to enforce compliance	196	60.9
There should be monitoring and evaluation	55	17.1
Periodic drainage clearing	318	98.8
Encourage community participation	202	62.7
Value reorientation	23	7.14

Source: Field Data (2020)

4.5.1 Adequate Machineries to Enforce Compliance

The result of the study (Table 4.7) showed that majority of the participants 196 (60.9%) admitted that, in improving compliance to flood risk management, all NEMA sections across all governmental levels alongside other disaster management stakeholders must provide adequate machineries to enforce compliance. To achieve a reasonable level of compliance, the authority:

i. must provide machineries to monitor and enforce compliance, supervise all FRM issues through the preparation and publications of FRM measures and strategies,
ii. conduct surveys aimed at identifying key issues FRM requires, preparation and publication of FRM plans stating objectives that the authority intend to achieve,
iii. provide and operate flood warning systems, extending and monitoring FRM works and watercourses, provide, install, operate, maintain apparatus required for effective monitoring of systems, and
iv. Publish other relevant information concerning FRM, provide effective education and guidance relating to FRM core values (Flood Risk Management Act, 2013).

More so, a personal opinion (based on risk education) is that the thematic flood risk management platforms can create a secondary measure which is often used to achieve similar goal, which requires mainstreaming risk mitigation into national plans through different sub-themes such as gender, the environment, and education, etc. For example, integrating disaster risk reduction into elementary and secondary school curricula can be accomplished through a series of educational seminars and workshops. This will assure community involvement, despite the fact that some state governments have been hesitant to form state disaster management agencies, which are meant to supplement NEMA's efforts at the federal level due to a lack of political will and finances. If this is achieved, the issue of non-compliance or low compliance as expressed by responses obtained from questionnaire will naturally be resolved. Similarly, local government councils' refusal to establish emergency management committees, ostensibly due to budgetary concerns, is a major impediment to the implementation of FRM policy. However, NEMA should make a concerted effort to guarantee that both bodies are formed and functioning at the state and municipal levels. NEMA should also offer financial assistance to six Nigerian federal institutions in order for them to fulfil their duty of teaching disaster risk management personnel.

Instead of depending on out-of-date FRM policies, the Nigerian Meteorological Agency's data policy might be used. This is because the Nigerian Meteorological Agency follows World Meteorological Organization standards for data collection and analysis in order to standardize its tactics and make data from other nations comparable. Weather forecasts data and early warning signs for flood disaster is provided by NMA. Prior to rainy season, it provides annual weather forecasts data on rainfall regime, which help in national planning in agriculture, disaster management and water resources. Weather and climatic data into national strategic plans for disaster management and sustainable development have minimized failure in agricultural sector, reduction in flood disasters, dam and bridge demolition by flood and weather-centred infectious diseases.

In sustaining socio economic development of the community, the study observed and gathered that, NEMA and disaster risk management centres at Nigerian universities established laboratories with suitable capabilities for GIS studies, and the majority of

the laboratories had relevant data extraction and analysis software. Through seminars aimed at resolving crises, NEMA partners with the National Orientation Agency to use the crisis resolution technique to handle human-centred disasters, which has greatly aided human-centred disasters.

4.5.2 Monitoring and Evaluation

The data analyzed showed 55 (17.1%) participants agreed that in improving compliance to flood risk management, there should be monitoring and evaluation of flood risk management policies. This is to ensure proper implementation of FRM and assess extent of implementation without false assumptions. Assessment and analysis of flood risk is significantly achieved through evidence – based measures which provide a platform to manage flood risk efficiently. Providing feedback is necessary to relevant authority and stakeholders on the achievement of flood risk management that is why NEMA is responsible for monitoring the outcome of flood risk policies to ascertain the extent to which FRM polices are working in disaster risk reduction (Adelekan, 2016).

FRM evaluation activities on socio-economic development often compare results of assessment of flood impact to ascertain the extent to which FRM has successfully achieved its aim and objectives. Making a value assessment whether a flood risk guideline's predicted outcome is adequate or not, is generally determined by comparing flood risk assessment and other relevant data to evaluate the extent to which a given tragedy is minimized. Flood risk management decision would often be modified through iteration of part or completely of flood risk management procedures due to post implementation responsibility if the evaluation procedures observed unsatisfactory inference (Ajibola, 2012).

In 2012, in assessing the extent of damage and losses on socio-economic systems as a result flood, NEMA assisted by World Bank applied ECLAC strategy to ensure the process conformed to global standards. The assessment data were used for establishing post flood recovery framework for affected sectors and was included in the national budget for 2014 and the national development plan for the medium term (Vision 20:2020). UNDP also created a platform and method for assessing human recovery needs, which combined flood data with post-disaster needs assessments.

4.5.3 Periodic Clearing of Drainages

In the study periodic clearing of drainages was identified by a vast majority of participants 318 (98.8%) as a measure put in place to improve flood risk management. Drainage systems have direct impact on functionality of flood mitigation structures and assessment of relationship between two systems has to be conducted in other to arrive at conclusion for operational principles and significance of FRM activities. Keeping water ways free from debris and solid waste and sanitation of drainages helps to reduce the effect of flood as blockages of drainage systems without periodic clearing in Loko community created a crucial sanitation problem for longer flooding period.

4.5.4 Community Participation

The data further identified community participation (Table 4.6) as a measure to flood risk management with 62.7% participants. Because Integrated Flood Management (IFM) emphasizes collaborative responsibility of all stakeholders and the actual application of flood control measures, community engagement is critical at every stage of flood risk management, including preparedness, intervention, and socio-demographic recovery after disasters. IFM roles contributes in coordinating various community sub-groups, as it affects their interests and help to maximize benefits through agreement within community in other to gain from the available resources endowed in the environment (World Meteorological Organization, 2008).

4.5.5 Value Reorientation

Table 4.6 item 5 showed value reorientation as a measure of improving flood risk management with 7.14% participants conforming to the statement. Understanding the effect of environmental best practices as to what is wrong and right will help the community members participate in environmental best practices that ensures sustainable development and support activities of flood risk management with the aim of reducing possible occurrences with negative impact on socio-demographic activities. FRM indulges in creating value reorientation to further improve on level of compliance to flood risk management

Absence of collective value reorientation in a community often leads to individualized or household level practices motivated by necessity due to insufficient knowledge and awareness of community collective value orientation and its impact on their sources of livelihood. Such measures are ineffective and, over time, will be unable to safeguard the community and individual households from the negative impacts of floods. The efficacy, efficiency, needs, and practicability of policies and initiatives targeted at reducing flood disasters may be justified through community activities that focus on enhancing member involvement (APFM, 2004).

4.5.6 Ways of improving adherence to FRM Policies

Based on the key informant information, there is Lack of enforcement and implementation of FRM policies aimed at ensuring sustainability. FRM policies need review to cater for new trends and emerging issues and there is insufficient monitoring and succession of laid out FRM plans. Hence, NEMA, alongside other stakeholders in Nigeria, should ensure that all developed measures and strategies for managing flood disaster risks in the country are strictly adhered to. Table 4.7 shows summary information on measures to improve FRM.

However, key informant information indicates that, due to bureaucratic bottlenecks, the teaching of disaster risk reduction at those levels has yet to begin; the National Council on Education has not authorized the implementation of the revised curricula.

The qualitative data gathered from key informants suggested that, government should exhibit some power to impose and enforce on the policy to ensure compliance to major actors of the policy and understand the problems of the policy through effective assessment and evaluation. To make informed decisions on tackling compliance, there should be sanctions on defaulting communities and vulnerability capacity assessment be carried out often.

The qualitative data gathered that, relevant stakeholders should take cognizance of the tripartite nature of the country, that is, Federal, state and local governments and integrate all arms of government. There should be structural amendments to make the local arm more informed about risks and fine tune the policy and land tenure system.

To test for statistical significance on level of compliance to flood risk management, ANOVA test was applied and the results presented in Table 4.7 revealed that at 95% confidence level, there was a statistical significance variation p=0.000 on the level of compliance to flood risk management policies in Loko community, Adamawa state, Nigeria at degree of freedom 2, 13. Therefore H_{02} which states that; there is no compliance to flood risk management policies in Loko community, Adamawa state, Nigeria was accepted as p=0.000 < p=0.05.

Table 4.8: ANOVA Test on Level of Compliance to Flood Risk Management

Source of variation	**df**	**Sum of Squares**	**MS**	**F**	**$F_{0.05,2,13}$**	**P**
Group	2	32764.96	28905.4	2.39	3.89	0.05
Error	13	156658.24				
Total	15	189423.2				

Source: Field Data (2020)

The level of compliance to flood risk management was statistically determined through the critical value of rejection region $F_{0.05,2,15} = 3.89$, shows the $F_{statistics} = 2.39$ with a *p*-value = 0.05. The null hypothesis was accepted, suggesting that there was no statistically significant variance in flood risk management compliance in Loko community, Adamawa state, Nigeria.

Because of ignorance, low environmental sustainability literacy, and superstitious beliefs such as rivers being viewed as deities who must be appeased when there is an outflow over river banks, drainage systems in many towns have been clogged with trash created by households. These reasons, according to scholars, are to blame for the non-compliance with flood risk management measures in the majority of Nigeria's flood-prone locations. For instance, Oladokun and Proverbs (2016) found that poor planning, drainage obstructions, and overt corruption among town planning authorities all contribute to the low level of FRM compliance in metropolitan settings. Their findings corroborated the findings in the study that blockage of drainage contribute to flood incidences. Similarly, Uzokwe (2015) observed that poverty, ignorance and belief contribute to low level of compliance to FRM policies.

4.6 Flood Risk Management on Socio-Economic Development

As part of fulfilling the study objective, the study also investigated how effective flood risk management is on socio-economic development in Loko community of Adamawa State Nigeria in line with the study objective three. The result is presented in Table 4.9.

Table 4.9: Response Distribution on FRM on Socio-Economic Development

Items	**Responses**					
	SD	**D**	**N**	**A**	**SA**	***X***
Urban planning and land use control	7	5	7	223	80	***F***
	2.2	1.6	2.2	69.3	24.8	**%**
Building capacity of stakeholders	0	0	22	215	85	***F***
	0	0	6.8	66.8	24.4	**%**
Active involvement of all	2	23	30	218	49	***F***
stakeholders	0.6	7.1	9.3	67.7	15.2	**%**
Preparation for emergency response	0	7	21	181	113	***F***
	0	2.2	6.5	56.2	35.1	**%**
Forecasting and early warning	0	0	9	290	23	***F***
system for flooding disasters	0	0	2.8	90.1	7.1	**%**
Inter-agency collaboration towards	0	7	13	151	151	***F***
disaster management	0	2.2	4.0	46.9	46.9	**%**
Adoption of insurance schemes	35	28	59	118	82	***F***
	10.9	8.7	18.3	36.6	25.5	**%**
Enhancement of flood resilience	0	25	35	212	50	***F***
	0	7.8	10.8	65.8	15.5	**%**
Flood preparedness	0	78	13	212	1	***F***
	0	24.2	4.0	65.8	0.3	**%**
Establishing single agency for flood	31	39	0	187	65	***F***
disaster management	9.6	12.1	0	58.1	20.2	**%**
Transfer of risk to third parties	113	35	28	54	29	***F***
	35.1	10.9	8.7	16.8	9.0	**%**
Education of the community through	0	118	52	85	67	***F***
public awareness	0	36.6	16.1	26.4	20.8	**%**

Ensures availability of food security	0	35	25	51	211	***F***
	0	10.9	7.8	15.8	65.5	**%**
Sustained economic systems even	103	119	23	77	0	***F***
after occurrence of flood disasters	31.9	36.9	7.1	23.9	0	**%**
Sustained socio-demographic status	0	153	69	51	49	***F***
of the Loko community after	0	47.5	21.4	15.8	15.2	**%**
flooding						
Others (please specify)	0	0	0	0	0	***F***

Note: SD- Strongly Disagree, D- Disagree, N- Neutral, A- Agree, SA- Strongly Agree

Source: Field Data (2020)

The summaries of findings from the questionnaire are as follows.

4.6.1 Urban Planning and Land Use Control

The study revealed that, 2.2% participants opined that flood risk management does not cater for urban planning and land use control, while 1.6% participants supported the aforementioned. About 2% (2.2%) neither agreed nor disagreed that flood risk management cater for urban development and land use control. A vast majority of participants 69.3% agreed that flood risk management in Loko community of Adamawa state provided positive conditions for urban planning and land use control while 24.8% strongly agreed and supported the opinion of the vast majority.

Urbanization and environmental sharp-practices have been thought of as human-centered causes of urban flood (UNISDR, 2010) as this obstruct where storm waters can freely flow through. Land surfaces have been covered by urbanization with roofs such as settlement, roads and pavements which reduce water infiltration capacity hence the need for inclusion of urban planning and land use control in FRM policy to ensure effective flood risk management.

The findings (Table 4.9) indicated that, flood risk management ensures urban development and land use control to sustain socio-economic development of the community by focusing on structural measures, given consideration to local technologies and expertise. Having adequate understanding of local situation over imported technologies and expertise by awarding contracts to build structural flood

defenses, canals, embankments, culverts and bridges to eliminate socio-technical problems that may arise from structures produced by foreign experts who are inadequate in local scenario. For example, lots of drainages and flood canals have turned into dumpsite shortly after commission given the high-cost concrete buildings and civil engineering projects are unlikely to provide a long-term protection against flood disasters (UNISDR, 2010).

Non-structural strategies are becoming important in the quest for flood risk management and disaster risk reduction through institutional preparedness, and coping strategies of affected communities against flood disasters. Stakeholders in Nigeria gradually understanding the measures of seeking non-structural flood risk management techniques in line with urban planning and land use control (Oladokun & Proverbs, 2017).

With the growing urban population profile throughout the world, the number of towns and individuals at danger of flood catastrophes is expected to rise. Disasters, regardless of their scale, will jeopardize socio-economic development and prevent the Sustainable Development Goals from being met (UNISDR, 2010). Effects can be high in the urban part of the country, due to its dense population and significant physical infrastructure. Therefore, flood risk management should ensure urban planning and land use control in order to encourage long-term environmental management, particularly in disaster-prone areas like Loko community in Song Local Government Area of Adamawa state Nigeria.

4.6.2 Building Capacity of Stakeholders

The analysis identified building capacity of stakeholders as part of flood risk management to be significant in socio economic development of Loko community in Adamawa state Nigeria (Table 4.9). While a little proportion of participants 6.8% neither agreed nor disagreed with the aforementioned, majority (66.8%) attest that flood risk management on socio-economic development in the study area is linked with building capacity of stakeholders. 24.4% supported the majority as explained above. By implication, building capacity of stakeholders has an influence on flood risk management on socio-economic development of affected areas in Loko community of Adamawa state Nigeria.

In ensuring effective implementation of FRM, capacity-building through the acquisition of relevant knowledge and skills on flood risk management are transmitted to specific groups in different sectors for effectual risk management. NEMA holds seminars and workshops for stakeholders on a variety of topics related to flood risk management on a regular basis in order to develop necessary human capacity for risk management. For example, in 2012, NEMA organized a capacity training workshop on post-disaster damage and loss assessment in collaboration with the World Bank, as well as a capacity workshop on the use of satellite technology for flood risk management in collaboration with the United Nations platform for space-based information on risk management and emergency response.

4.6.3 Active involvement of all stakeholders

From the data collected and analyzed for item 3 on table 4.9, 0.6% of the participants were of the opinion that conducting flood risk management in respect to socio-economic development of Loko community does not actively involve all stakeholders. However, responses in this regard increased as 7.1% participants supported the aforementioned that there is no active participation of all stakeholders in the flood risk management process. Meanwhile, 9.3% neither agreed nor disagreed that in Loko community, stakeholders are actively involved in flood risk management. The result obtained further revealed that, majority representing 67.7% of the participants confirmed active involvement in flood risk management for socio-economic development of Loko community in Adamawa state Nigeria while 15.2% supported the views of the majority. Flood risk management that is based on socio-economic development often ensures active participation of stakeholders in flood risk management.

4.6.4 Preparation for Emergency Response

Item 4 on Table 4.9 showed that 2.2% of participants were in disagreement that, flood risk management on socio-economic development captures preparation for emergency response in affected location in the study area as a strategy to sustain socio-economic development though, 6.5% were neither in agreement nor disagreement with the statement. Majority of participants (56.2%) constituting more than half of the total participants were in agreement that, and 35.1% strongly supported there is preparation

for emergency response as part of efforts for flood risk management on socio-economic development for Loko community. The results indicated that, relevant authorities saddled with the responsibility of flood risk management often prepare for emergency response towards flood disaster in the study area.

Not only must the plan be in paper and accessible to people who will be responding, but it must also be reviewed and updated on a regular basis. The following are some of the most important pieces of information: which agencies and persons are responsible for particular tasks; who to contact for professional guidance; and where to get information about backup communication methods. This material is continuously changing and must be confirmed and validated on a regular basis.

The plan must contain mechanisms for coordination, such as the organization of response committees, where they will meet, and the sources of resource information accessible to them. This frequently takes the shape of a "war room" where maps, blueprints, and other materials, as well as support personnel, are readily available.

4.6.5 Forecasting and Early Warning Systems for Flood Disaster

The result of the study observed that 2.8% participants neither agreed nor disagreed that flood risk management conduct forecasting and provide early warning systems for flood disasters. Majority of the participants (90.1%) agreed and 23 (7.1%) strongly agreed that flood risk management provided forecasting and early warning systems for flood disasters. This indicated that, in achieving the goal of flood risk management, there is always forecasting and provision of early warning systems for flood disaster in the study location.

Despite the late inclusion of disaster risk reduction in national and sectorial development plans and subsequent execution, Nigeria has achieved some progress in its mainstreaming. This has been achieved through early warning systems for hazards which have been integrated into different sectors of the economy, including the introduction of yearly weather forecasts by the Nigerian Meteorological Agency at the start of each rainy season, since it is regarded an efficient instrument for flood hazard reduction.

NEMA data is used as an early warning system for flood disaster planning and other associated hydro meteorological risks, assisting in the mitigation of losses and damages in the agricultural, transportation, and housing sectors. In the case of a flood disaster, the Hydrological Services Agency has also established an early warning system through its network of river gauges, minimizing damages and losses to agriculture, the environment, transportation, and water resources sectors. By implication, flood risk management provided forecasting and early warning systems for flood disasters in flood prone related locations in Adamawa state, Nigeria.

The popular measure to improve flood risk management in Nigeria through relevant authority and machineries is the early warning system for floods which at the start of the rainy season, the Nigerian Meteorological Agency offers an annual rainfall projection, which NEMA disseminates to other stakeholders through workshops, public awareness initiatives, and publications. This approach has aided in the reduction of floods in various towns around the country, particularly in the study region.

4.6.6 Inter-agency Collaboration towards Disaster management

The result obtained from the analysis on flood risk management for socio-economic development of Loko community showed the distribution on item 6; Table 4.9 as follows: 2.2% participants indicated that there is inter-agency collaboration towards disaster control as part of activities of FRM, while 13 (4.0%) were neutral, neither agreeing nor disagreeing.

A vast majority of participants 46.9% observed that, FRM availed inter-agency collaboration towards flood disaster management as observed in the study. This was achieved as a result of coordination and collaboration of NEMA at federal, state and local level with other government agencies, development partners and NGOs through flood risk management programmes in order to reduce the risk of flooding in Nigeria. This allows the mobilization of people and material resources across a broad range of possible financing sources. Flood depletion will necessitate a variety of entities (both public and private), for example, energy utilities maintain reservoirs. The development of shared goals and parameters for each stakeholder's defined role can

be a big roadblock. Land developers must be directly involved in the solutions from a land-use perspective.

NEMA is working with the National Space Research and Development Agency to get the satellite images required for hazard risk assessments and pre-hazard flood assessments. For the distribution of weather predictions and flood mitigation, NEMA partners with the Nigerian Meteorological Agency. For disaster risk management training, the Agency collaborates with six Nigerian institutions. The World Bank and UNDP assisted in the coordination of post-disaster needs assessments following the 2012 flood disaster. NEMA collaborates with the International Federation of Red Cross and Red Crescent Societies in disaster management in Nigeria.

4.6.7 Adoption of Insurance Scheme

The result obtained in item 7 on Table 4.9 from the descriptive analysis revealed 10.9% of the participants strongly disagreed and 8.7% disagreed with the statement that, flood risk management provides insurance schemes for flood disaster victims while 18.3% participants neither agreed nor disagreed. A large proportion of participants on the other hand, 36.6% agreed that, flood risk management provided insurance schemes for flood disaster victims while 25.5% participants strongly agreed. On an average the study observed that flood risk management provides insurance scheme for victims after flood events.

Flood disaster insurance is one of several strategies for mitigating flood losses in Loko community. When a potential purchaser uses money received from a federally insured or regulated institution to purchase a property in a designated flood-prone region, the lender is obligated to advise the borrower of the need for flood insurance. Flood insurance payouts are made from policyholders' collected premiums rather than from disaster relief money (Sani et.al. 2018). This strategy has certain flaws, such as the fact that not all homeowners in flood-prone areas buy insurance, and the need for public financing if damages exceed premiums. Other nations, notably portions of Germany, have tried flood insurance programs with various degrees of success.

To be successful, insurance systems require a precise definition of risk, as premiums should reflect the level of risk at a specific area. Governments should also encourage

or, where practical, enforce universal insurance coverage and provide financing when payments exceed premiums. Such programs should be built to be self-sustaining in the long run. Another issue is the information base, which is rarely sufficient to accurately characterize the degree of risk. It's also tough to make insurance mandatory in an efficient way. Those most at danger from floods are frequently the least able to pay, or unwilling to pay owing to exorbitant rates.

In terms of insurance, the United States has an advantage since 20,000 towns are at danger of flooding; with such a big number of flood-prone communities, the financial risk can be spread out more readily than in smaller nations. Insurance is a viable alternative to explore, although it is unlikely to be available in many poor nations at this time.

4.6.8 Enhancement of Flood resilience

The study examined the availability of provision of enhancement of flood resilience by the management of flood risks and the findings of the study on item 8; table 4.9 showed clearly that, little proportion of participants 7.8% disagreed that flood risk management provide enhancement of flood resilience as part of effort to reduce flood disaster and boast socio-economic development in Loko community of Adamawa state Nigeria. Also, 10.8% participants neither agreed nor disagreed with the statement.

(65.8%) of participants agreed that efforts made by flood risk management provided enhancement for flood resilience while 15.5% participants strongly agreed that in terms of improving flood resilience, flood risk management is successful. Considering the results and number of participants per scale of measurement, it was an indication that in reducing the consequence of flood disaster on socio- economic development, flood risk management often provided an effective flood resilience to reduce damages and losses of livelihood in the study location. Flood protection frameworks, such as flood dams or reservoirs, water rerouting to side routes, storage or other watersheds, storm channels to move water around flood paths, and levees along flood courses, give instruments to minimize flood damages. Such framework can be provided to various levels of cover, usually based on: 1) minimal flood mitigation standards; 2)

based on a demographic study, the optimal costs and benefits; or 3) to achieve certain levels of conceivable risk.

When substantial construction has already begun and the costs of protecting current investments are less than those of rebuilding, lost demographic activity, disaster management, or relocation of existing framework and activities, protective framework should be considered. Flood protection measures in Winnipeg, Canada, for example, were completed in the late 1960s at a cost of $US 92 million. Since then, the loss reduced in five big floods is estimated to be over $US 2.0 billion. Constructive pathways have a propensity to boost development in flood-prone regions since it is assumed that it is now safe to construct and invest in flood-protected places. However, it must be acknowledged that the design event will almost certainly be surpassed at some time in the future, resulting in catastrophic consequences. When design limits are surpassed, levees and storage dams are especially dangerous because an unexpected breakdown can result in a rapid rise in water level, making evacuation and emergency protection exceedingly difficult. Diversions or storm channels are less likely to fail catastrophically, and the level of protection can be temporarily enhanced by emergency measures if the flood warning has enough lead time. Information must also be reliable and simple to comprehend. The foregoing approaches, when paired with a flood forecast, provide a very effective means of identifying flood-prone regions and conveying this information to decision-makers, emergency response teams, and the general public.

A multi-purpose reservoir development may include a component for flood control storage. To the detriment of flood management, the reservoir's operation may be changed over time to improve other advantageous storage applications. It is necessary to commit to "specified flood storage" and reservoir operation techniques in order to attain that storage (Pradhan, 2010).

A routine and systematic inspection, rehabilitation, and maintenance program is necessary to ensure that the design capabilities of structural works are maintained. Levees, for example, may be weakened due to erosion from a previous flood event, burrowing animals, or the installation of utility lines through the levee. An inspection program, as well as responsibilities for repair and maintenance, are particularly

important. Dams, for example, should be subjected to a dam safety program, generally at the national level, to guarantee that the specific knowledge needed for inspection of all structures is available. Many nations have dam safety programs in place, and standards or recommendations are readily available.

Since 2012, impacted governments in Nigeria, as well as international and bilateral organizations and NGOs, have embraced and mainstreamed flood disaster reduction and management into their policy agendas. Through UN General Assembly Resolution 54/219, The International Strategy for Disaster Reduction (ISDR) seeks to integrate efforts in creating sustainable performance by creating a culture of mitigation and response among governments, UN agencies, regional organizations, the commercial sector, and civil society.

4.6.9 Flood Preparedness

Item 9 on table 4.9 revealed that, 24.2% disagreed that flood risk management on socio-economic development in Loko community is effective in terms of flood preparedness while 4.0% of participants said they were neither agreeing nor disagreeing with the statement. 65.8% agreed that flood risk care is effective in terms of flood preparedness in Loko community while 1 (0.3%) participants strongly agreed and supported the large proportion. This signified that, flood risk management is effective in terms of flood preparedness in Loko community of Adamawa state Nigeria. Results from FGD showed that possible strategies of flood risk management will help in improving the socio-demographic situation in Loko community of Adamawa state in other to buttress the activities of FRM geared towards sustaining economic growth and development. If members of community are prepared and guided towards maintaining a secure environment for sustainable development, this would improve community preparedness against flood activities and hence, reduce flood damage and losses, raise awareness on best practices on flooding to foster economic development, ensure policies put in place to reduce flood risks are adhered to and this will provide an enabling environment for economic development. And community preparedness was aligned to community participation to ensure community based disaster management.

4.6.10 Establishment of Single Agency

Furthermore, in establishing the role of flood risk management on socio-economic development in Loko community (table 4.9) indicated that 31 (9.6%) participants strongly disagreed that flood risk guidance establishes single agency responsible for flood disaster control while 12.1% participants disagreed and supported the above category explained above as these set of participants do not agreed with the fact that flood risk management established a single agency responsible for flood disaster control. Majority of participants 58.1% responded positively to the statement while 20.2% strongly agreed and supported the majority that flood risk guidance a single flood-control agency should be created. The findings suggested that flood risk management established a single entity accountable for flood disaster response.

In most cases, an inter-agency body will need to be formed, with the leadership position going to the agency with the most engagement or a powerful central agency.

Given the unique conditions, there is unlikely to be an optimal model for such a structure. Although an independent agency seems appealing, it is generally best to attempt to build on the capabilities of existing organizations so that supportive resources can be mobilized rapidly in the event of extreme occurrences in any nation. Within this varied paradigm, however, it is critical that one agency be given overall leadership and held accountable for the whole process.

4.6.11 Transfer of Risk to Third Parties

The result on table 4.9; item 11 showed that majority 35.1% of participants strongly disagreed that flood risk management transfers risk to third parties while 10.9% participants disagreed. More so, 8.7% neither agreed nor disagreed that flood risk management transfer risk to 3rd party. Other proportion of the participants 16.8% clearly agreed that, flood risk management transfer risk to third parties while 9.0% strongly agreed that flood risk management transfers risk to 3rd parties. This signified that, flood risk management does not transfer risk to third party rather internalize risk for the purpose of achieving its goal.

4.6.12 Educate Community through Public Awareness

The descriptive analysis on table 4.9; item 12 indicated that, 36.6% of participants disagreed that flood risk management educate the community through public awareness while 16.1% neither agreed nor disagreed to the statement. Also, 26.4% agreed that flood risk management n educates the community through public awareness while 20.8% participants strongly agreed that, flood risk management educates community through public awareness.

Looking at the result and distribution of responses based on participants, it is obvious that flood risk management do not educate the community through public awareness this may be as a result of inadequate funding as a common challenge to flood risk disaster management or unwillingness of the community due to stereotype and environmental illiteracy which in turn affects the crucial role of flood risk reduction among communities and this is not considered an important determinant in the planning and execution of economic growth. In Nigeria, there is a lack of education and public knowledge of flood risk management, including among politicians and bureaucrats. Also, in the discussion with focus group, issues concerning how flood risks management will help address these problems were raised and participants suggested that flood risk management should conduct environmental assessment whereby long term plans can be made to mitigate vulnerability of the community, should curtail the magnitudes of flood occurrences through public awareness as this will be a better mitigation strategy to manage floods and improve on community preparedness before floods and resilience after flood events.

4.6.13 Availability of Food Security

Furthermore, the result on table 4.9; item 13 revealed that little proportion 0.9% of participants disagreed that flood risk management ensures availability of food security while 7.8% neither agreed nor disagreed that food security is ensured by flood risk management. The descriptive analysis further explained that a large proportion 15.8% and 65.8% of participants agreed and strongly agreed that flood risk management on socio-economic development ensures availability of food security. The analysis provided facts that the activities and programmes of flood risk control in cooperate

food security and flood risk management have available and efficient food security platform in Loko community.

4.6.14 Sustained Economic Systems even after Flood Occurrence

Item 14 on table 4.9 showed a vast majority 31.9% and 36.9% of participants were not in agreement with the statement that flood risk management practice is geared towards sustained economic systems even after the occurrence of flood disaster in addition, 7.1% participants neither agreed nor disagreed to the statement. More so, 23.9% participants agreed and strongly agreed that flood risk management practice focuses on sustained economic systems even after the occurrence of flood disaster. From this analysis it was evident that flood risk management practices do not incorporate policies and action plans geared towards sustained economic systems even after occurrence of flood disasters in Loko community of Adamawa state.

This is contrary to flood risk management policy outlined by NEMA in 2001 considering the consequence of flood on economic losses which has the potential to multiply over time, resulting in the loss of human lives and livelihoods, damage of economic systems, and frequently difficult recovery owing to inadequate flood risk management policies on long-term economic systems (Munich Re, 2002).

Senior government officials should plan ahead of time to create clearly defined response plans and programs. In the absence of such regulations, the response is frequently haphazard, politically and emotionally motivated, and establishes unwise precedents in the long run. Frequently, the response is insufficient in that it addresses the apparent and urgent needs while ignoring fundamental shifts in thinking and long-term plans.

Following a large flood, it's a good idea to analyze the flood's causes and consequences and offer recommendations to enhance readiness for the next occurrence and decrease future flood losses. This type of evaluation can also lead to better flood plain management policy (Oladokun and Proverbs 2016).

In the aftermath of a disaster, the long-term economic and societal consequences of floods become apparent. Governments must show leadership and, on occasion, take strong actions to restore jobs, solve social concerns, and reorient the economy.

Natural catastrophes can serve as a good incentive for change in this regard (Olanrewaju et.al. 2019)

Meanwhile, flood disasters that occur on a regular have been recognized as a key issue to sustainable development. Floods, according to Action Aid International (2006), are natural occurrences, but flood damage and losses are the result of human behavior toward the environment, and they destroy produce that provides a source of livelihood, such as rice paddy, fruit trees, and vegetables, putting subsistence farmers at risk of hunger and commercial farmers at risk of significant economic loss (Kolawole et.al. 2011).

4.6.15 Sustained Socio-Demographic Status

One of the goals of this study, as previously stated, was to analyze the socio-demographic status of the individuals in the community. Hence Table 4.9; item 15 indicated majority 47.5% of participants were in disagreement that, flood risk management has sustained socio-demographic status of Loko community after flooding while 21.4% neither agreed nor disagreed to the statement, 15.8% and 15.2% were in agreement that flood risk management have sustained socio economic status of Loko community.

From the analysis presented it is obvious that, flood risk management does not sustain socio-demographic status of Loko community in Adamawa state Nigeria. It is worthy to note that, flood poses serious and devastating challenge to the nation's economy and the economic environment consists of its financial sector, social welfare, electricity sector, transportation, investments, commerce, manufacturing, and construction.

Flood disasters often result in huge damages and losses to the economy of people in the affected location which in turn affect the nation's economy at large and in most cases, it is difficult to quantify the actual cost of losses and reconstruction, which also destroys several years of infrastructure investments, as well as the loss of lives, destruction of public utilities, and disruption in the smooth operation of the system, which causes fear and uncertainty among the population.

In addition to lost livelihoods, environmental harm, financial loss, and resource diversion, diseases, migration, food insecurity, and population relocation are also factors. This results in loss of socio-demographic status of the populace and the community at large which recovery can only be achieved through flood risk management policies geared at sustaining socio-demographic status of victims after a flood disaster (Echendu, 2020).

Consequently, data was collected from participants through focus group discussion to strengthen responses obtained in the study in different aspect of the objectives most importantly on flood risk management for socio-economic development of Loko community in Adamawa state.

4.7 Impact of flood on socio-economic development of the area

The third objective of the study was to gain a better understanding of the impact of flooding on the community's socio-economic activities. Interviewees provided the following information; loss of livelihoods, mainly agricultural lands which is the main income source of community members and food insecurity, disease outbreak, collapse of buildings which include houses, shops, stores among others, destruction of bridges and drainages which in turn affects the socio-economic status of community members.

4.7.1 Impact of FRM on Economic Systems

The study further investigated by way of seeking opinion from community members to corroborate the findings from quantitative research process through FGD and KII. A number of community members were engaged in group and personal discussion. The discussants opinion reflects on effective practice of the FRM policy to sustain socio-demographic systems as vital. The data gathered identified farming as the major source of income of community members. However, property loss, such as houses, businesses, and stores, typically necessitates rescue efforts that does not end with the flood occurrence, but continues through the recovery and resettlement phases. This often result in high cost of recovery after a flooding event and hinders or slow down economic growth and development of the people.

Also, to improve economic situation of community members, FRM focuses on sustaining economic growth and development. If members of community are prepared and guided towards maintaining a secure environment for sustainable development, this would improve community preparedness against flood activities and hence, reduce flood damage and losses, raise awareness on best practices on flooding to foster economic development, ensure policies put in place to reduce flood risks are adhered to and this will provide an enabling environment for economic development and community preparedness was aligned to community participation to ensure community based disaster management.

4.7.2 Impact of FRM on Social Systems

Participants further provided information regarding social benefits obtainable from flood risk management program in regard to food security and sources of livelihood, views were presented as follows; since flood risk management ensures mitigation measures are put in place, social coexistence and ties as well as socio-cultural practices will not be affected by displacement, fear and anxiety that flooding events brings will be curbed to the barest minimum, hence an experience of peace and tranquility that will cause mental and emotional stability, there will be a sense of security from loss of agricultural products and other structural properties, livelihoods as well as disease outbreak, collapsed of buildings which include houses, shops, stores among others, destruction of bridges and drainages as all these reduces community members standard of living.

To test for statistical significance on flood risk management effectiveness on socio-economic development in Loko Community of Song Local Area Government, ANOVA test was applied and the results presented in table 4.8 it was discovered that at confidence level of 95%, there exists a statistical significance variation p=0.000 on flood risk management effectiveness in Loko community, Adamawa state, Nigeria at degree of freedom 4, 14. Therefore H_{03} which state that; Flood risk management is not effective in promoting socio-economic development in Loko Community of Song Local Area Government area of Adamawa state Nigeria was rejected as p=0.000 > p=0.05

Table 4.10: ANOVA Test on Flood Risk Management on Socio-Economic Development

Source of variation	**Df**	**Sum of Squares**	**MS**	**F**	**$F_{0.05,4,14}$**	**P**
Group	4	327018.4952	81754.6238	4.58	3.18	0.05
Error	13	231981.92	17844.7631			
Total	17	559000.415				

Source: Field Data (2020)

These findings also indicated that, the $F_{statistics}$= 4.58 with a p = 0.05 and the critical value of rejection region $F_{0.05,4,13}$ = 3.18, explains a positive response from participants indicating that, flood risk management is effective in promoting socio-economic development in Loko Community of Song Local Area Government. Having established this and comparing the result with compliance level, we can infer that the high level of compliance and the socio-demographic factors are interlinked.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the research, draws inferences from the findings, and gives suggestions on flood risk management for socio-economic development in Loko community of Adamawa state, Nigeria. Finally, it recommends on areas that should be considered directed by the study objectives, for additional study.

5.1 Summary of Findings

The main objective of this study was to assess flood risk management for socio-economic development in Loko community of Adamawa state, Nigeria.

In assessing the socio-demographic features of Loko community, the study found that male participants comprised the largest proportion, aged between 28 - 37 years and education wise, had attained senior secondary. A majority had blue collar jobs where they work on the agricultural fields. ANOVA test conducted at 95% confidence level showed that there is a significant distinction between people in flood-prone areas from others not affected.

The level of compliance to flood risk management was assessed through quantitative and qualitative procedures. Considering the effect that floods have on socio-economic development of the area, the findings showed that there is a high level of compliance to flood risk management following the descriptive analysis.

The study also looked at how effective flood risk management is for socio-economic development in Loko community of Adamawa State Nigeria. It was observed that FRM in Loko community provided positive conditions for urban planning and land use control, building capacity of stakeholders in its activities of flood risk reduction, forecasting and early warning systems, provision of insurance schemes, flood preparedness and establishment of single agency, and sustained economic systems after flood occurrence.

5.2 Conclusions of the Study

It is evident, based on the conclusions of the research that floods have harmed the socio-economic standing of livelihoods for people in the community under study. The study has found that livelihood patterns influence settlement patterns to a considerable extent. It is also clear that several underlying reasons of people's susceptibility exist, which makes lowering or eliminating vulnerability difficult. The major underlying reasons of susceptibility include proximity to a flood-prone area, residence in a flood-prone area, and poverty. Consequently, the findings show that the identified socio-demographic characteristics of Loko community of Song LGA Adamawa state, Nigeria are livelihood patterns and socio-demographic status of the households. Floods in one area of society might have an impact on other sectors of society, according to the study. In the health sector, for example, the impact of floods on water supplies and sanitary facilities was blamed for the increase of illness cases (malaria, diarrhoea, and cough). The issue of river water pollution during floods, as well as the management of water from boreholes, raises the health risk. Furthermore, while no health facilities were harmed as a result of the floods, access to health services may be hampered as a result of infrastructural (roads and bridges) damage.

In observing objective two of the study, the study findings demonstrated that in Loko community considering the effect of the floods on socio-economic progress of the area, there is a high level of compliance to flood risk management. This was due to active participation in discussions and support rendered by disaster management stakeholders across the state. The study findings also indicated that the community is well enlightened on flood risk management as there is a well-structured mode of communication, flood Warning/Sensitization, Resettlement plans as well as drainage operations within the flood-prone areas. The study revealed that there were challenges in effective FRM. It shows that the challenges of flood risk management in Loko community include: Inadequate funding for flood risk management, poor level of community participation, high Illiteracy levels within the community, and community stereotypes.

It was obvious, as stated in section 4, that households react differently when they are impacted by floods. The present coping techniques used by the majority of households are ineffective as it tells on the socio-demographic status and promotes

poverty due to loose of farmland to flood. The coping techniques were not sustainable, according to community discussions, because they had been used and the situation did not appear to improve. The ability of local communities to cope should not be underestimated, but rather enhanced. The emphasis must be on improving people's living situations.

Communities should be urged to construct homes made of sturdy materials and away from flood-prone locations as a strategy of coping with floods.

To enhance household food security, the Ministry of Agriculture and Cooperatives should use Extension Services to urge communities to cultivate more on upland. A program of input assistance for disadvantaged but productive farmers should be proposed. It is necessary to create better and more suitable methods to prepare for and reduce the consequences of floods, as well as to include all stakeholders in order to improve communities' flood resilience.

5.3 Recommendations of the Study

The following are the recommendations based on the findings of this study on flood risk management on socio-economic development in Loko community of Adamawa state, Nigeria.

i. The study calls for the creation of an informative and standardize database by the government, of the economic consequences of flooding to make progress on the understating of the wider economic impacts of flood risk. This will help inform the necessary bodies and affected households, community to know the path to seek help or where they can get help. The study findings show that, the socio-demographic and economic statuses of the people are usually affected in time of flooding.
ii. There is need to promote community participation as it is crucial and necessary at every step of flood management, including flood preparation, response, and recovery. Through associated development initiatives, communities can attempt to optimize the advantages. Although the study observes that compliance to FRM is considerably high, the stereotyped people should be orientated and encouraged to appreciate the initiative.

iii. Involving the community in flood risk assessment, as well as planning and implementing risk management measures, is critical to the success of flood risk mitigation plans. As observed in the study findings, the gaps between the federal and state is huge as a result, there is a lack of engagement in local governance. These gaps should be closed up and form coordination to promote proper planning and implementation of the FRM.

iv. The government and stakeholders must address the socio-economic variables that impact communities' desire to participate in flood risk management, such as poverty, livelihood profile, cultural beliefs, position of weaker social groupings, and rights of minorities and ethnic groups. The study established that flooding in the community causes many socio-demographic problems leading to loss of farmland, property and other sources of livelihood. The government should be willing to assist affected households and communities in time of flooding.

5.4 Suggestion for Further Research

Due to the transition in flood risk management and the dynamics in the socio-economic interaction with climate change, what has been discovered is not exhaustive. The following suggestions for further research are based on this viewpoint.

i. This study was limited to assessing flood risk management on socio-economic development in Loko community of Adamawa state, Nigeria. There is thus a need to carry out further research to determine the same process in a number of other communities in Nigeria to find out how flood risk management affects their socio-economic development.

ii. More inclusive research should be conducted that will involve a bigger scope to establish whether flood risk management has an impact on socio-economic development in Loko community of Adamawa state, Nigeria.

iii. To arrive at the above conclusions, this study used a case study research design. The structure, on the other hand, enables for observation of events in their natural contexts without the need for data processing. As a result,

the researcher suggests that an experimental design be employed, with variables that can be controlled and quantified precisely, to reveal the impact of flood risk management on socio-economic advancement in Loko community.

iv. The community plays a great role in disaster risk handling. This is because, despite the use of similar disaster risk management methods in the same community setting, individual members of the community perform better than their colleagues in managing disasters. Therefore, it is necessary to determine the function of each community member in disaster risk management.

REFERENCES

Adebayo, A., & Nwaigwe, S. (2015). *Community Participation in Flood Management in Yola Metropolis, Adamawa State, Nigeria*. Journal of Basic and Applied Research International, 7(2), 83-89.

Adedeji, O.H., Odufuwa, B.O. & Adebayo, O.H (2012). *Building capabilities for flood disaster and hazard preparedness and risk reduction in Nigeria: need for spatial planning and management*. Journal of Sustainable Development in Africa, 14(1): 45–58.

Adekola, O., and J. Lamond. 2018. "A Media Framing Analysis of Urban Flooding in Nigeria: Current Narratives and Implications for Policy." *Regional Environmental Change* 18 (4): 1145–1159.

Adelekan, I. O. 2016. "Flood Risk Management in the Coastal City of Lagos, Nigeria." *Journal of Flood Risk Management* 9 (3): 255–264.

Adeloye, A. J., and R. Rustum. 2011. "Lagos (Nigeria) Flooding and Influence of Urban Planning." *Proceedings of the Institution of Civil Engineers-Urban Design and Planning* 164 (3): 175–187.

Aderogba, K. A. 2012. "Qualitative Studies of Recent Floods and Sustainable Growth and Development of Cities and Towns in Nigeria." *International Journal of Academic Research in Economics and Management Sciences* 1 (3): 1.

Aerts, J., Botzen, W (2011). *Flood-resilient waterfront development in New York City: Bridging flood insurance, building codes, and flood zoning*. Ann. N.Y. Acad. Sci. 12(27): 1-80.

Aghaei, N., Seyedin, H., &Sanaeinasab, H. (2018). *Strategies for disaster risk reduction education: A systematic review*. Journal of education and health promotion, 7.

Ainehvand, S., Raeissi, P., Ravaghi, H., & Maleki, M. (2019). *Natural disasters and challenges toward achieving food security response in Iran*. Journal of education and health promotion, 8.

Aja, G. N., and A. Y. Olaore. 2014. “The Impact of Flooding on the Social Determinants of Health in Nigeria: A Case for North-South Institutional Collaboration to Address Climate Issues.” *Developing Country Studies* 4 (22): 6–12.

Ajibade, I., McBean, G. &Bezner-Kerr, R (2013). *Urban flooding in Lagos, Nigeria patterns of vulnerability & resilience among women*. Global Environment Change, 23(6): 1714-1725.

Ajibola, M. E., Omoshehin, T. O. and Olosunde, S. O (2016). Evaluation Of Food and Feeding Habits of Hoplobatrachus Occipitalis (Günther, 1858) From Four Locations on Obafemi Awolowo Campus, Ile-Ife. *Ife Journal of Science* 18(1): 85-94.

Alam, E. (2017). Food security and household coping strategies during disasters in Bangladesh. *International Journal of Health System and Disaster Management*, *5*(3), 51.

Alexander, D. (2000) *Confronting Catastrophe: New Perspectives on Natural Disasters*, New York, NY: Oxford University Press.

Aliyu, A & Orisakwe, K.U (2012). *An Overview of 1989 Loko Flood Disaster and its Mitigation Measures in Adamawa State of Nigeria*. Journal of Environmental Science and Engineering. 26(4): 149-155.

Aliyu, A. (2015). Management of disasters and complex emergencies in Africa: The challenges and constraints. *Annals of African medicine*, *14*(3), 123.

Alpi, K. M., & Evans, J. J. (2019). Distinguishing case study as a research method from case reports as a publication type. *Journal of the Medical Library Association: JMLA*, *107*(1), 1.

Amangabra, G.T. & Obenade, M. (2015). *Flood vulnerability assessment of Niger Delta states relative to 2012 flood disaster in Nigeria*. American Journal of Environmental Protection. 3(3):76–83.

Bariweni, P., C. Tawari, and J. Abowei. (2012). “Some Environmental Effects of Flooding in the Niger Delta Region of Nigeria.” *International Journal of Fisheries and Aquatic Sciences* 1 (1): 35–46.

Baytiyeh, H. (2018). Can disaster risk education reduce the impacts of recurring disasters on developing societies? *Education and urban society*, *50*(3), 230-245.

Behera, A. (2002). *Government - NGO Collaboration for Disaster Reduction and Response: The India (Orissa) Experience*, paper presented at the Regional Workshop on Networking and Collaboration among NGOs of Asian Countries in Disaster Reduction and Response, Kobe, Japan.

Brundtland, G. H. (1987). Report of the World Commission on environment and development "our common future.": United Nations.

Bubeck, P., H. Kreibich, E. C. Penning-Rowsell, W. Botzen, H. de Moel, and F. Klijn. (2017). “Explaining Differences in Flood Management Approaches in Europe and in the USA– a Comparative Analysis.” *Journal of Flood Risk Management* 10 (4): 436–445.

Cardona.G (2001). *Disaster Risk Management in Third World Countries* (CIMNE), Universidad Politécnica de ataluña.

Chan, E. Y. Y., Man, A. Y. T., & Lam, H. C. Y. (2019). Scientific evidence on natural disasters and health emergency and disaster risk management in Asian rural-based area. *British medical bulletin*, *129*(1), 91.

Chapagain, T., and M. N. Raizada. (2017). “Impacts of Natural Disasters on Smallholder Farmers: Gaps and Recommendations.” *Agriculture &Food Security* 6 (1): 39.

Charveriat, B. (2000). *Natural Disasters in Latin America and the Caribbean: An Overview of Risks*, Working Paper No. 434. Washington, D.C.: Research Department, Inter-American Development Bank.

Chukwu, O. G., V. Wekpe, and C. Ikebude. (2018). "Impact of Coastal Flooding on Fish Production in Brass, Niger Delta Nigeria, Implication for Coastal Resource Management." *Oceanography and Fisheries* 6 (1).

Crook, N. and Manor. B. (1998). *Democracy and Decentralization in South-East Asia and West Africa: Participation, Accountability and Performance,* Cambridge: Cambridge University Press.

Deressa, D., Hassan, R., Ringler, C., Alemu, T., & Yesuf, M. (2009). Determinants of farmer's choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Environmental Change,* 2(19).

Davis, C., Keilis-Borok, V., Kossobokov, V., Soloviev, A. (2012). *Advance prediction of March 11, 2011 Great East Japan Earthquake: a missed opportunity for disaster preparedness*. International Journal of Disaster Risk Reduction, 1(1): 17-32.

Dube, E., O. Mtapuri, and J. Matunhu. (2018). "Flooding and Poverty: Two Interrelated Social Problems Impacting Rural Development in Tsholotsho District of Matabeleland North Province in Zimbabwe." *Jàmbá: Journal of Disaster Risk Studies* 10 (1): 1–7.

Echendu A.J. (2020). The Impact of Flooding on Nigeria's Sustainable Development Goals (SDGs), Ecosystem Health and Sustainability, 6:1, 1791735.

ECLAC (2002). United Nations Economic Commission for Latin America and the Caribbean, "*Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters*", report LC/MEX/L.519, Mexico, D.F.

Egbenta, I.R., Udo, G.O. & Otegbulu, A.C (2015). *Using hedonic price model to estimate effects of flood on real property value in Lokoja Nigeria*. Ethiopian Journal of Environmental Studies and Management, 8(5): 507–516.

Eneji, C., J. E. O. Eneji, V. Ngoka, and M. Abang. (2016). "Attitudetowards Waste Management and Disposal Methods and the Health Status of Cross River State, Nigeria." *SCIREA Journal of Agriculture* 1(2): 231-247.

Erica, C., P. Jessie, and P. Stephanie (2018). "How Natural Disasters Undermine Schooling.

Everett, G. & Lamond, J (2014). *A conceptual framework for understanding behaviours and attitudes around 'Blue-Green' approaches to FRM. Flood Recovery*. Innovation and Response IV: 101–112.

Fatima M. Al-Nammari, M. Alzaghal. (2015). "Towards local disaster risk reduction in developing countries: challenges from Jordan". *International journal of disaster risk reduction* 12 (1): 34-41.

Frankenberg, E., Laurito, M., & Thomas, D. (2014). The demography of disasters. *International encyclopedia of the social and behavioral sciences (area 3), 2nd edition. North Holland, Amsterdam*, 1-22.

Freeman, A. (2003). *Dealing with Increased Risk of Natural Disasters: Challenges and Options*. IMF Working Paper WP/03/197.

Garba, A. (2012). Secondary Education in Nigeria: A synthesis of basic student-specific concerns from guidance and counselling perspective. *Journal of International Cooperation in Education*, *15*(2), 195-205.

Ghesquiere, F. (2007). *Sovereign Natural Disaster Insurance for Developing Countries: World Bank Policy*. Research Working Paper WPS4345.

Gil, J. D. B., P. Reidsma, K. Giller, L. Todman, A. Whitmore, and M. van Ittersum. (2019). "Sustainable Development Goal 2: Improved Targets and Indicators for Agriculture and Food Security." *Ambio* 48 (7): 685-698.

GoK. (2009). Kisii Central District Development Plan. Nairobi: Government Printer.

Gostin, L., Phelan, A., Coutinho, A. G., Eccleston-Turner, M., Erondu, N., Filani, O., & Tomori, O. (2019). Ebola in the Democratic Republic of the Congo: time to sound a global alert? *The Lancet*, *393*(10172), 617-620.

Harrison, K., (2008). *Navigating the grey areas: Reflections on the Western Cape powers and functions review process*. Local Government Bulletin, 10(4):17-19.

Harvey R. B (2006). *Research Methods in Anthropology*: *Qualitative and Quantitative Approaches.* (4th Ed) Lanham: Rowman and Littlefield.

Howley, P., Cathal, O. D., & Heanue, K. (2012). Factors affecting farmer's adoption of agricultural innovations: A panel data analysis of the use of artificial insemination among dairy farmers in Ireland. *Journal of Agricultural Science,* 4(6).

Idris, S., & Dharmasiri, L. M. (2015). Flood risk inevitability and flood risk management in urban areas: A review. *Journal of geography and Regional Planning*, *8*(8), 205-209.

IFRC (2010). *World Disasters Report 2010. Focus on Urban Risk*. International Federation of Red Cross and Red Crescent Societies (IFRC), Geneva.

Ike, P.C. and Uzokwe, U.N. (2015). Estimation of poverty among rural farming households in Delta State. *Journal of Poverty, Investment and Development*, 11.

Iloka, N. G. (2016). Indigenous knowledge for disaster risk reduction: An African perspective. *Jàmbá: Journal of Disaster Risk Studies*, *8*(1).

Izah, S. (2018). "Ecosystem of the Niger Delta Region of Nigeria: Potentials and Threats." *Biodiversity International Journal* 2 (4): 338–345.

Jackson-Smith, D., Dolan, M., Holyoak, G., Flint, C. G., Trentelman, C. K., Thomas, B., & Ma, G. (2016). Effectiveness of the drop-off/pick-up survey methodology in different neighborhood types. *Journal of Rural Social Sciences*, *31*(3), 35.

Jha, A.K., Bloch, R. & Lamond, J (2012). Cities and Flooding: A Guide to Integrated Urban FRM in the 21st Centuries. World Bank, DC.

Jones, S., Oven, K. J., Manyena, B., & Aryal, K. (2014). Governance struggles and policy processes in disaster risk reduction: A case study from Nepal. *Geoforum*, *57*, 78-90.

Jongman, B. 2018. "Effective Adaptation to Rising Flood Risk." *Nature Communications* 9 (1): 1986.

Kenny, S. (2016). *Community development today: engaging challenges through cosmopolitanism*. Community Development Journal, 51(1), 23-41.

Khan, Y., O'Sullivan, T., Brown, A., Tracey, S., Gibson, J., Généreux, M., & Schwartz, B. (2018). Public health emergency preparedness: a framework to promote resilience. *BMC public health*, 18(1), 1344.

Kiedrzyńska, E., M. Kiedrzyński, and M. Zalewski. (2015). "Sustainable Floodplain Management for Flood Prevention and Water Quality Improvement." *Natural Hazards* 76 (2): 955–977.

Komolafe, A.A., Adegboyega, S.A. & Akinluyi, F.O (2015). A review of flood risk analysis in Nigeria. *American Journal of Environmental Sciences.* 11(3): 157–166.

Kwari, J. W., M. K. Paul, and L. B. Shekarau. (2015). "The Impacts of Flooding on Socio-Economic Development and Agriculture in Northern Nigeria: A Case Study of 2012 Flooding in Yola and Numan Areas of Adamawa State Nigeria." *International Journal of Scientific & Engineering Research* 6 (7).

Lal, P. N., Lal, P. N., Singh, R., & Holland, P. (2009). *Relationship between natural disasters and poverty: a Fiji case study*. SOPAC.

Loayza, N. V., Olaberria, E., Rigolini, J., & Christiaensen, L. (2012). Natural disasters and growth: Going beyond the averages. *World Development*, *40*(7), 1317-1336.

Louise, K. C. Comfort. A (1999). *Shared Risk: Complex Systems in Seismic Response*, New York, NY: Pergamon.

Ludwig, F., C. T. Van Scheltinga, J. Verhagen, B. Kruijt, E. vanIerland, R. Dellink, . . . P. Kabat. 2007. *Climate ChangeImpacts on Developing countries-EU Accountability*.Wageningen University and Research Centre.

Lukamba, M. T. (2010). Natural disasters in African countries: What can we learn about them? *TD: The Journal for Transdisciplinary Research in Southern Africa*, *6*(2), 478-495.

Larrauri H., Receveur, T. (2018). Nigeria Special Report Early Warning & Early Response in Plateau State. Available Online at: http://howtobuildup.org/wp-content/uploads/2016/04/bp-ptl-nigeria.pdf.

Mahul, O., and Gurenko, E. (2006). *The Macro Financing of Natural Hazards in Developing Countries*. World Bank Policy Research Working Paper WPS4075.

Mall, R. K., Srivastava, R. K., Banerjee, T., Mishra, O. P., Bhatt, D., & Sonkar, G. (2019). *Disaster risk reduction including climate change adaptation over south Asia: challenges and ways forward.* International Journal of Disaster Risk Science, 10(1), 14-27.

Mata-Lima, H., Alvino-Borba, A., Pinheiro, A., Mata-Lima, A., & Almeida, J. A. (2013). Impacts of natural disasters on environmental and socio-economic systems: What makes the difference? *Ambiente & Sociedade*, *16*(3), 45-64.

Matemilola, S., and I. Elegbede. (2017). "The Challenges of Food Security in Nigeria." *Open Access Library Journal* 4 (12): 1–22.

McDermott, T. K. (2016). *Investing in disaster risk management in an uncertain climate*. The World Bank.

McElfish, P. A., Long, C. R., Selig, J. P., Rowland, B., Purvis, R. S., James, L., Holland, A., Felix, H. C., & Narcisse, M. R. (2018). Health Research Participation, Opportunity, and Willingness among Minority and Rural Communities of Arkansas. *Clinical and translational science*, *11*(5), 487–497. https://doi.org/10.1111/cts.12561.

Mechler, R. (2016). Reviewing estimates of the economic efficiency of disaster risk management: opportunities and limitations of using risk-based cost–benefit analysis. *Natural Hazards*, *81*(3), 2121-2147.

Messer, N. M. and Townsley, P. (2003). *Methodological Guidelines on Understanding Linkages between Household Livelihood Strategies and Local Institutions*, SDA/FAO, Rome.

Morrison, A., Westbrook, C. J., & Noble, B. F. (2018). A review of the flood risk management governance and resilience literature. *Journal of Flood Risk Management*, *11*(3), 291-304.

Mudavanhu, C. (2014). "The Impact of Flood Disasters on Child Education in Muzarabani District, Zimbabwe." *Jàmbá: Journal of Disaster Risk Studies* 6 (1): 1–8. doi:10.4102/jamba.v6i1.138.

Mugenda, O., & Mugenda, A. (2003). Research methods quantitative and qualitative approaches. Nairobi: Act Press.

Murray, V., Aitsi-Selmi, A., & Blanchard, K. (2015). The role of public health within the United Nations post-2015 framework for disaster risk reduction. *International Journal of Disaster Risk Science*, *6*(1), 28-37.

Mwape, Y. P. (2019). *An Impact of Floods on the Socio-economic Livelihoods of People: A Case Study of Sikaunzwe Community in Kazungula District of Zambia*. Bloemfontein: University of the Free State.

Nabegu, A. B. (2014). "Analysis of Vulnerability to Flood Disaster in Kano State, Nigeria. *Greener Journal of Physical Sciences* 4(2): 22-29.

Najafi, M., Ardalan, A., Akbarisari, A., Noorbala, A. A., & Jabbari, H. (2015). Demographic determinants of disaster preparedness behaviors amongst Tehran inhabitants, Iran. *PLoS currents*, *7*.

NDMF, (2010). National Disaster Management Framework. Nigeria Government.

NEMA, (2013). Report on flood disasters in Nigeria. Abuja: Government Press.

NEMA, (2014). *Nigeria: National progress report on the implementation of the Hyogo Framework for Action (2013-2015) – Interim*. Abuja: Government Press.

Nkwunonwo, U.C., Whitworth, M. & Baily, B (2015). *Review article: a review & critical analysis of the efforts towards urban flood reduction in the Lagos region of Nigeria*. Natural Hazards and Earth System Science Discussion, 3: 3897–3923.

Nnaemeka-Okeke, R. (2016). "Urban Sprawl and Sustainable City Development in Nigeria." *Journal of Ecological Engineering* 17 (2): 1-11.

Obeta, M.C. (2014). The Characteristics of Inland Water Transport in Nigeria. Journal of Humanities and Social Sciences, 19, 191-126.

Obiefuna, G.I and Orazulike, D.M., (2010). Physicochemical characteristics of groundwater Quality from Yola area North-eastern Nigeria. *Journal of Applied Science and Environmental Management* 14(1): 5-11.

Obiefuna, G.I and Orazulike, D.M., (2010). A comparative method of estimating potential evapotranspiration over a semi-arid station in Yola Area, Northeast Nigeria. *Journal of the Nigerian Association of Hydrogeologists*. 20(1):11-31.

Odufuwa, B.O., Adedeji, O.H., Oladesu, J.O. & Bongwa, A. (2012). *Floods of fury in Nigerian cities*. Journal of Sustainable Development, 5(7): 69–79.

Oghenekohwo, J. E., and E. A. Frank-Oputu. (2017). "Literacy Education and Sustainable Development in Developing Societies." *International Journal of Education and Literacy Studies* 5 (2): 126–131.

Ogundele, J., and A. O. Jegede. (2011). "Environmental Influences of Flooding on Urban Growth and Development of Ado-Ekiti, Nigeria." *Studies in Sociology of Science* 2 (2): 89.

Ojo, O.O., and, Adejugbagbe, J. A. (2017). "Solid Waste Disposal Attitude in Sango Ota, Ogun State: Implication for Sustainable City Development in

Nigeria." *Journal of Environment and Waste Management* 4(3): 253 260.

Okaka, F. O., and B. Odhiambo (2018). "Relationship between Flooding and Outbreak of Infectious Diseases in Kenya: A Review of the Literature." *Journal of Environmental and Public Health* 2018: 1–8.

Okuthe, I., Kioli, F. and Abuom, P. (2013). Socio cultural determinants of the adoption of intergrated natural resource management technologies by small scale famers in Ndhiwa Division, Kenya. *Current Research Journal of Social Sciences*, 5(6).

Oladokun, V. and Proverbs, D. (2016). Flood risk management in Nigeria: a review of the challenges and opportunities. *International Journal of Safety and Security Engineering*6 (3).

Olalekan, A. 2018. "Many African countries are flooding, risking decades of development if they do not adapt".

Olanrewaju, C. C., Chitakira, M., Olanrewaju, O. A., & Louw, E. (2019). Impacts of flood disasters in Nigeria: A critical evaluation of health implications and management. *Jàmbá: Journal of Disaster Risk Studies*, *11*(1), 1-9.

Olokesusi, F (2005). *Financing disaster mitigation in Nigeria: The imperative of public-private partnership.* Disaster Reduction in Africa – ISDR Informs, 5(6): 17-19.

Olorunfemi, F (2008). Disaster Incidence and Management in Nigeria. *African Journals Online* 24(2): 200-208.

Olowu, D. (2010). "The Hyogo Framework for Action and Implications for Disaster Management and Reduction in Africa" *Jàmbá: Journal of Disaster Risk Studies* 3(1): 303-320.

Olu, O., Usman, A., Manga, L., Anyangwe, S., Kalambay, K., Nsenga, N., & Benson, A. (2016). Strengthening health disaster risk management in Africa: multi-

sectoral and people-centred approaches are required in the post-Hyogo Framework of Action era. *BMC public health*, *16*(1), 691.

Olukanni, D. O., R. A. Adebayo, and I. T. Tenebe. 2014. "Assessment of Urban Drainage and Sanitation Challenges in Nigeria." *International Journal of Emerging Technology and Advanced Engineering* 4 (12): 100–105.

Oluwaseyi, O. B. (2019). "Assessment of Physical Planning Administration in Nigeria.

Omoboye, I. F., and I. A. Festus (2014). "Environmental Challenges in Nigeria: Typology, Spatial Distribution, Repercussions and Way Forward." [Google Scholar]

Onwuemele, A. 2012. "Chapter 11 Cities in the Flood: Vulnerability and Disaster Risk Management: Evidence from Ibadan, Nigeria." In *Urban Areas and Global Climate Change*, edited by W. G. Holt, 277–299. Emerald Group Publishing Limited.

Osabohien, R., E. Osabuohien, and E. Urhie. 2018. "Food Security, Institutional Framework and Technology: Examining the Nexus in Nigeria Using ARDL Approach." *Current Nutrition and Food Science* 14 (2): 154 163.

Osaghae, E. (1992). The Status of State Governments in Nigeria's Federalism. *Publius*, *22*(3), 181-200. Retrieved November 20, 2020, from http://www.jstor.org/stable/3330259.

Oywaya. (1995). Socioeconomic factors influencing innovation and participation of women in agricultural extension programmes in Malala Division, Makueni District. Egerton University. Njoro: Egerton University.

Peters, K., & Peters, L. E. (2018). Disaster Risk Reduction and violent conflict in Africa and Arab states.

Raghuram, G. R. (2008). The future of the IMF and the World Bank. *American Economic Review*. 98(2) 110-115.

Raimi, M., O. T. Vivien, O. E. Odipe, and O. E. Owobi. 2018. "The Sources of Water Supply, Sanitation Facilities and Hygiene Practices in Oil Producing Communities in Central Senatorial District of Bayelsa State, Nigeria." *MedCrave Online Journal of Public Health* 7 (6): 337–345.

Reckien, D., F. Creutzig, B. Fernandez, S. Lwasa, M. Tovar Restrepo, D. McEvoy, and D. Satterthwaite. 2017. "Climate Change, Equity and the Sustainable Development Goals: An Urban Perspective." *Environment and Urbanization* 29 (1): 159–182

Rengalakshmi, R. 2002. Rural and tribal women in agro biodiversity conservation. An Indian case study. 8. MSSRF and FAO. 2002-01-01 | Report.

Roy, J., P. Tschakert, H. Waisman, S. A. Halim, P. Antwi-Agyei, P. Dasgupta, C. Okereke. 2018. "Sustainable Development, Poverty Eradication and Reducing Inequalities." In *Global Warming of 1.5 C*. IPCC:Intergovernmental Panel on Climate Change. In Press.

Salami, R. O., Von Meding, J. K., & Giggins, H. (2017). Urban settlements' vulnerability to flood risks in African cities: A conceptual framework. *Jàmbá: Journal of Disaster Risk Studies*, *9*(1), 1-9.

Sanne, C., Jorgen H., Winnie W., Hezekiah M. and Martin M. (2014). Agricultural Sector Development Support Programme (ASDSP) Mid Term Review. Final Report.

Sani, A. M., Obaro, D.O., & Ibrahim, A.I. (2018). Disaster risks and management policies and practices in Nigeria: A critical appraisal of the National Emergency Management Agency Act. *International Journal of Disaster Risk Reduction,* 33(1), 253-265.

Sardar, A., S. A. Javed, and R. Amir-ud-Din. 2016. *Natural Disasters and Economic Growth in Pakistan: An Enquiry into the Floods Related Hazards' Triad*. Islamabad: Pakistan Institute of DevelopmentEconomics.

Smith, F. (2017). “How are People Affected by Floods?” *www.sciencing.com website*. https://sciencing.com/how-are-people-affected-by-floods 12510012.html.

Storbjörk, S. (2007). Governing climate adaptation in the local arena: challenges of risk management and planning in Sweden. Local Environment. *The International Journal of Justice and Sustainability*, 12(5):457–469.

Talbot, C. J., E. M. Bennett, K. Cassell, D. M. Hanes, E. C. Minor, H. Paerl, W. Wollheim. 2018. “The Impact of Flooding on Aquatic Ecosystem Services.” *Biogeochemistry* 141 (3): 439–461.

Thieken, A. H., Cammerer, H., Dobler, C., Lammel, J., & Schöberl, F. (2016). Estimating changes in flood risks and benefits of non-structural adaptation strategies-a case study from Tyrol, Austria. *Mitigation and Adaptation Strategies for Global Change*, *21*(3), 343-376.

Thornton, P. K., Jones, P. G., Alagarswamy, G., & Andresen, J. (2009). Spatial variation of crop yield response to climate change in East Africa. *Global Environmental Change*, 19(1).

Tirivangasi, H. M. (2018). Regional disaster risk management strategies for food security: Probing Southern African Development Community channels for influencing national policy. *Jàmbá: Journal of Disaster Risk Studies*, *10*(1), 1-7.

United Nations. Economic Commission for Africa (2015-03). Economic Report on Africa 2015: Industrializing Through Trade. Addis Ababa. © UN. ECA.

UN, D. (2016). “Transforming Our World: The 2030 Agenda for Sustainable Development.”

UNDP. (2016). “Nature Count$ - Investing in Ecosystems and Biodiversity for Sustainable Development.”

Union, A. (2004). Africa regional strategy for disaster risk reduction. *Disaster Risk Reduction for Sustainable Development in Africa*.

UNISDR, (2010). *Global Facility for Disaster Reduction and Recovery. Integrating disaster risk reduction and climate adaptation into the fight against poverty*. Annual Report.

Van Niekerk, D. (2015). Disaster risk governance in Africa: A retrospective assessment of progress against the Hyogo Framework for Action (2000-2012). *Disaster Prevention and Management*, *24*(3), 397-416.

Vorhies, F. (2012). The economics of investing in disaster risk reduction. *Geneva, Switzerland: UN International Strategy for Disaster Reduction*.

WHO. (2018). Adamawa State Integrated Disease Surveillance and Response (IDSR) Nigeria Emergency Response WK 17 2018 (April 23 - 29). Retrieved 11 August 2019, from https://reliefweb.int/report/nigeria/adamawa-state-integrated-disease-surveillance-and-response-idsr-nigeria-emergency-12.

Wilkinson, E. (2012). Transforming disaster risk management: a political economy approach. *ODI, London*.

Wilhelmi, O.V and Wilhite, D.A 2002. Assessing Vulnerability to Agricultural Drought: A Nebraska Case Study. *Drought Mitigation Center Faculty Publications.*

Wisdom, J., & Creswell, J.W. (2013). Mixed method: integrating quantitative and qualitative data collection and analysis while studying patient-centred medical home models. Rockville: Agency for healthcare research and quality.

World Bank. (2017). Strengthening Environmental Management and Reducing Degradation in Peru. Retrieved 2 September 2019, from https://www.worldbank.org/en/results/2017/04/04/strengthening-environmental-management-reducing-degradation-peru.

World Metrological Organization (2008). WMO statement on the status of the global climate in 2008. WMO-No. 1039.

Yamane, T (1967). *Statistics: An Introductory Analysis*. (2nd Ed) New York: Harper and Row.

Yin, R.K (2014). *Case study research design and methods*. Canadian Journal of Program Evaluation, 30(1):285.

Zimmerman, M. A. (2000). Empowerment theory. In *Handbook of community psychology* (pp. 43-63). Springer, Boston, MA.

Zorn, M. 2018. "Natural Disasters and Less Developed Countries." In *Nature, Tourism and Ethnicity as Drivers of (De) Marginalization*, edited by S. Pelc, and M. Koderman, 59–78. Springer international publishing.

APPENDICES

Appendix I: Questionnaire

These research instruments have been designed for data collection on the influence of Flood Risks Management for socio- economic development of Loko community. The researcher aims to establish how FRM promotes socio- economic development in the local area. All the information you provide here will be dealt with, with uttermost confidentiality and will only be used for study purposes. The findings of this study may be used in the formulation of interventions to improving the current situation regarding flooding risk management. Kindly read the items carefully before commencing to give your honest opinions. **Please do not write your name anywhere on this questionnaire**.

Section A. Demographic Data

1. Gender

   Male [ ] Female [ ]

2. Age

   18-27yrs [ ] 28-37yrs [ ] 38-47yrs [ ]
   48-57yrs [ ] Above 58yrs [ ]

3. Level of education

   Basic [ ] Senior [ ] Tertiary [ ]

4. Type of occupation

   White collar [ ] Blue collar [ ] Entrepreneurship [ ]
   Unemployed [ ] Volunteer [ ]

5. Occupation

   Inhabitant [ ] Household [ ] NEMA Staff [ ]
   ADSEMA Staff [ ]

Section B: Effectiveness of flood risk management framework

6. Are the interventions made towards flood risk management effective?

   Yes [ ] No [ ]

7. If yes, to what extent do you agree with the following;

Flood risk management for social development		**SD**	**D**		**N**	**A**	**SA**
1.	Urban planning and land use control						
2.	Building capacity of stakeholders						
3.	Active involvement of all stakeholders						
4.	Preparation for emergency response						
5.	Forecasting and early warning system for flooding disasters						
6.	Inter-agency collaboration towards disaster management						
7.	Adoption of insurance schemes						
8.	Enhancement of flood resilience						
9.	Flood preparedness						
10.	Establishing single agencies responsible for flood disaster management						
11.	Transfer of risk to third parties						
12.	Education of the community through public awareness						
13.	Ensures availability of food security						
14.	Sustained economic systems even after occurrence of flooding disasters						
15.	Sustained socio-demographic status of the Loko community after flooding						
16.	Others (please specify)						

Section C: Compliance to flood risk management policies

8. Has Adamawa State laid out policies to guide flood risk management?

Yes [ ] No [ ]

9. If yes, what are some of the policies in place?

   ……
   ……
   ……
   ……
   ……

10. What challenges have you experienced in trying to comply with the policies?

    ……
    ……
    ……
    ……
    ……

11. What measures can be undertaken to improve compliance to disaster risk management policies?

    ……
    ……
    ……
    ……
    ……

Section D: Flood risk management for social and economic development

Please fill out the following table by giving one response for every question

Note; SD-Strongly disagree; D-Disagree; N-Neutral; A-Agree; SA-Strongly Agree

Flood risk management for social development		**SD**	**D**	**N**	**A**	**SA**
1.	FRM helps to reduce deaths and injuries related to flooding					
2.	It helps to reduce spread of waterborne diseases					
3.	Eases access to healthcare services for people in the areas prone to flooding					
4.	It facilitates continuity of learning in schools even during period of flooding					
5.	It helps to promote cultural interaction among					

	community members due to limited interruption on their normal ways of life					
6.	Limited interruption on the ways of life of the people helps alleviate the poverty problem					
7.	FRM helps in the alleviation of hunger					
8.	Limited interruption on the economic systems helps to reduce the problem of unemployment					
9.	The presence of a stable way of life helps mitigate societal vices such as drug abuse					
10.	FRM will help solve the problem of homelessness					
11.	FRM is one of the ways of eradicating inequality and social stratification in the Song local government area					
12.	FRM can help in eliminating gender-based discrimination in the Song local government area					
13.	FRM will help increase access to safe and clean drinking water for the people in Song local government area during the seasonal floods					

Please fill out the following table by giving one response for every question

Note; SD-Strongly disagree; D-Disagree; N-Neutral; A-Agree; SA-Strongly Agree

Flood risk management for economic development		**SD**	**D**	**N**	**A**	**SA**
1.	FRM will help promote economic equality between people in Song Local Government area and those from other regions					
2.	The program will help end pollution of water resources during flooding					
3.	FRM will increase access to affordable housing					

4.	Such programs help ensure food security through sustained production processes					
5.	FRM will help in improving land utilization as community members can adopt adaptive farming practices					
6.	There will be reduced losses to infrastructure and other economic systems in the Song local government area					
7.	FRM provides a stable market environment by balancing demand and supply of commodities produced in the area					
8.	It would help improve the transport sector during flooding due to limited damage to infrastructure					
9.	FRM would enhance accessibility of Song local government area during all seasons of year					

Appendix II: Focus Group Discussion Topics

Participants will sign a consent to show their willingness to participate in the study. The principle researcher will also serve as the moderator of the focus group discussion

Principle researcher's signature …….

FGD no. …….

Number of respondents in the FGD …….

Date …….

Location …….…….

GUIDE

Flood Risks Management for social development

1. What are some of the social issues that you face as result of flooding in Song local government area?
2. In your opinion, how do you think flood risks management will help address these problems?
3. How do you stand to benefit socially from the flood risk management program?

Flood Risks Management for economic development

1. In what ways does flooding contribute to economic losses in the Loko community in Adamawa State?
2. How do you think flood risk management will help in improving the economic situation in Song local government area?
3. What other measures do you think can be adopted to overcome the challenge of flooding and will promote economic development in Song local government area?

Appendix III: Toolkit for Key Informants

1. Have you heard about the National Disaster Management Framework?

   Yes [ ] No [ ]

2. If yes, what does the policy talk about?

   ……
   ……
   ……
   ……
   ……
   ……

3. How has the policy assisted in mitigating flood risks in Loko Community of Adamawa State?

   ……
   ……
   ……
   ……
   ……

4. What are the weaknesses of the policy with regard to flood risk management?

   ……
   ……
   ……
   ……
   ……
   ……
   ……

5. What amendments should be made to improve upon the current situation regarding effectiveness of the National Disaster Management Framework?

   ……
   ……

Thank you

Appendix IV: Approval of Research Proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School

DATE: 7th February, 2020

TO: Ms. Ndagana Iyami Hadiza
C/o Department of Environmental
Studies & Community Development

REF: N50F/25135/2018

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on 29th January, 2020, approved your Research Proposal for the M.Env. Studies Degree entitled, **"Flood Risk Management for Socio-Economic Development in Loko Community, Adamawa State, Nigeria."**

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

EDWIN OBUNGU
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Environmental Studies & Community Development Department

Supervisors:

1. Dr. Samuel O. Ochola
   C/o Envi. Studies & Community Development Dept.
   Kenyatta University

2. Dr. Felix L. M. Ming'ate
   C/o Envi. Studies & Community Development Dept.
   Kenyatta University

Appendix V: Research Authorization

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: N50F/25135/2018 DATE: 7th February, 2020

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS. NDAGANA IYAMI HADIZA REG. NO. N50F/25135/18

I write to introduce Ms. Ndagana Iyami Hadiza who is a Postgraduate Student of this University. She is registered for M.Env. Studies degree programme in the **Department of Environmental Studies & Community Development.**

Ms. Ndagana intends to conduct research for a M.Env. Studies thesis Proposal entitled, **"Flood Risk Management for Socio-Economic Development in Loko Community, Adamawa State, Nigeria."**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

ED/sw

Appendix VI: Map of Nigeria showing flood-prone areas