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HEALTH AND ENVIRONMENTAL HAZARDS ASSOCIATED WITH FLOODING AMONG RESIDENTS IN TWO SENATORIAL DISTRICT IN RIVERS STATE

BY

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ABSTRACT

This research examined health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State. It explored the prevalence, physical, psychosocial, chemical and biological hazards that associate with flooding. The study assessed the prevalence of victims in Rivers South East, Rivers and South West senatorial district all in Rivers States and explained control towards addressing the problem in Rivers State. The study utilized five research objectives and adopted two theories which is disaster theories and urban resilience theories. The study used secondary sources of data to obtain relevant information for analysis and *adopted historical analysis research design*. The population consist of residents of the two senatorial district. Sampling size was 1,200 copies of questionnaire, data recovered were analyzed with statistical tool. It presented the data in Tables' and applied the simple percentage method of data analysis to explain results obtained, while content analysis was used to explain responses from victims of flooding. The responses from the field show that 100% of the victims were affected by the flood, while the relevant Ministries/Agencies responded to the situation within the limits of their capacity. As part of the findings, relevant government Agencies and Ministries made frantic efforts to carry out their statutory responsibilities in the matter of flooding. They were, however, constrained by a number of factors that were external and internal in nature. Specifically, lack of sufficient funds and trained personnel hindered these Agencies and Ministries from operating at full length towards addressing the problems associated with the flooding. Among the recommendations made in the study is the need for government to restructure these Agencies and Ministries, as well as ensuring that local government authorities be mandated to set up Local Emergency Management Agencies (LEMA).

Keywords: flooding, environmental hazards, public health, disaster management, urban resilience, risk assessment, Rivers State, Nigeria.

THESIS IN PARTIAL FULFILMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY (Ph.D) DEGREE IN OCCUPATIONAL HEALTH AND SAFETY

SUPERVISORS: DR. ELECHI. C. E.

NOVEMBER, 2021.

DECLARATION

I **RIGHTEOUS, INNIME** declare that this thesis is on health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State. This research was carried out by me; it is my original work and that it has not been submitted wholly or in parts for the award of degree in any institution.

Righteous, Innime Signature/Date……

(*Researcher)*

CERTIFICATION

IGNATIUS AJURU UNIVERSITY OF EDUCATION

POST GRADUATE SCHOOL

HEALTH AND ENVIRONEMTAL PROBLEMS ASSOCIATED WITH FLOODING AMONG RESIDENTS IN RIVERS STATE

BY

RIGHTEOUS, INNIME

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The board of Examiners certified that this Thesis is accepted in partial fulfillment of the requirement for the degree of Doctor of Philosophy (PhD) in occupational Health and Safety Studies.

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DEDICATION

This dissertation is dedicated to God Almighty: The Father, the Son and the Holy Spirit who made all things possible.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Health and environmental Problems associated with flooding have become frequent in Rivers State. In 2019 alone, about 10 Local government area in Rivers State were affected. The number increased to 12 in 2020. In those natural disasters, families vacated their homes. Properties were also destroyed, in addition to loss of livelihoods and a large number of people died either from the pains of the losses or from direct or immediate shock and hazards associated with the floods. The 2020 flooding problems was, largely, attributed to the opening of the Lagos Dam in Cameroon and blockage of canals. Electricity in northern Cameroon is mainly generated from this Dam. Cameroon, in the past, experienced inadequate rainfall, which, predictably, affected the production capacity of hydroelectricity in the Lagos Dam (Jide, 2020). The situation made the management of the Dam retain as much water as possible in its reservoirs. With changes in climate, rainfall increased meaning that more water can now be stored to boost hydroelectric power generation. Expert analyses of the situation revealed a threat or risk posed to the Dam by increasing rainfall regarding its water storage capacity. It has to be opened to avoid over filling. But this has meant a lot for Nigeria and Cameroon. Due to the nature of the environment, water released from the Dam cannot easily find its path within Cameroon to the Atlantic Ocean through water bodies. Instead, it flows into River Benue from the highland of Cameroon. Since River Benue is naturally steep, this leaves the lowland planes of Adamawa, Plateau, Benue, Kogi, Delta and some other States flooded with high volume of water (Jide, 2020).

Nigeria Meteorological Agency (NIMET, 2020), predicted increase in rainfall in most parts of the country. By this warning, government at the various levels of federal, state and local were expected to take appropriate measures to tackle the effects of, the consequences of the impact of the rainfall. The intensity of rainfall for 2020, as predicted by NIMET, was expected to be higher than the previous year. As it was clear that increase rainfall was the reason for opening the Lagos Dam, Cameroonian authorities rightly informed the Nigerian government of the opening in the said year.

The 2019 and 2020 flooding have affected socio-economic activities of people. For instance, about 250 villages in four Orashi Local Government Area of Rivers State were cut -off from other areas in the State as a result of the 2019- 2020 flood.

The most affected local government areas in Rivers State were group into three categories with their senatorial district, which is urban area, sub-urban and rural area: rural local governments are Ahoada West, Abua/Odual and Onelga. Sub-urban local government areas are Ahoada East and urban local government area are Phalga and Obio/Akpor. In Rivers State, over 270 communities were affected. The flood affected 1200 houses, and numerous farmlands and livestock in Rivers State (NEMA, 2020). Affected senatorial district with their local government's area. Rivers West senatorial district are: Ahoada West,Ahoada East, Abua/Odual and Onelga. Rivers East senatorial district are: Obio/Akpor, Phalga, Ikwere and Etche local government areas.

In Obio/Akpor Local Government Area about

50 houses were affected. Twenty-Five of the houses damaged were in Phalga Local Government Area. (Otabor, 2020). Floods seem to be a major threat to the welfare of people in Nigeria, even beyond 2019 and 2020. The Nigeria Meteorological Agency predicted intense rain in 2020. In Rivers State, several roads were washed away after flash rainfall caused gully erosion. Mbiama East west roads, were among those seriously affected (NEMA, 2020).

It is important to point out here that incident of flooding and other natural disasters are prevalent in other areas of the world. For instance, at least 34 persons and 100 houses, mostly poorly constructed mud-brick buildings on drainage, were destroyed as the Niger river burst into banks due to torrential rain in Bamako, Mali in 2020 (NEMA, 2020). Flooding in China's north and south caused by heavy rainfall left at least 107 dead and inundated roads and farmlands (Agency Reports, The Punch, and August, 2020). Experts and stakeholders predicted food shortages, epidemics and worsening living conditions in the temporary abodes of the internally displaced persons (IDPs) in the affected areas (NEMA, 2020). Given the level of devastation to farmlands, there were also fears among many people that the country would witness food shortage, after the floods. Trans-national transportation would be seriously threatened, and so food prices and production affected (Sessou, 2020).

Other stakeholders described the loss to culture and tourism as colossal, adding that the floods destroyed some significant monuments and artifacts in the State, as well as compelled suspension of some cultural and tourism related activities (Nwogu, 2020).

The United Nations warned of looming food crisis in 2020.The report stated that world grain reserves were dangerously low and that severe weather conditions in the United States and other food exporting countries could trigger a major hunger crisis the following year. The story further states that with food consumption exceeding the amount growth for six of the past eleven years, countries have run down reserves from an average of 107 days of consumption for ten years ago to under 74 days recently, prices of staple food items, such as wheat and maize, sky-rocketed beyond the reach of the common man. The Food and Agriculture Organization (FAO) figures released suggested that 870 million people are malnourished and the food crisis is growing in the Middle East and Africa. Wheat production is expected to be 5.2% below 2019, with yields of most other crops, except rice, also falling. The figures came as one of the world's leading environmentalists issued a warning that the global food supply system could collapse at any point (Vidal, 2020).

The impact of flooding in some parts of Nigeria and the destruction of farmlands is already becoming evident as data from the National Bureau of Statistics show marked increase in inflation which jumped to 10.2% in September 2020 compared to 9.8% in August. The data showed that the rise in the food index was mainly due to higher food prices in various cases led by potatoes, yams and other tubers, fruits, beans, bread, and cereal (including rice), as well as movement of food products to markets across the country. Right now, there will be food scarcity because we never prepared for any emergency in this country (Sessou, 2020). Apart from the fact that it may lead to starvation or famine there were fears that due to the situation of things, there would be famine in few months because there were no crops (Adingupu, 2020). According to a Tribune Editorial, there have been predictions of an imminent food crises by the Federal Government and the course of events appear to be leading inexorably towards the fulfillment of the prophesy (Tribune, October, 2020). The

comment further argues that Nigeria falls squarely within the fold of countries that need to get .their acts together in the critical area of food security. Another editorial from The Punch argues that "Long after the raging flood may have been tamed and the waters may have found their way back to the ocean, rivers and rivulets, Nigerians will still have to face other related challenges, chief of which is food shortage.

Against this background, this study examined the health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State.

1.2 Statement of the Problem

Problems of flooding causes severe damages to the environment. It also results to loss of lives, communicable diseases, erosions, hunger, displacement of businesses, displacement of residential houses, drains of farm land and market places. The topography of the Rivers State makes it prone to be adversely affected by the flow of excess water attempting to find its way into the Atlantic Ocean.

The responsibility of any government is to provide and protect the lives and property of its residents. In this regard, Rivers State governments initiate programmes and policies aimed at addressing the challenges the people may face- be it natural or man-made. Such initiatives lead to the establishment of institutions and agencies by Rivers State government to implement policies and strategies to control the damages and effect of flooding in Rivers State. Most often, government institutions have been accused of inefficiency, thereby treading the policies of government in promoting the welfare of the citizenry ineffective. As a result, there is negative perception of flooding among the lives of the affected persons. It is as a result of this problems associated with flooding among residents that this study is carried out.

1.3 **Aim and Objectives of the Study**

The aim of the study is to examine the health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State.

The specific objectives are:

1. ascertain the prevalence of flooding in two senatorial district in Rivers State.
2. identify physical hazards associated with flooding in two senatorial district in Rivers State.
3. investigate psychosocial hazards associated with flooding in Rivers State.
4. investigate chemical hazards associated flooding in senatorial district in Rivers State.
5. determine the biological hazards associated flooding in two senatorial district in Rivers State

1.4 Research Questions:

1. What are the prevalence of flooding in two senatorial district in Rivers State?
2. What are the physical hazards associated with flooding in two senatorial district in Rivers State?
3. How do psychosocial hazards associate with flooding in two senatorial district in Rivers State?
4. How do chemical hazards associate with flooding in two senatorial district in Rivers State?
5. What are the biological hazards associated flooding in two senatorial district in Rivers State?

1.5 Hypotheses:

The following hypotheses were tested at 0.05 level of significance to the study.

1. There is no significance difference between prevalence of flooding and socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two

senatorial district in Rivers State.

2. There is no significance difference between physical hazards associated with flooding base on socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.
3. There is no significance difference between psychosocial hazards associated with flooding base on socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.
4. There is no significance difference between chemical hazards associated with flooding base on socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.
5. There is no significance difference between biological hazards associated with flooding base on socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.

1.6 Significance of the Study:

The Rivers state government and the federal republic of Nigeria may benefit from his study by employing the recommendation to set-up agencies that shall manage natural disasters with policy makers and development practitioners. This positions this research on a platform for a tremendous contribution to the debate.

This study will stimulate issues of interest on the debate and body of knowledge, such that scholars, policy makers and development practitioners can benefit from the work. It is even more promising when it comes to Nigeria, as the country seems currently eager for knowledge that can direct policy at the national and local fronts.

Students, researchers and policy makers in relevant government agencies will benefit from the findings of this research. It is also hoped that national and state assembly would find this research useful in proffering welfare bills that would mitigate the harsh effects of natural disasters in Nigeria. Civil society groups and non-governmental organizations who are engaged in advocacy for enhanced living conditions of the citizenry would also benefit from it.

1.7 Scope of the Study

This study covered health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State. The local government identified were urban and rural local government affected by the floods that occurred in 2019-2020 with their senatorial districts. The study also examined the activities of relevant ministries/departments agencies in mitigating the effects of the hazards on the people. The agencies investigated were: the Rivers State Ministry of Environment, Rivers State Ministry of Special Duties. National Emergency Management Agency (NEMA), Nigeria Meteorological Agency (NIMET).

CHAPTER TWO

LITERATURE REVIEW

In this chapter, the researcher presented a review of related literature on health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State. The review was organized under the following headings: Conceptual framework, Theoretical framework, Empirical Studies and appraisal of reviewed of related studies

2.1 Conceptual Framework: the following concepts were operationally defined: prevalence, physical hazards, chemical hazards, psychosocial hazards, and biological hazards. Response to the flooding and review of variables of the study.

2.1.1 The Concept of Flooding

The conceptual framework is divided into nine components and has been derived from an accumulation of methods and practices within the scope of Nigeria's past flooding events. Nkwunonwo et al., (2020) conceptualized flood problems within the Lagos region of Nigeria and Niger Delta region, depicting a breakdown of four key components of urban flooding: climate and meteorological events, poor urban planning, urbanization and anthropogenic activities. These components illustrate a first-hand relationship to improving, comprehending and setting up an urban flood management plan.

The problems is conceptualized on the basis of three integral components frequently implemented during flood damage estimation.

Prevalence: This is a term that means being widespread and it is distinct from incidence. Prevalence is a measurement of all individuals affected by the disease at a particular time, whereas incidence is a measurement of the number of new individuals who contract a disease during a particular period of time. Prevalence is a useful parameter when talking about long-lasting diseases, such as HIV, but incidence is more useful when talking about diseases of short duration

Physical hazards: These are the hazards that could be seen felt or perceived by somebody which gives physical (or bodily) harm or loss to persons of their properties in a work or work related area (Onumbu, 2018). Gupta (2010) asserted that the resultant effect of exposure to physical hazards include temporary or permanent hearing loss, damage to blood vessels and nerves, hearing loss, to heat cramps, exhaustion, stroke, first bite, hypothermia, cancer and visual impairment. Onyia (2011) submitted that physical hazards are hazards in the physical environment that can be seen, heard felt or experienced in the physical environment that can be seen, heard felt or experienced in the physical way. Onumbu (2018), outlined that physical hazards can be sources from heat and cold environment, noise, electric current, vibration, radiation, falling objects, traffic smarts, poor residential or office housekeeping industrial wastes, fire, existence of gangsters, cultists and robbers, poor illumination or light, presence of religious intolerance, assault heavy workload, overcrowded environment, confined spaces, other environmental pollutants like air particles explosion and odours.

Psychosocial hazards: Psychosocial hazards are associated with the workers state of mind. Prashar and Bansal (2009). More so, psychosocial hazards may equally result from faulty unity of command and relationship. Psychosocial issues in the workplace may include: Violence from and outside the organization, bullying which may include emotional and verbal abuses, sexual harassment mobbing, burnout, exposure to unhealthy elements. Onumbu (2018) affirmed that psychosocial hazards are those hazards that are emotional in nature and they may off an employee's mental spiritual and social well-being negatively while at work or in a work-related area. They may affect the employee's cognitive, affective and even psychological domains. They arise in form of shouting, aggression, lack of promotion, intimidation, threats, poor remuneration or wages, nepotism, harassment distrust, hostility, poor conditions of service and interpersonal relations, witch-hunting exercise assaults, denials and some others. Psychosocial hazards are hazards that arise from a worker's emotional state while at work or within a work environment which have the capacity to influence

work. They may lead to some other hazards and cause accident to the worker which means that they may have multiplier effects sometimes.

Chemical hazards: Jones and David (2012), opined that a chemical can be considered hazardous by virtue of its intrinsic properties, can cause harm or danger to humans, property or the environment. Onumbu (2018) opined that chemical hazards are substances that are corrosive, toxic or undergo atomic reactions which may cause damage, harm or losses to persons or their properties while at work or in a work related area. They exist in various forms like acids, bases (alkalis), gases, fumes, vapour powder, mists, dusty air, solvent and some other solutions. Examples are flammables like some petroleum products carcinogens, dust smoke, drugs or alcohol and others. They are either through the mouth or impacted through the skin.

Gupta (2010) Prashar and Bansal (2009) noted that worker may suffer from respiratory diseases, skin infections, allergy, neurological and reproductive disorders as a result of exposure to chemical hazards. Safe handling of chemical is very important. Chemicals are generally grouped into various categories that is, very toxic, harmful, corrosive, irritant, sensitizing, carcinogenic or mutagenic and toxic. Material Safety Data Sheets (MSDS) should be made available for all hazardous chemical as well as grouping of the chemical and physical properties, precautions for use, first aid and fire-fighting, procedures. Hazardous substances get into the body by inhalation; absorption through the skin, cuts or abrasions and ingestion through the mouth.

Biological hazards: Gupta (2010) submitted that biological hazards are living things or substances produced by living things that can cause illness in humans. These hazards enter into the body system through inhalation, ingestion and absorption. They include bacteria, viruses, fungi parasites, rickettsia, algae and plants.

Substances considered to be biological hazards are micro-organisms, ecto and endo-parasites whether or not genetically modified which may cause infection, allergy, and toxicity or otherwise create a hazard to human health. Prashar and Bansal (2009), suggested that in occupations where there is potential exposure to biological hazards, workers should practice proper personal hygiene, particularly hand washing personal protective equipment should be provided for workers waste disposal systems and appropriate control including isolation in cases of contagious diseases.

2.5 Theoretical Framework.

Theories are related to concepts or definitions that specify relationships among variables in order to explain or predict things. Learning theories attempt to explain flooding, causes and control measures of such related prevalence (Ikiriko, 2020).

2.5.1 Dominant, Behavioral and Structural Theories.

This study was anchored on several approaches to natural hazard theory. Three (3) main approaches identified are. Dominant, Behavioral and Structural Theories by Smith (1992). For the Dominant/Technocratic View, the blame is assumed to lie with nature; hence it appeared logical that the control, monitoring and prediction of natural events would provide effective solution. The aim is to contain nature through environmental engineering works which include zoning, building codes and fail-safe structures such as flood embankment (Thanahathai, 2020).

The Behavioural Approach looks at ways people can avoid disasters by modifying their behaviours. This patterns their lives and activities in a manner that would make them conform to positive rules/principles that necessitate a conducive environment.

The Theoretical Framework for this study is anchored on the Systems Theory. It was propounded by David Easton (Easton: 1965).Easton's behavioural approach to politics proposed that a political system could be seen as a delimited and fluid systems of steps in decision-making and that changes in the social or physical environment surrounding a political system produce "demands" and 'supports" fractions or the status quo directed as inputs towards the political system through political behaviour.

These demands and supporting groups stimulate competition in a political system, leading to decisions or "outputs" directed at some aspects of the surrounding social physical environment. After a

decision or output is made, it interacts with its environment and if it produces change in the environment, there are outcomes. In relation to this study, the alteration of the environment as a result of natural disaster such as flooding alters the socio-economic activities of the citizenry, thereby impacting negatively on their living standards. This, then, necessitates the intervention of government through policy implementation which is the "support" needed to mitigate the harsh effects of the disaster on the citizenry. Burton, Kate and White (1978) used the systems Approach to explain how humans responded to hazards and focused on the interactions of humans with the environment, as well as the natural event that occur within the environment (Mmom, 2013).

Review of the theoretical literature on natural disaster risk management yields two international policy frameworks: The Hyogo Framework for Action 2020-2030 and the Sendai Framework, 2020-2030. These are conceptualized in terms of effort at building resilience of countries and communities to disasters. These are the inputs or supports that provide the basis for outputs or results as enunciated by proponents of the Systems Theory.

The Hyogo Framework was the outcome of decision by the World Conference on Disaster Reduction, which held from 18-22 January 2020 in Kobe, Hyogo, Japan. The Conference objectives were:

i) To conclude and report on the review of the Yokohama Strategy and its Plan of Action, with a view to updating the guiding framework on disaster reduction for the 21st century;
ii) To identify specific activities aimed at ensuring the implementation of relevant provisions of the Johannesburg Plan of Implementation of the World Summit on Sustainable Development on vulnerability, risk assessment and disaster management;
iii) To share good practices and lessons learned to further disaster reduction within the context of attaining sustainable development, and to identify gaps and challenges;
iv) To increase awareness of the importance of disaster risk reduction policies thereby facilitating and promoting the implementation of these policies;
v) To increase the reliability, availability of appropriate disaster related information to the public and disaster management agencies in all regions, as set out in relevant provisions of the Johannesburg Plan of Implementation (WCDR Report, 2020:

The Conference provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks to hazards. It underscored the need for, and identified ways of building the resilience of nations and communities to disasters.

The Framework observes that disaster loss is on the rise with grave consequences for the survival, dignity and livelihood of individuals, particularly the poor and hard-won development gains. It also observes that despite the growing understanding and acceptance of the importance of disaster risk reduction and increased response capacities, disasters and in particular the management and reduction of risk continue to pose a global challenge.

The Hyogo Framework for Action acknowledges international efforts to reduce disaster risks must be systematically integrated into policies, plans and programmes for sustainable development and poverty reduction and supported through bilateral, regional and international cooperation including partnership.

The Framework identifies specific:

Gaps:

Governance: organizational, legal and policy frameworks,Risk identification, assessment, monitoring and early warning,Knowledge management and education,reducing underlying risk factors,Preparedness for effective response and recovery, The Framework also provides the following priorities for action, ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation, identify, assess and monitor disaster risks and enhance early warning, Use knowledge, innovation and education to build a culture of safety and resilience at all levels, reduce underlying factors, strengthen disaster preparedness for effective response at all levels,

The above are described as key areas for developing a framework for action for the decade 2020-2030.The

Sendai Framework for Disaster Risk Reduction 2020-2030 was adopted at the Third United Nations World Conference on Disaster Risk Reduction held from 14-18 March, 2020 in Sendai, Miyagi, Japan. It presented opportunity for countries:

i) To complete the assessment and review of the implementation of the Hyogo Framework for Action 2020-2030: Building the Resilience of Nations and Communities to Disasters.
ii) To consider the experience gained through the regional and national strategies/ institutions and plans for disaster risk reduction and their recommendations, as well as relevant regional agreements for the implementation of the Hyogo Framework for Action;
iii) To identify modalities of co-operation based on commitments to implement a post 2020 Framework for disaster risk reduction;
iv) To determine modalities for the periodic review of the implementation of a post 2020 framework for disaster reduction (WCDR Report 2020).

The expected outcome of the Framework is the substantial reduction of disaster risk losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries. It stipulates that to attain the expected outcome, it must preview new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery and thus strengthen resilience. It is obvious that the Frameworks provide the roadmap to developing programmes and policies by relevant governments in the implementation of strategies that are aimed at reducing the vulnerabilities of residents through disaster risk management strategy.

They enunciate the principles to engender actions and programmes that promote policies which would enhance the living standards of the people, with regards to the negative consequences of disasters as already identified.

From the foregoing, the basic principles of these Frameworks will provide a clue to the realization of the objectives of this study. This will be achieved as they provide an explanation to whether through its policies as provided in the Frameworks, government is able to put in place mechanisms that would reduce the negative impact on the citizenry in the face of natural disaster. Systems theory postulates axiomatically that changes in one element will not be limited to that unit alone; there is the presumption that they will influence other proximate elements in the system. In relation to this study, the change that results from environmental/ natural disasters such as flood alters the socio-economic lives of the people. This gives credence to the interrelationship between the environment and the socioeconomic activities of the people.

The relevance of the Systems Theory to the study stems from the fact that any obstruction in the environment as a result of natural disasters such as flooding affects the citizenry. In this regard, it becomes the responsibility of the government to introduce an "input" which is the policy and its implementation to produce an "output" which is the result that would mitigate the negative effects of flooding on the citizenry. In other words, it implies that government policies towards natural disasters should be effectively implemented as it is geared towards cushioning the harsh effects on the individuals.

2.2 Types of Flood

There are different types of floods, including Rivers, tidal and meteorological flash floods (Fubara, 2020). Abam (2020) classify flooding into: Urban, Flash, River and Dam flooding. Oyebande (2020) citing World Bank Report (2020), identifies three types of floods. They include: river flood which is caused by rainfall and river bank over flow, flash floods that occur due to intense rainfall, while tidal floods is caused by tidal or storm surges in the coastal areas during high tides combined with monsoon rains, etc. On his part, Gobo (2020), argues that coastal flooding, river flooding, flash floods and urban flooding are forms in which flooding can occur in Rivers State. According to him, coastal flooding occurs in the low lying belt of mangrove and fresh water swamps

along the coast. Coastal floods are generally extremely dangerous and the combination of storms, surges, tides, river inflow and waves cause severe damages. In their study of Oju Ore road in Ado Odo Ota Local Government Area in Ogun State, Daudu (2020), identify coastal flooding, inland overland flow, and river flooding and flooding from artificial drainage system as major types of flooding that occur in the area.

River floods are the most common types of flood. They occur in flood plains of larger rivers. When the amount of river flow is larger than the amount that the channel can hold, the river will over flow its banks and flood the areas alongside the river. Flash floods occur in human habitations and other social infrastructure due to high intensity rainfall, intense thunder storms, dam break or intentional dam water release, which accumulate water over impermeable surface or saturated soil, usually without adequate drainage capacity (Fubara, 2020). Urban flooding occur in towns located on flat or low lying terrains, especially where little or no provision has been made for surface drainage, where existing drainage has been blocked with municipal waste, refuse and eroded soil sediments.

2. 2. 2 Flood Problems

From the foregoing, there is no doubt that Problems of flood pose grave consequences to socio-economic lives of the people. Flood dates back to ancient times. Biblical accounts indicate that God destroyed the first world with floods when He preserved Noah and his seven sons. There have been floods in several countries of the world. In the case of Nigeria, several Problems of floods dating back to the pre-colonial and colonial eras have occurred. However, between 1900 and 1974, just a single flood occurred killing 200 persons and affecting about 80,000 (Oyebande, 2020).

Flood has been described as the most common environmental hazard in Nigeria (Etunovbe, 2020). It has caused deaths and damaged property, destroyed the environment and displaced people. The phrase "Internally Displaced Persons" (IDPs) is often linked to natural disasters such as flooding.

Globally, there has been a growing concern about the effects of natural disasters on the individuals. In this regard, governments of both the developing and developed world have made frantic efforts to address the problem. The United Nations, in meeting with its obligations, has made attempts to address the problem of flood as they affect the various continents of the world. This stems from the advocacy by the global organization for governments to give attention to the welfare of their residents. In recent years we have seen the UN adopt several strategies through its agencies to address the problem.

As we have seen, the reality is that no matter when and where, the impact of flood Problems is very devastating. Countries have at various times witnessed Problems of flood, which has a very negative effect on the environment. Problems of flood are known as frequent and most devastating events worldwide (Zheng et al., 2008). For instance, on July 31, 1976, a notable flash flood occurred along the Big Thompson River near Denver Colorado, after an unusually heavy rainstorm The flood killed 140 people and caused millions of dollars in property damage(Global Resources: 141). Rahman (2010:58) avers that flood is more or less a recurring phenomenon in Bangladesh, and often taken within tolerable limits. In 1997, 1988, 1998, and 2000, Bangladesh faced unprecedented flood, causing massive loss of lives and property. Somalia is one of the poorest countries in the world with the livelihood of the rural communities based on pastoralist, agro-pastoralist and crop production There is no doubt that the limited livelihood opportunities for the predominantly rural population have been further eroded by the prevalence of calamities such as drought and floods, besides twenty years of civil war in that country. In Somalia, two major flood events occurred between 1997 and 1998, as well as in 2006 in the Juba and Shabelle basins (Gadan and Jama, 2020). The floods had a tremendous impact on the environment and population. Juba and the Shabelle Valley were destroyed. The flood also caused land degradation and increased soil erosion with consequent silting and irrigation barrages. Extensive damage was caused to the rivers. The majority of existing irrigation and flood control infrastructure were destroyed. The protective dykes were over topped and suffered breaches at several places. In addition, all the settlements along the Juba River in Somalia were flooded with some villages cut -off

completely by the water for extended period of time. For the Shabelle, many villages along the river were under water for a prolonged period. Hundreds of thousands of people were left homeless as the floods affected the lives of people negatively. There were up to one million people whose lives were so affected. At least over 2000 persons died, while about one million persons were displaced. In the case of the United States, flooding continued along the lower Mississippi with major inundations in 1903, 1912 and 1913. In 1913, the floods in the Ohio Valley killed 415 people and caused about $200million in property loss (Friesecke, 2008).

Different countries have adopted policies to deal with the situation of floods according to their peculiarities. These policies have evolved over a long period of time. The United States, for instance, witnessed a long period of Flood Acts which has ultimately shaped its current policy on flood. Friesecke, (2008) further states that the Mississippi River Commission proposed major improvements in the levee system. Public interest in flood control after the 1912 and 1913 flood disasters led to the creation of a basin-wide levee associations and lobby groups (Wright, 2000) The activities of these lobby groups led to the passage of the Flood Control Act of 1917, which has been described as the most important piece of flood control legislation prior to the Flood Control Act of 1936. Due to increasing cases and magnitude of flood events worldwide, a lot of international organizations and activities have been initiated. The main objective of these projects is the development of new and improved methodologies to forecast, mitigate and prevent floods.

Among others, the following institutions and initiatives are related to disaster research (including flood disaster research) at the global level.

- United Nations International Strategy for Disaster Reduction (ISDR) including International Flood Network (IFN);

- the United Nations University Institute for Environment and Human Security (UNU-EHS) created on 1st December, 2020 in Bonn, Germany;

- The UNESCO Centre for Water Hazard and Risk Management in Tsukuba, Japan.

In addition, priority was given to create comprehensive guidelines that could be used by governments, international (partly non-governmental) organizations and society to help avert losses from water related disasters. The following key documents can be mentioned:

- The United Nations and Economic Commission of Europe "Guidelines on Sustainable Flood Protection" (UN/ECE 2020);

- The UN/ECE Document "Best Practices on Flood Prevention, Protection and Mitigation (UN/ECE, 2020);

- The UN Department of Economic and Social Affairs, Inter-Agency Secretariat of the International Strategy for Disaster Reduction, UN Economic and Social Commission for Asia and the Pacific "Guidelines for the Reduction of Flood Losses (DESA, UN/ISDR, UNESCAP, 2020).

These documents prescribe measures to reduce the risk of flood on the environment, while all relevant aspects of water management land use, agriculture, transport and urban development at all levels (local, regional, national and international) are taken into account.

It is not surprising that the global body has assumed this posture on tackling flood Problems in the world. This is because flooding is one of the most universal and destructive challenges facing cities around the world. World Bank research suggests that floods are the most frequent of all natural disasters and that the number of flood events is rising rapidly.

(Daminabo, 2014). The frightening dimension of floods is a matter of concern to governments and policy makers and cannot be over emphasized. Forecasting the dangerous dimension the situation is going, Lookman (2013), citing Channel news Asia (2020) asserts that the Organization for Economic Cooperation and Development (OECD) study has identified 20 port cities in the world which in terms of population would be most exposed to coastal flooding by 2070. Lagos (Nigeria) is ranked 15th on the scale.

These are important economic, social, cultural and even political centres in the world. With this impending threat, the world definitely is on its brink if adequate

precautionary measures are not taken to address the problem.

Given the prevalence of natural disasters such as flood, the European Union has taken the initiative to address the problem. Friescecke (2008) reports that the European Commission has financed research on floods in the framework of several environmental research programmes. According to him, research has concentrated on achieving a better understanding of causes and on methods of prediction and management of floods and their damage. Therefore, these three main elements are of particular interest: Water management, Partial planning and Damage prevention and risk management (2020).

The study suggests that to prevent flood damage, these elements must be integrated into a new holistic policy and strategy.

The European Union has further engaged in other research projects on flood to address the problem in member states. For instance, the European Union Flood Forecasting System or FLOOD RELIEF, Real Time Flood Decision Support System Integrating Hydrological, Meteorological and Remote Sensing Technologies, the transnational action programmes IRMA which stands for Intereg Rhime-Muese Activities.

Proactive measures to check Problems of flood and its harsh effects also have a long history. There have been attempts to find solutions to the problem. The construction of dykes to halt the spread of flood waters and increase the current to flush silt downstream dates back to, at least, the eight century in China. Developed countries in Europe and North America have adopted policies to mitigating the effects of flood on the residents. Tarlock (2020) assessing the United States Flood Control Policy acknowledges that there are a great deal of innovative flood protection and management initiatives taking place around the United States. He had earlier argued that flood protection policy in the United States has evolved through five overlapping stages, namely: 'Passive Adaptation, Channel Control, Upstream Water Retention, Floodplain Management and Integrated Flood Risk Management.

It is acknowledged that flood hazards are widespread and persistent in Nigeria with valuable resources lost as a result of the sheer magnitude of the problem and the inability to tackle them.

2.4 Empirical Study

2.4.1 Prevalence of flooding.

Abrahim *et al* (2011) researched on causes and consequences of flooding in Nigeria in Usmani Danfodio University of Sokoto. A reviewed Climate change resulting from global warming is attributed to anthropogenic influences, leading to many consequences, one of which is flooding. It is one of the major environmental crises that keep recurring every year in Nigeria from one region to another. Although flooding is a natural phenomenon caused by antecedents such as melting of icebergs, hurricanes, overfilling of the major rivers, many other flood types are human-caused. The aim of this review is to evaluate the causes, and consequences of flooding in Nigeria. A critical analysis revealed that many cases of flooding experienced in this country are caused by dam failure, (e.g. the flood event in Sokoto, in 2010) overfilling of the major rivers, coastal storms, ignorance of warnings from Nigerian Meteorological Agency (NIMET) and other meteorological agencies, delay in evacuation of flood victims and settlement of people at flood-prone areas such as riverine areas and seacoast. The need for government and other professional bodies to collaborate and implement preventive measures, while ensuring the use of information from NIMET and other agencies against the future flood events becomes eminent. Keywords: Consequences, Flood, Nigeria, Riverine, Seacoast. This study is similar to the present study since it is aim at causes and consequences of flooding.

Agbonkhese *et al* (2014) conducted a study onFlood menace in Nigeria: impacts, remedial and management strategies. Flood menace in Nigeria have become a normal and re-occurring phenomenon which sometimes has devastating impacts on human livelihoods and infrastructural development. Causes of this problem such as rapid population growth, poor governance, poor drainage facilities and decaying infrastructures, lack of proper environmental planning and management strategies, poor practice of

dumping waste/refuse and climate change coupled with inadequate preparedness have been traced and among others, human activities in terms of developmental involvements adjudged to be very important factors in accelerating the rate of this disaster which often leaves in its wake spread of diseases, loss of thousands of lives from various parts of the country and properties worth billions of naira being destroyed. The impacts of floods are more pronounced in low-lying areas. In more recent years, 2011 and 2012 appears to be the worst incidence of flooding in Nigeria with a lot of reported cases indicating how flood menace ravaged affected states of the country when water from the Lagos Dam in Cameroon was released. Although the Nigerian Meteorological Agency (NIMET) had alerted Nigeria that there would be an above normal rainfall in strategic parts of the country which might lead to flooding incidents in 12 states of the federation, yet nobody gave consent to that warning. This paper provides an overview of how Nigerian cities have been affected by flood menace incidences as it takes a look at the devastating impacts, remedial and management strategies at curbing flooding in Nigeria. A review of literature on flood menace was done. The articles were accessed from public libraries, as well as online through internet search engines and relevant information extracted. Onsite assessment of some areas affected by flood was done and pictures taken with the aid of a camera. Flooding in Nigeria is a serious issue requiring the attention of all stake holders aimed at preventing and remedying its adverse effects which threatens human existence. This study was reviewed because it addresses the flood menace in Nigeria: impacts, remedial and management strategies.

Michael and Oyewale (2013) studied evaluation of the causes and effects of flood in Apete, Ido Local Government Area, Oyo State, Nigeria. Floods in Nigeria had done more harm without any notice of benefits. In the last 30 years, Nigerian cities have experienced great physical development, in terms of building, manufacturing industries and others without any appreciable infrastructures such as drainages, roads and canals to support them. These have made floods to be a serious challenge that plague many Nigerian cities. Thus, this research investigates the causes and effects of flood in Apete Area of Ibadan, Oyo State, Nigeria, and proffer recommendations to avert the future occurrence of flood in the area. The results of the research will expose Nigerian government to the strategies of mitigating any occurrence of flood, as well as enlighten the public on how to guide against the occurrence of flood. 156 questionnaires were administered to the residents of Apete area to know the causes and effects of floods in the area. The findings of this research show that there is poor waste management practices among the residents of Apete .They engaged in indiscriminate waste dumps which have blocked the inadequate drainage available. There is high rate of building construction along water channels which usually results to floods. Many lives and properties have been destroyed by flood.

The data used for this research was obtained through both secondary and primary sources. The secondary data were gathered from the 2012 report of NEMA (National Emergency Management Agency) in Nigeria, and other available published and unpublished literature. Primary data were obtained through a set of questionnaire administered to the residents of the study area. The questionnaire was used to obtain the socio-economic data of the residents in Apete Area of Ibadan. Interview and observation were used to collect information on the causes and effects of flood in Apete. The total number of questionnaire used for this study was one hundred and fifty six (156), (See Table 1) which was eleven percent of the overall number of houses in the seven selected areas in Apete. i.e.(11 ÷ 100) x 1417 = 155.8, approximately 156. The sampling method used for the questionnaire administration was systematic sampling, where the first building was selected randomly, followed by a systematic selection of the next building at an interval of every 8th houses. The data collected from the primary source was analyzed using Scientific Package for Social Scientist (SPSS). Descriptive statistic like tabulations, frequency counts, percentages, charts and graphs were used to present the research data. To manage the effects of any future occurrence of flood in the study area and beyond, following measures are suggested; (1) there is need for repair and construction of new drainages. (2) Construction of flood diversion channels which

involves the construction of artificial channels along main river channels to divert part of the discharge during flood flows. (3) Governmental and Non-Governmental organizations should set up various information programmes to enlighten the public on dangers of flood disaster. (4) Adequate medical facilities should be provided for the treatment of various environmental diseases emanated from occurrence of flood. The study is related to the present study due to the Evaluation of the Causes and Effects of Flood.

Sussan *et al* (2012) conducted a study in urban flooding and memoryscape in Argentina. The relationship between social experience and action in the context of recurrent disasters is often thought of in terms of adaptation. This study problematises this assumption from an anthropological perspective by analysing the memoryscape that mediates past experiences of disasters. The inquiry is based on translocal and transtemporal ethnographic fieldwork conducted in 2004-2011 in the flood-prone city of Santa Fe in Argentina. The study examines how past flooding is remembered by flood victims in the middle- and low-income districts and by activists of the protest movement that emerged in the wake of the 2003 flood. It deals with flood memory in the local bureaucracy, in local historiography, myths and popular culture. The analysis reveals that the Santafesinian flood memoryscape is dynamically configured by evocative, reminiscent and commemorative modes of remembering, which are expressed in multiple forms, ranging from memorials and rituals to bureaucratic documents, infrastructure and everyday practices. The study addresses the relationship between memory, morality and social inequality and discusses the implications for questions regarding vulnerability, resilience and adaptation. This study is related to the present study due to similarity in variables such as educational level, age socioeconomic status and others. This study is in line with the present study because of the context of urban flooding and memoryscape.

Uchenna (2018) examined the disaster risk reduction and Local Knowledge in Flood-Prone Communities in Waterloo, Ontario, Canada, 2018. There has been a long debate regarding the value of traditional/indigenous/local knowledge in disaster risk reduction. Often viewed as 'backwards', governments instead have emphasised 'advanced' technologically sophisticated and economically expensive approaches to DRRM (generally equated with 'Western science'). Increasingly, however, it is recognised that local participation and ways of knowing are essential for long-term DRRM. This is formally articulated in numerous inter-governmental and governmental documents. Despite this recognition, the gap between saying and doing remains wide. There continues to be an over-reliance on techno/economic approaches to DRRM led by state actors, while local people and contexts are broadly ignored. In many cases, DRR plans are little more than empty proclamations. When disaster strikes, people are left to fend for themselves; where the government is involved, it is generally in a reactive, crisis-management way. In this thesis, the author examines the case of Nigeria. He describes the Nigerian setting. He analyses the formal government position on DRRM, in particular reflecting on the ways that government foresees local participation and contributions to DRRM. He then looks at three case studies of disaster events in three different states of Nigeria. Each community was hard hit by flooding in 2012. They were again hard hit by flooding in 2017. The author reflects on the event and the outcome of each occurrence in each case: what was the iv preparedness setting? What were the effects on the community? How did the community react? How did these actions align with government DRRM policy, programming and action? It is hypothesised that, in the context of evolving global attention to DRRM mainly through the Hyogo and Sendai frameworks, one would anticipate different events and outcomes in the study areas. Put differently, five years after the 2012 flood events, the effects of the 2017 flood should have been better prepared for, so leading to less intense negative local level side effects. The author reveals that the 2017 flood event was similar in effect to the 2012 event. Indeed, interestingly people failed to heed early warnings from authorities regarding impending flood and recommended action. While it is beyond the scope of this thesis to analyse why this is so, one can reflect on the actions taken by local people in each case and examine them for the potential to build bridges with state authorities, so drawing local

action and understanding into alignment with government claims regarding DRRM. This study is worth reviewing because the variables geared towards finding means of improving control of flooding globally.

Vimalkumar (2005) carried out a study on flood impact analysis using GIS for Lake Roxen and Lake Glan-Sweden. Floods are common natural disaster occurring in most parts of the world. This results in damage to human life and deterioration of environment. There have been immense uses of technology to mitigate measures of flood disaster i.e. structurally and non-structurally. Undoubtedly, structural measures are very expensive and time consuming which involves physical work like construction of dams, reservoirs, bridges, channel improvement, river diversion and other embankments to keep floods away from people. Whereas non-structural measures is concerned with planning like flood forecasting and warning, flood plain zoning, relief and rehabilitation for reducing the risk of flood damage to keep people away from floods. Thus, non-structural measures involve analysis, planning providing spatial information on maps with high accuracy in less time. Non-structural measures can help decision maker to plan an effective emergency response towards flood disaster. A one of the good way to plan non-structural measures is to analyze impact of flood in the flood prone areas. The thesis tries to analyze impact of flood on environment along the demarcated flood prone areas of Lake Roxen and Lake Glan in Östergötland County, Sweden. The thesis also proposes how to use current flood information during flood emergency utilizing geographical information system. This provides spatial information for area in the flood zone for assessment regarding flood vulnerability. Using map overlay analysis in GIS software (ArcGIS); flood prone areas and topographic data along Lake Roxen and Lake Glan were digitized from PDF maps. Thus, the thesis work is an effort to analyze impact of flood when areas along Lake Roxen and Lake Glan are flooded. ESRI® GIS software Arc Map 9 and Arc View 3.3 is used for data preparation, integrating, analyzing, and spatial data with attribute table information. Finally, to show GIS can be an effective tool for development of flood emergency system as a part of disaster preparedness by the decision makers. This study recommended the use of orthophoto and digital elevation model (DEM) for the study area, by creating 1m contours interval while keeping base contour 33 m at lake water level and find out how much land use, road etc would be affected for each interval in flood prone areas zones. Secondly, with the help of DEM and other topographic information the amount toxic elements, nutrients flow into Lake Roxen and Lake Glan can be calculated. This study was reviewed because it addresses the analysis of impact of flood prone area using GIS system.

Karin *et al* (2016) conducted a research on framework for evaluation of flood management strategies during the last decades in Scokholms University, a great deal of attention has been focused on the financial risk management of natural disasters. The reason is that the economic losses from floods, windstorms, earthquakes and other disasters in both the developing and developed countries are escalating dramatically. Catastrophic events, in particular floods, have contributed substantially to financial and human costs of disaster, accounting for over half of the fatalities and a third of the damages from all natural catastrophes worldwide. It has become apparent that an integrated water resource management approach would be beneficial in order to take the best interests of society and the environment into consideration. One improvement consists of models capable of handling multiple criteria as well as multiple stakeholders. In this thesis, a system approach is applied for coping with complex environmental and social decisions with respect to flood catastrophe policy formation, wherein the emphasis is on computer-based modelling and simulation techniques combined with methods for evaluating strategies. As a consequence, the SEMPAI framework is developed. The framework consists of a simulation model, a decision analytical tool, and a set of suggested policy strategies for policy formulation. The framework is applied to two different case studies and stakeholder workshops and assessments using expert interviews have demonstrated its appropriateness and applicability. This study is similar to the present study and is also in concern with framework for evaluation of flood management strategies.

Zahra *et al* (2005) research on road structures under climate and land use change: Bridging the gap between science and application in Sweeden. Future changes in climate and land use are likely to affect catchment hydrological responses and consequently influence the amount of runoff reaching roads. Blockages and damage to under-dimensioned infrastructure can be extremely costly for the regions affected. This study aims to produce scientifically well-founded suggestions on adaptation of road drainage systems to climate changes resulting in more frequent floods. This thesis demonstrates the need to integrate aspects of climate change and land use impacts into the planning and practice of road construction and maintenance in Sweden. Tools such as hydrological models are needed to assess impacts on discharge dynamics. Identifying a 'best' practically performing hydrological model is often difficult due to the potential influence of modeller subjectivity on calibration procedure, parameter selection, etc. Hydrological models may need to be selected on a case-by-case basis and have their performance evaluated on an application-by-application basis.The work presented here began by examining current practice for road drainage systems in Sweden. Various hydrological models were then used to calculate the runoff from a catchment adjacent to a road and estimate changes in peak discharge and total runoff resulting from simulated land use measures. Overall, the results indicate that the specific effect of land use measures on catchment discharge depend on their spatial distribution and on the size and timing of storm events. Scenarios comprising a changing climate up to 2050 or to 2100 and forest clear-cutting were used to determine whether the current design of road drainage construction is sufficient for future conditions. Based on the findings, the approach developed can be used for similar studies, e.g. by the Swedish Transport Administration in dimensioning future road drainage structures to provide safe and robust infrastructure. Furthermore, a statistical method was developed for estimating and mapping flood hazard probability along roads using road and catchment characteristics. The method allows flood hazards to be estimated and provides insight into the relative roles of landscape characteristics in determining road-related flood hazards. Overall, this method provides an efficient way to estimate flooding hazards and to inform the planning of future roadways and the maintenance of existing roadways. This research is flood related and as such it giv room for the method allows flood hazards to be estimated and provides insight into the relative roles of landscape characteristics in determining road-related flood hazards.

2.4.2 Physical Hazards Associated with Flooding.

Weiwei *et al* (2010) conducted a study on Health Impacts of Floods Queensland University of Technology. Floods are the most common hazard to cause disasters and have led to extensive morbidity and mortality throughout the world. The impact of floods on the human community is related directly to the location and topography of the area, as well as human demographics and characteristics of the built environment. The aim of this study is to identify the health impacts of disasters and the underlying causes of health impacts associated with floods. A conceptual framework is developed that may assist with the development of a rational and comprehensive approach to prevention, mitigation, and management. This study involved an extensive literature review that located >500 references, which were analyzed to identify common themes, findings, and expert views. The findings then were distilled into common themes. The health impacts of floods are wide ranging, and depend on a number of factors. However, the health impacts of a particular flood are specific to the particular context. The immediate health impacts of floods include drowning, injuries, hypothermia, and animal bites. Health risks also are associated with the evacuation of patients, loss of health workers, and loss of health infrastructure including essential drugs and supplies. In the medium-term, infected wounds, complications of injury, poisoning, poor mental health, communicable diseases, and starvation are indirect effects of flooding. In the long-term, chronic disease, disability, poor mental health, and poverty-related diseases including malnutrition are the potential legacy. This article proposes a structured approach to the classification of the health impacts of floods and a conceptual framework that demonstrates the relationships between floods and the direct and indirect health consequences. This study is in line with the present research since it is aim at determining the

floods are the most common hazard to cause disasters and have led to extensive morbidity and mortality throughout the world.

Paola *et al* (2014) research in Climate changes, floods, and health consequences In the European Region, floods are the most common natural disaster, causing extensive damage and disruption. In Italy, it has been estimated that over 68% of municipalities are at high hydrogeological risk and with the recent intense rainfall events local populations have been facing severe disruptions. The health consequences of floods are wide ranging and are dependent upon the vulnerability of the environment and the local population. Health effects can be a direct or indirect consequence of flooding. The immediate health impacts of floods include drowning, heart attacks, injuries and hypothermia. The indirect effects include, injuries and infections, water-borne infectious disease, mental health problems, respiratory disease and allergies in both the medium and long term after a flood. Future efforts should be addressed to integrate health preparedness and prevention measures into emergency flood plans and hydrological warning systems. The research is similar to the present study because of Climate changes, floods, and health consequences.

Carmen *et al* (2015) examined the impact of flooding on people living with HIV: a case study from the Ohangwena Region, Namibia. Floods are a disaster situation for all affected populations and especially for vulnerable groups within communities such as children, orphans, women, and people with chronic diseases such as HIV and AIDS. They need functioning health care, sanitation and hygiene, safe water, and healthy food supply, and are critically dependent on their social care and support networks. A study carried out in the Ohangwena region, Namibia, where HIV prevalence is high and extensive flooding frequently occurs, aims to provide a deeper understanding of the impact that flooding has on people living with HIV (PLWHIV) as well as on HIV service providers in the region. The qualitative research applying grounded theory included semi-structured interviews with PLWHIV, focus group discussions with HIV service providers, and a national feedback meeting. The findings were interpreted using the sustainable livelihoods framework, the natural hazard research approach, and health behaviour theories. The study reveals that flooding poses major problems to PLWHIV in terms of their everyday lives, affecting livelihoods, work, income, and living conditions. The factors threatening them under normal conditions - poverty, malnutrition, unsafe water, sanitation and hygiene, limited access to health facilities, a weak health status, and stigma - are intensified by flood-related breakdown of infrastructure, insecurity, malnutrition, and diseases evolving over the course of a flood. A potential dual risk exists for their health: the increased risk both of infection and disease due to the inaccessibility of health services and antiretroviral treatment. A HIV and Flooding Framework was developed to display the results. This study demonstrates that vulnerabilities and health risks of PLWHIV will increase in a disaster situation like flooding if access to HIV prevention, treatment, care and support are not addressed and ensured. The findings and the HIV and Flooding Framework are not specific to Ohangwena and can be transferred to any flood-affected region that has a high HIV prevalence and relies mainly on subsistence agriculture. They serve as a model case for analysing vulnerabilities related to health and health service provision under disaster conditions. The impact will vary according to the physical, geographical, climatological, social, and behavioural characteristics of the region and the people affected. In the Ohangwena region, a disaster risk management mechanism is already in place which addresses people with HIV during flooding. However, preparedness could be improved further by applying the HIV and Flooding Framework. This study is related to the present study due to its objective of the impact of flooding on people living with HIV.

Euripides and Virginia (2004) conducted a study on Public health impacts of floods and chemical contamination. Flooding accounts for about 40 per cent of all natural disasters that occur worldwide. In 2002-2003 many counties in England experienced severe floods. Floods are particularly important in public health terms as they may have multiple environmental consequences. Details of floods reported to Chemical Hazards and Poisons Division, London [CHaPD(L)] were analysed and a literature

review was undertaken to identify published reports of flood-related chemical incidents that have had an impact on public health. Epidemiological evidence shows that chemical material may contaminate homes and that in some cases flooding may lead to mobilization of dangerous chemicals from storage or remobilization of chemicals already in the environment, e.g. pesticides. Hazards may be greater when industrial or agricultural land adjoining residential land is affected. Less evidence exists to support the hypothesis that flooding that causes chemical contamination has a clear causal effect on the pattern of morbidity and mortality following these flooding events. In the light of this evidence, a checklist/pro forma for public health response to and investigation of flooding events that may result in chemical contamination was needed. This is available from CHaPD(L). This study is in line with the present research since it is at public health impacts of floods and chemical contamination.

Katarzyna *et al* (2012) conducted a study on floods and human health: a systematic review Floods are the most common type of disaster globally, responsible for almost 53,000 deaths in the last decade alone (23:1 low- versus high-income countries). This review assessed recent epidemiological evidence on the impacts of floods on human health. Published articles (2004-2011) on the quantitative relationship between floods and health were systematically reviewed. 35 relevant epidemiological studies were identified. Health outcomes were categorized into short- and long-term and were found to depend on the flood characteristics and people's vulnerability. It was found that long-term health effects are currently not well understood. Mortality rates were found to increase by up to 50% in the first year post-flood. After floods, it was found there is an increased risk of disease outbreaks such as hepatitis E, gastrointestinal disease and leptospirosis, particularly in areas with poor hygiene and displaced populations. Psychological distress in survivors (prevalence 8.6% to 53% two years post-flood) can also exacerbate their physical illness. There is a need for effective policies to reduce and prevent flood-related morbidity and mortality. Such steps are contingent upon the improved understanding of potential health impacts of floods. Global trends in urbanization, burden of disease, malnutrition and maternal and child health must be better reflected in flood preparedness and mitigation programs. This study is related to the present research due to the floods and human health context.

Erik (2000) did a study on flood warnings in a risk management Context: A Case of Swedish Municipalities as a result of the United Nations' International Decade for Natural Disaster Reduction (1990-2000), and recent high profile disasters, disaster risk reduction has climbed high on the international political agenda. There has been a paradigm shift from reacting to disasters towards preparing for and mitigating effects of disasters. Among the measures that have been highlighted on the disaster risk reduction agenda are early warning systems. In a Swedish context, there are needs for early warnings for various flood risk types. Municipalities carry big responsibilities for managing flood risks, and early warnings have a potential to facilitate decision-making and ultimately reduce flood losses. The aim of this thesis is to describe how a variety of flood warning signals are used in the risk management process of Swedish municipalities, how they can contribute to the flood risk reducing process, and which factors influence the success of this. The thesis is based on two papers. Paper I is based on interviews with three respondents from Swedish municipalities that have invested in and established local early warning systems. The paper shows that the possible effects from a local early warning system are not only reduced flood losses but also potential spinoff, the occurrence of which is dependent on the well-being of the organisation and its risk management processes. Paper II is based on interviews with 23 respondents at 18 Swedish municipalities, who have responsibilities related to flood risk management, and one respondent who works at SMHI with hydrological warning. The paper shows that municipalities can use a variety of complementary flood warning signals to facilitate decision-making for a proactive flood response. This is however not systematically the case, and is dependent on available resources. The theoretical contribution of this thesis is a development of existing conceptual models of early warning systems with respect to risk management and system contexts, and the use of complementary warning signals. This study is in line with the present research since it is aim at

flood warnings in a risk management context.

Wei *et al* (2014) conducted a research on Impacts of floods on dysentery in Xinxiang city, China, during 2004-2010: a time-series Poisson analysis. Xinxiang, a city in Henan Province, suffered from frequent floods due to persistent and heavy precipitation from 2004 to 2010. In the same period, dysentery was a common public health problem in Xinxiang, with the proportion of reported cases being the third highest among all the notified infectious diseases. We focused on dysentery disease consequences of different degrees of floods and examined the association between floods and the morbidity of dysentery on the basis of longitudinal data during the study period. A time-series Poisson regression model was conducted to examine the relationship between 10 time's different degrees of floods and the monthly morbidity of dysentery from 2004 to 2010 in Xinxiang. Relative risks (RRs) of moderate and severe floods on the morbidity of dysentery were calculated in this paper. In addition, we estimated the attributable contributions of moderate and severe floods to the morbidity of dysentery. A total of 7591 cases of dysentery were notified in Xinxiang during the study period. The effect of floods on dysentery was shown with a 0-month lag. Regression analysis showed that the risk of moderate and severe floods on the morbidity of dysentery was 1.55 (95% CI: 1.42-1.670) and 1.74 (95% CI: 1.56-1.94), respectively. The attributable risk proportions (ARPs) of moderate and severe floods to the morbidity of dysentery were 35.53 and 42.48%, respectively. This study confirms that floods have significantly increased the risk of dysentery in the study area. In addition, severe floods have a higher proportional contribution to the morbidity of dysentery than moderate floods. Public health action should be taken to avoid and control a potential risk of dysentery epidemics after floods. This research is related to the objective of this study due to the impacts of floods on dysentery in Xinxiang city, China, during 2004-2010: a time-series poison analysis.

Lowe *et al* (2013) research on Factors increasing vulnerability to health effects before, during and after floods. Identifying the risk factors for morbidity and mortality effects pre-, during and post-flood may aid the appropriate targeting of flood-related adverse health prevention strategies. We conducted a systematic PubMed search to identify studies examining risk factors for health effects of precipitation-related floods, among Organisation for Economic Co-Operation and Development (OECD) member countries. Research identifying flood-related morbidity and mortality risk factors is limited and primarily examines demographic characteristics such as age and gender. During floods, females, elderly and children appear to be at greater risk of psychological and physical health effects, while males between 10 to 29 years may be at greater risk of mortality. Post-flood, those over 65 years and males are at increased risk of physical health effects, while females appear at greater risk of psychological health effects. Other risk factors include previous flood experiences, greater flood depth or flood trauma, existing illnesses, medication interruption, and low education or socio-economic status. Tailoring messages to high-risk groups may increase their effectiveness. Target populations differ for morbidity and mortality effects, and differ pre-, during, and post-flood. Additional research is required to identify the risk factors associated with pre- and post-flood mortality and post-flood morbidity, preferably using prospective cohort studies. This study deals with the variables of the present study and is also concerned with factors increasing vulnerability to health effects before, during and after floods.

2.4.3 Psychosocial hazards associated with flooding.

Carla *et al* (2012) research on the effects of flooding on mental health: Outcomes and recommendations from a review of the literature. While most people who are involved in disasters recover with the support of their families, friends and colleagues, the effects on some people's health, relationships and welfare can be extensive and sustained. Flooding can pose substantial social and mental health problems that may continue over extended periods of time. Flooding can challenge the psychosocial resilience of the hardiest of people who are affected. Methods The Health Protection Agency (HPA) undertook a review of the literature published from 2004 to 2010. It is intended to: assess and appraise the epidemiological evidence on flooding and mental health; assess the existing guidance on emergency planning for the impacts of flooding on

psychosocial and mental health needs; provide a detailed report for policymakers and services on practical methods to reduce the impacts of flooding on the mental health of affected people; and identify where research can support future evidence-based guidance. The HPA identified 48 papers which met its criteria. The team also reviewed and discussed relevant government and non-government guidance documents. This paper presents a summary of the outcomes and recommendations from this review of the literature. Results The review indicates that flooding affects people of all ages, can exacerbate or provoke mental health problems, and highlights the importance of secondary stressors in prolonging the psychosocial impacts of flooding. The distressing experiences that the majority of people experience transiently or for longer periods after disasters can be difficult to distinguish from symptoms of common mental disorders. This emphasises the need to reduce the impact of primary and secondary stressors on people affected by flooding and the importance of narrative approaches to differentiate distress from mental disorder. Much of the literature focuses on post-traumatic stress disorder; diagnosable depressive and anxiety disorders and substance misuse are under-represented in the published data. Most people's psychosocial needs are met through their close relationships with their families, friends and communities; smaller proportions of people are likely to require specialised mental healthcare. Finally, there are a number of methodological challenges that arise when conducting research and when analysing and comparing data on the psychosocial and mental health impacts of floods. Conclusions The HPA's findings showed that a multi-sector approach that involves communities as well as agencies is the best way to promote wellbeing and recovery. Agreeing and using internationally understood definitions of and the thresholds that separate distress, mental health and mental ill health would improve the process of assessing, analysing and comparing research findings. Further research is needed on the longitudinal effects of flooding on people's mental health, the effects of successive flooding on populations, and the effects of flooding on the mental health of children, young people and older people and people who respond to the needs of other persons in the aftermath of disasters. This study outcomes may help to control the effects of flooding on mental health.

Ana *et al* (2015) carried out a study on Flooding and Mental Health: A Systematic Mapping Review. Floods are the most common type of global natural disaster. Floods have a negative impact on mental health. Comprehensive evaluation and review of the literature are lacking. To systematically map and review available scientific evidence on mental health impacts of floods caused by extended periods of heavy rain in river catchments. We performed a systematic mapping review of published scientific literature in five languages for mixed studies on floods and mental health. PUBMED and Web of Science were searched to identify all relevant articles from 1994 to May 2014 (no restrictions). The electronic search strategy identified 1331 potentially relevant papers. Finally, 83 papers met the inclusion criteria. Four broad areas are identified: i) the main mental health disorders—post-traumatic stress disorder, depression and anxiety; ii] the factors associated with mental health among those affected by floods; iii) the narratives associated with flooding, which focuses on the long-term impacts of flooding on mental health as a consequence of the secondary stressors; and iv) the management actions identified. The quantitative and qualitative studies have consistent findings. However, very few studies have used mixed methods to quantify the size of the mental health burden as well as exploration of in-depth narratives. Methodological limitations include control of potential confounders and short-term follow up. Floods following extreme events were excluded from our review. Although the level of exposure to floods has been systematically associated with mental health problems, the paucity of longitudinal studies and lack of confounding controls precludes strong conclusions. This study outcome may be helpful to control flooding and mental health: A Systematic Mapping Review.

Lamond (2014) researched on the role of flood memory in the impact of repeat flooding on mental health A highly important but under researched impact of flood events is the long term psychological effect of the distress and trauma caused by damage and losses associated with repeated flooding of communities. As a part of the recovery process responders need to

consider flooded households and offer support to mitigate against the stress of flooding. This research aims to consider how the risk of repeat flooding and flood memory can affect the needs of communities with respect to post disaster support. Previous research has identified a variety of influencing factors that affect the prevalence of mental health disorders in the aftermath of flooding. Using a structured literature review and novel conceptual model this research examines the role of flood experience and memory in the impact of flooding on mental health and the needs of flooded communities. It is found that the memory of previous flooding can influence future outcomes in a variety of ways, with some positive incentives towards actions that may result in lower damages in future events. These actions, that affect future trauma, have the potential to mitigate the impact of repeated flooding. Therefore appropriate post disaster needs assessment should not only identify vulnerable individuals but also take account of the risk of future flooding. This research is similar to the present study due to the objectives of the role of flood memory in the impact of repeat flooding on mental health.

Daiga *et al* (2018) researched on the English National Cohort Study of Flooding and Health: the change in the prevalence of psychological morbidity at year two. The longer term impact of flooding on health is poorly understood. In 2015, following widespread flooding in the UK during winter 2013/14, Public Health England launched the English National Study of Flooding and Health. The study identified a higher prevalence of probable psychological morbidity one year after exposure to flooding. We now report findings after two years in year two (2016), a self-assessment questionnaire including flooding-related exposures and validated instruments to screen for probable anxiety, depression and post-traumatic stress disorder (PTSD) was sent to all participants who consented to further follow-up. Participants exposure status was categorised according to responses in year one; we assessed for exposure to new episodes of flooding and continuing flood-related problems in respondents homes. We calculated the prevalence and odds ratio for each outcome by exposure group relative to unaffected participants, adjusting for confounders. We used the McNemar test to assess change in outcomes between year one and year two. In year two, 1064 (70%) people responded. The prevalence of probable psychological morbidity remained elevated amongst flooded participants [n = 339] (depression 10.6%, anxiety 13.6%, PTSD 24.5%) and disrupted participants [n = 512] (depression 4.1%, anxiety 6.4%, PTSD 8.9%), although these rates were reduced compared to year one. A greater reduction in anxiety 7.6% (95% confidence interval [CI] 4.6–9.9) was seen than depression 3.8% (95% CI 1.5–6.1) and PTSD: 6.6% (95% CI 3.9–9.2). Exposure to flooding was associated with a higher odds of anxiety (adjusted odds ratio [aOR] 5.2 95%, 95% CI 1.7–16.3) and depression (aOR 8.7, 95% CI 1.9–39.8) but not PTSD. Exposure to disruption caused by flooding was not significantly associated with probable psychological morbidity. Persistent damage in the home as a consequence of the original flooding event was reported by 119 participants (14%). The odds of probable psychological morbidity amongst flooded participants who reported persistent damage, compared with those who were unaffected, were significantly higher than the same comparison amongst flooded participants who did not report persistent damage. This study shows a continuance of probable psychological morbidity at least two years following exposure to flooding. Commissioners and providers of health and social care services should be aware that the increased need in populations may be prolonged. Efforts to resolve persistent damage to homes may reduce the risk of probable psychological morbidity. This study would indirectly increase the control of The English National Cohort Study of Flooding and Health: the change in the prevalence of psychological morbidity.

Ai *et al* (2017) examined mental health impacts of flooding: a controlled interrupted time series analysis of prescribing data in England. There is emerging evidence that people affected by flooding suffer adverse impacts on their mental well-being, mostly based on self-reports. We examined prescription records for drugs used in the management of common mental disorder among primary care practices located in the vicinity of recent large flood events in England, 2011–2014. A controlled interrupted time series analysis was conducted of the number of prescribing items for antidepressant drugs in the year before and after the flood onset. Pre–post changes were compared

by distance of the practice from the inundated boundaries among 930 practices located within 10 km of a flood. After control for deprivation and population density, there was an increase of 0.59% (95% CI 0.24 to 0.94) prescriptions in the post flood year among practices located within 1 km of a flood over and above the change observed in the furthest distance band. The increase was greater in more deprived areas. This study suggests an increase in prescribed antidepressant drugs in the year after flooding in primary care practices close to recent major floods in England. The degree to which the increase is actually concentrated in those flooded can only be determined by more detailed linkage studies. This is an Open Access article distributed in accordance with the terms of the Creative Commons Attribution (CC BY 4.0) license, which permits others to distribute, remix, adapt and build upon this work, for commercial use, provided the original work is properly. This study examined on the objective because of its similarity on mental health impacts of flooding: a controlled interrupted time series analysis.

Sebastien *et al* (2017) researched on the effect of flooding on mental health: Lessons learned for building resilience Risk management and climate adaptation literature focuses mainly on reducing the impacts of, exposure to, and vulnerability to extreme events such as floods and droughts. Posttraumatic stress disorder is one of the most important impacts related to these events, but also a relatively under-researched topic outside original psychopathological contexts. We conduct a survey to investigate the mental stress caused by floods. We focus on hydrological, individual, and collective drivers of posttraumatic stress. We assess stress with flood-specific health scores and the GHQ-12 General Health Questionnaire. Our findings show that the combination of water depth and flood velocity measured via a Hazard Class Index is an important stressor; and that mental health resilience can be significantly improved by providing the population with adequate information. More specifically, the paper shows that psychological distress can be reduced by (i) coordinating awareness of flood risks and flood protection and prevention behavior; (ii) developing the ability to protect oneself from physical, material and intangible damage; (iii) designing simple insurance procedures and protocols for fast recovery; and (iv) learning from previous experiences. The research outcomes may help to control the effect of flooding on mental health: Lessons learned for building resilience.

Tabassom *et al* (2021) studied economic evaluation of mental health effects of flooding using Bayesian Networks. The appraisal of appropriate levels of investment for devising flooding mitigation and to support recovery interventions is a complex and challenging task. Evaluation must account for social, political, environmental and other conditions, such as flood state expectations and local priorities. The evaluation method should be able to quickly identify evolving investment needs as the incidence and magnitude of flood events continue to grow. Quantification is essential and must consider multiple direct and indirect effects on flood related outcomes. The method proposed is this study is a Bayesian network, which may be used ex-post for evaluation, but also ex-ante for future assessment, and near real-time for the reallocation of investment into interventions. The particular case we study is the effect of flood interventions upon mental health, which is a gap in current investment analyses. Natural events such as floods expose people to negative mental health disorders including anxiety, distress and post-traumatic stress disorder. Such outcomes can be mitigated or exacerbated not only by state funded interventions, but by individual and community skills and experience. Success is also dampened when vulnerable and previously exposed victims are affected. Current measures evaluate solely the effectiveness of interventions to reduce physical damage to people and assets. This paper contributes a design for a Bayesian network that exposes causal pathways and conditional probabilities between interventions and mental health outcomes as well as providing a tool that can readily indicate the level of investment needed in alternative interventions based on desired mental health outcomes. The study objective is related to the present study due to Economic Evaluation of Mental Health Effects of Flooding.

Hector *et al* (2014) conducted a study in institutional aspects of integrated flood management in Guatemala

floods are a recurrent natural disaster in Guatemala. Heavy and prolonged rainfall often results in floods that affect people's life and property. Several institutions and policy instruments at local, national or transnational level address flood management. The purpose of this study is to provide useful insights of the institutional aspects of integrated flood management at local, national and trans boundary level in Guatemala. Papers I and II, explore institutions at local level, paper III at national level, while paper IV addresses flood management institutions at transboundary level. This research found that for the local and national level, there are several institutions concerned with flood management. In contrast, at transboundary level, and especially for international rivers, flood management institutions are largely absent. At local level, the Local Councils for Development (COCODEs, the acronym in Spanish) are responsible for flood prevention and preparation. While some municipalities are active in flood prevention, response and recovery activities, their limited economic and technical resources restrict their scope of action. Local stakeholders such as COCODEs, farmers groups and other actors are largely neglected in the decision making process. The National Coordinator for Risk Reduction to Disasters (CONRED, Coordinadora Nacional para Reducción de Desastres), the Secretariat for Planning and Programming of the Presidency (SEGEPLAN, Secretaría de Planificación y Programación de la Presidencia), the Guatemalan Ministry of Infrastructure and other national institutions are in charge of planning and implementing flood management strategies, leaving public involvement of local actors mainly to public consultation. At the Central American level, the Coordination Centre for Natural Disasters Prevention in Central America (CEPREDENAC, Centro de Coordinación para la Prevención de Desastres Naturales en América Central), an institution part of the Central American Integration System (SICA by Spanish acronym), shall promote trans boundary cooperation regarding disaster management, including flood management. However, trans boundary flood management faces several challenges: territorial disputes and sovereignty issues over international rivers are significant obstacles to the implementation of integrated flood management programs. This study is in line with the present study since it's geared toward institutional aspects of integrated flood management.

2.4.4 Chemical hazards associated with flooding.

Sylvia *et al* (2006) researched on the health effects of flooding: Social research results from England and Wales. This paper presents interview survey data by social scientists using established health measures on the health effects of flooding for residents in 30 locations in England and Wales. Firstly, it examines the extent to which flooded residents reported suffering physical and psychological health effects during and after the event. Secondly, it explores the issue of whether these effects were long-lasting by comparisons with the general population and with those at risk but not flooded. In the study, about two thirds of the flood victims were found to have scores on the General Health Questionnaire-12 scale indicative of mental health problems (scores of 4+) at their worst time after flooding. The evidence of the study also suggests that some flood victims suffered long term mental health effects as a result of their experience of flooding. The study examines the influence of a wide range of factors: characteristics of the flood event, types of property, and socio-demographic and the intervening factors such as the extent of family or community support that may explain the health effects of flooding. It finds that a complex set of social and other factors are involved and that some factors susceptible to human intervention such as having adequate flood insurance cover are important factors in the stress experienced by flood victims. This study deals with the variables of the present research due to The health effects of flooding: Social research.

Ase *et al* (2000) examined bridging the floods - The role of social learning for resilience building in urban water services in Colombia. The development of cities is increasingly threatened by a worldwide water crisis. Urban water services (including drinking water, sanitation and drainage) are facing complex and multiple pressures, which are becoming increasingly frequent and severe. These pressures include floods, and the depletion, pollution and degradation of water resources and their associated ecosystems. These diverse pressures fall mainly within the domains of

flood risk and water resources management: two working fields that are divided by different institutional structures, approaches and practices. Social learning is becoming increasingly popular as an approach that has the potential to "bridge" these silos, and ultimately, contribute to building resilience in urban water services. However, empirical analyses on this issue are rare and fragmented. Against this background, this thesis investigates the role of social learning for resilience building in urban water services. It is based on single and multiple case studies from the urban areas of Cali (Colombia), Cebu (The Philippines), Durban (South Africa), Gorakhpur (India) and Kristianstad (Sweden). The results identify challenges to the integration of the identified silos, what resilience means for urban water services, and the key elements of social learning that can support or inhibit urban water resilience. The results provide important input for new theory, policy and practice related to the United Nations' Sustainable Development Goals (SDGs), the Sendai Framework for Disaster Risk Reduction and national policies on sustainable water management, risk reduction and climate change adaptation. This study is related to the present study and is also concerned with social learning for resilience building in urban water services.

Vidya *et al* (2019) researched on systematic review of the human health and social well-being outcomes of green infrastructure for storm water and flood management. The increase in frequency and intensity of urban flooding is a global challenge. Flooding directly impacts residents of industrialized cities with aging combined sewer systems, as well as cities with less centralized infrastructure to manage storm water, fecal sludge, and wastewater. Green infrastructure is growing in popularity as a sustainable strategy to mimic nature-based flood management. Although its technical performance has been extensively studied, little is known about the effects of green storm water infrastructure on human health and social well-being. We conducted a multidisciplinary systematic review of peer-reviewed and gray literature on the effects of green infrastructure for storm water and flood management on individuals', households', and communities' a) physical health; b) mental health; c) economic well-being; and d) flood resilience and social acceptance of green infrastructure. We systematically searched databases such as PubMed, Web of Science, and Scopus; the first 300 results in Google Scholar; and websites of key organizations including the United States Environmental Protection Agency. Study quality and strength of evidence was assessed for included studies, and descriptive data were extracted for a narrative summary. Out of 21,213 initial results, only 18 studies reported health or social well-being outcomes. Seven of these studies used primary data, and none allowed for causal inference. No studies connected green infrastructure for storm water and flood management to mental or physical health outcomes. Thirteen studies were identified on economic outcomes, largely reporting a positive association between green infrastructure and property values. Five studies assessed changes in perceptions about green infrastructure, but with mixed results. Nearly half of all included studies were from Portland, Oregon. This global systematic review highlights the minimal evidence on human health and social well-being relating to green infrastructure for storm water and flood management. To enable scale-up of this type of infrastructure to reduce flooding and improve ecological and human well-being, widespread acceptance of green infrastructure will be essential. Policymakers and planners need evidence on the full range of benefits from different contexts to enable financing and implementation of instfrastructure options, especially in highly urbanized, flood-prone settings around the world. Therefore, experts in social science, public health, and program evaluation must be integrated into interdisciplinary green infrastructure research to better relate infrastructure design to tangible human outcomes. This study would indirectly increase systematic review of the human health and social well-being outcomes of green infrastructure for storm water and flood management.

WHO. (2017) researched on flooding: managing health risks. Over the last 20 years, flood events have occurred in 49 countries in the WHO European Region. These have caused more than 2000 deaths, other health effects, property losses, damage to health facilities, displacement and enormous economic costs (estimated at €70 billion). A survey of countries in the Region highlighted the gaps in the prevention of health effects of floods and the availability of timely

flood–health response strategies or established action plans. Further cross-sectoral coordination is crucial in preventing deaths, injuries, disease and other health consequences. A range of measures to protect population health care are proposed in this publication, organized around prevention, preparedness, response and recovery. Approaches to manage the health risks of floods should be based on the common policies, plans and measures for all types of hazards, before addressing the specific issues associated with floods. This research is related to the objective of the present study due to the empirical of flooding: managing health risks.

Jiseon *et al* (2020) studied water-related disasters and their social health impacts: A global review. While the frequency and intensity of floods and droughts have dramatically increased over the past century, there is limited epidemiological evidence on the social health impacts of these disasters. The paper examines the global trends and main social health impacts of these events based on databases and case studies, identifies gaps in the Sustainable Development Goals (SDGs) indicator framework for monitoring health impacts of disasters and suggests recommendations to address these gaps. Natural disaster data and 38 case studies published from 2008 to 2018 were reviewed, and measures of association (Risk Ratio, Odds Ratio, and Incidence Rate Ratio) were extracted from the case studies for quantitative analysis. The findings of the review indicate that the SDGs lack of multifactorial disease and mental health risk factors, as well as water-borne disease indicators, misses critical health-associated impacts of floods and droughts. In particular, the narrow focus on suicide as an indicator of mental health overlooks how anxiety disorders or post-traumatic stress disorder (PTSD) can also have severe consequences for those affected by disasters. Health must be included in resilience-building initiatives at the individual, community, and national levels. The findings of the study suggest that further implementation research of the Sendai Framework and disaster risk reduction (DRR) efforts can contribute to the development of the broadly framed concept of health resilience to meet the needs of people at risk in disasters. This study is study is related to the study objective of social health impact on water-related disasters and their social health impacts: A global review.

Lisa and Stockholms (2005) conducted a research on microsimulation models for disaster policy making in University of Kista. Two executable simulation models for answering policy questions were designed and implemented. The first for a flood management case, and the second for a disease transmission case that is currently underway. The flood simulation model differs from earlier natural disaster simulation models in several respects. It represents explicitly the geographical location and the economic strength of each household. It is also equipped with a graphical user interface, making it possible to design policies interactively, and to test their outcomes. If policy options are compared, the simulation results can automatically be transformed into decision trees. The flood simulation model shows that a micro-level representation makes it possible to investigate the distributional effects of policy changes. Novel features of the disease transmission model include the use of (anonymized) data representing nine million individuals, the inclusion of important parts of the contact patterns, and the explicit representation of places. The disease transmission model shows that the incorporation of social structure allows for a more realistic representation of disease spread than do models that assume homogenous mixing. Using this model, it is possible to conduct experiments of significant policy relevance, such as investigating the initial growth of an epidemic on a real-world network. Together, the two cases demonstrate the usefulness of a spatially explicit micro-level representation for policy simulation models in the area of disaster management. This research is related to the present study since the focus is on microsimulation models for flood disaster policy.

Roozbeh (2018) conducted a study on Flood Damage Assessment in Urban Areas University of Melbourne. Natural disaster prevention activities are attracting greater priority since prevention is more cost-effective and less uncertain than response, and aligned with the vision and mission of sustainable development. Increasing the resilience of communities and businesses is dependent on the extension of structural and non-structural risk mitigation activities. Hence, the nation-wide frameworks of natural disaster risk management are promoting a global movement from reactive activities

(response and recovery) to proactive actions (prevention and mitigation). In Australia, flood risk management is of high priority since flood is a frequent natural hazard with significant financial consequences. Flood risk assessment and flood damage estimation are the primary steps in the flood risk management process because they are essential for the identification and prioritization of top priority areas, cost-benefit analysis, checking the feasibility of risk mitigation options, selecting best practices in risk reduction and land use planning. This research aims to develop a validated flood damage assessment framework for the geographical area of Australia using historical data collected in several disaster events to inform disaster management policy in support of the development of risk reduction measures. In Australia, due to a lack of empirical data, most damage models are not calibrated with real damage data, and few studies have been conducted on the validation of results. In addition, most approaches are absolute, which is quite rigid and does not easily transfer across time and space. All approaches are of the traditional type, which relies on a deterministic relationship between type or use of the properties at risk and the depth of water. Thus, the interaction of most damage-influencing parameters and the uncertainty of data are neglected. This study has attempted to address these issues and the knowledge gaps. –IV Firstly, a comprehensive empirical data set including information on damage extent, flood impact variables and resistance factors was collected, and data mining, data preparation and data transformation were conducted. Since the function approach is a common and internationally accepted methodology for estimating the value of flood losses, some new relative multi-parameter flood damage assessment functions were derived, calibrated and validated for the most common residential and commercial building types in Australia. The functions were developed using the bootstrapping approach and considered the inherent uncertainty in the data sample. The performance of the new flood loss functions, in comparison to the empirical data, was contrasted with that of well-known flood damage assessment models from overseas and Australia. The new model was then transferred to a study area in Italy to check the ease of using local empirical data, evaluating the accuracy of the outcome, and assessing the ability to change parameters based on building practices across the world. Flood damage assessment is a complicated process and can be dependent on a variety of parameters which are not considered in stage-damage functions. Accordingly, a tree based model was developed for exploring the interaction, importance and influence of other damage-influencing parameters on the extent of losses. Finally, the candidate has explored the predictive performance of the new approaches (i.e. flood loss functions and tree-based flood loss models) in assessing the extent of physical damages after temporal and spatial transfer. The predictive power of these models was tested for precision, variation and reliability, and was also checked for some sub-classes of water depth and some groups of building type. The advantages of the newly derived stage-damage functions compared to the existing Australian models include: calibration with empirical data, greater accuracy in results, a better level of transferability in time and space, consideration of the epistemic uncertainty of data, transparency of the logic behind the model and the ability to change parameters based on building practices across the world. Furthermore, results of the tree-based analysis showed that while water depth is the most significant damage predictor in the area of study, floor space, private precautionary measures, building value and building quality also correlate with the extent of flood losses. Also, the tree-V based models are shown to be more accurate than the stage-damage function. Thus, considering more parameters and taking advantage of tree-based models are recommended. Finally, it has been shown that considering more details of the damaging process can be useful for enhancing the level of transferability of damage models in time and/or space. Overall, this thesis presents a significant contribution to the flood damage assessment process by offering a calibrated and validated flood loss estimation framework. The results provide the input data for subsequent damage reduction, vulnerability mitigation and disaster risk reduction. This study would indirectly increase flooding control measure via flood damage assessment in urban areas.

2.4.5 Biological hazards associated with flooding.

Elina *et al* (2000) did a study changes in hydrological risk perception and implications for disaster risk reduction in Uppsala University. Economic losses caused by hydrological extremes, such as floods and droughts, are exacerbating because of increased anthropogenic activities and global environmental changes. Understanding how individuals and communities interact with hydrological extremes thus becomes fundamental to develop effective strategies for disaster risk reduction. Risk perception plays an important role in determining how individuals and communities respond to the

occurrence of an extreme event. This thesis aims at addressing aspects of risk perception that remain largely unknown. They include: i) how flood risk perceptions change over time, ii) the role of previous experiences, and iii) how the perception of flood risk relates to the perception of other natural hazards, such as droughts. The work is based on survey data collected in different study areas – both in Italy and Sweden at the local and national scales – via longitudinal as well as cross-sectional approaches. In relation to the three main objectives, this thesis found that: i) flood risk perceptions evolve differently over time depending on social groups; ii) different types of previous experiences with floods directly influence specific facets of risk perception, with knowledge deriving from the experience also playing an important role; iii) flood risk perception is heavily intertwined with drought risk perception. These results have policy and theoretical implications. Concerning the former, they can inform disaster risk reduction efforts in terms of risk communication and promote an integrated management of hydrological risk. As for the latter, they stress the importance of taking social heterogeneity into account when modelling the interaction between the social and the hydrological spheres, as this can influence the community's response to extreme events. Fostering human adaptation to climate extremes is a priority. This thesis argues that adaptation can be achieved by promoting the awareness that not only are we at risk, but also that we have the means to address the risk. This deals with similar variables with the present study and is also in concern with economic losses caused by hydrological extremes, such as floods and droughts.

Tonje *et al* (2000) research on Nordic Perspective on Data Availability for Quantification of Losses due to Natural flood Hazards Natural hazards caused enormous amounts of damage worldwide every year in Karlstad University. Since 1994 more than 1.35 billion people have lost their lives and more than 116 million homes have been damaged. Understanding of disaster risk implies knowledge about vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Quantitative damage assessments are a fundamental part of disaster risk management. There are, however, substantial challenges when quantifying damage which depends on the diversity of hazards and the fact that one hazardous event can negatively impact a society in multiple ways. The overall aim of the thesis is to analyze the relationship between climate-related natural hazards and subsequent damage for the purpose of improving the prerequisite for quantitative risk assessments in the future. The thesis concentrates on two specific types of consequences due to two types of hazards, 1) damage to buildings caused by lake floods, and 2) loss of lives caused by quick clay landslides. Several causal relationships were established between risk factors and the extent of damages. Lake water levels increased the probability of structural building damage. Private damage reducing measures decreased the probability of structural building damage. Extent of damage decreased with distance to waterfront but increased with longer flood duration while prewar houses suffered lower flood damage compared to others. Concerning landslides, the number of fatalities increased when the number of humans in the exposed population increased. The main challenges to further damage estimation are data scarcity, insufficient detail level and the fact that the data are rarely systematically collected for scientific purposes. More efforts are needed to create structured, homogeneous and detailed damage databases with corresponding risk factors in order to further develop quantitative damage assessment of natural hazards in a Nordic perspective. This study outcome may help to keep data availability for quantification of losses due to natural flood hazards.

Denis *et al* (2011) carried out a study on impacts of climate oscillation on precipitation and river flows of small scale river basins in Eastern Northeast Brazil. The Northeast region of Brazil is one of the most susceptible parts of the country to the effects of climate variability leading to severe droughts or extreme floods. Indeed, drought is a major issue due to a large semiarid area that covers 53% of the region, which determines the main climate characteristics of this region. On the other hand, extreme floods have caused widespread damage in river basins in the eastern part of Northeast. The Eastern Northeast is the most humid area of the Northeast region. It comprises the Atlantic rain forest and may receive up to 2000 mm precipitation a year, but 70% of total falls are concentrated from April to August, the period defined as its rainy season. The remaining of the year, when 30% of the yearly precipitation falls, is considered as the dry season of the region. This study focuses on investigating the spatial and temporal variability of the seasonal precipitation at river basin scales in Eastern Northeast Brazil, and how climate oscillation factors are connected to the inter-annual variability of the precipitation over the region. This study has shown that the local rainfall variability is dominated by a multi-

annual variation related to the tropical Atlantic Ocean conditions and intensified by the tropical Pacific. Furthermore, flood events were analysed in one of the most affected river basins in the Eastern Northeast region, the Mundaú river basin. The extreme flood event of June 2010 was reproduced by combining hydrological and hydraulic modelling and probabilistic flow estimations. Due to the lack of recorded flows during the event, secondary data sources were used such as water-level to estimate flows from the stage-discharge relationship, and post-event flood marks to calibrate a hydraulic model. Thus, it was possible to simulate the flooded areas of the June 2010 floods, and mapping areas susceptible to flooding for different return periods. The hydrological model was also used to explore flood risk monitoring by using high-resolution data from automatic rain/discharge gauge stations and weather radar, which has recently been installed to monitor river basins of Eastern Northeast Brazil. The radar capability on estimating rainfall was qualitative and quantitative evaluated, and combined with observed rainfall to be applied as input on the hydrological model as a basis for the development of a tool for flooding warning system. The study is related to the present study due to the effects of climate variability leading to severe droughts or extreme floods.

Elin *et al* (2017) examined a study essays on the economic impacts of floods and landslides in Lulea Tekniska University. This study consists of an introduction and four self-contained papers addressing aspects that are important for how the negative societal effects of natural disasters can be handled, using floods and landslides in the Gothenburg region in Sweden as examples. In paper I the valuation of the benefits of reducing the negative effects of floods, namely, property damage, traffic disturbances and water supply security, were analysed, using a choice experiment. To understand what motivates individuals to contribute towards reducing the negative effects of floods, the impact of individual differences in personality traits were also analysed. Data was collected via a web panel, the final sample consisted of 809 responses. The results showed that individuals' were willing to pay to reduce the societal costs of floods, and that personality traits helped to explain heterogeneity in preferences. People scoring high on the personality trait including empathic and altruistic characteristics increased the individuals' probability to support policies aimed at reducing the negative impacts of floods. These results indicate that further investments in flood risk reducing measures should be taken and that public support might increase if policy makers emphasize the welfare gained by society as whole, when designing flood management policies. In paper II the preferences for reducing the negative effects of floods, elicited in paper I, were compared to the preferences of public officials involved in flood risk management. Residents will have to bear the consequences in the future, of decisions made by governments today. Therefore, it can be argued that decisions should reflect residents' preferences. By asking residents and public officials to respond to identical choice-experiment surveys, it was possible to analyse whether priorities and monetary valuations of the negative effects of floods, namely, property damage, traffic disturbances and water supply security, differed. The overall finding was that public officials and residents preferences were quite similar, and that both residents and public officials were willing to pay to reduce the negative effects of floods. The results imply that decisions made within the public sector will likely not differ substantially from residents' preferences. In paper III the trade-offs between the distributional aspects and aspects of economic efficiency in in four selected European countries compensation systems for damages caused by floods, namely Sweden, England, France and the Netherlands, were analysed. These countries differ in terms of the level of flood risk, influenced by the physical conditions, as well as in philosophical standpoint of what constitutes a just distribution of compensation following a flood. These aspects has come to affect the costs and benefits of the trade-off between availability and affordability on the one hand and incentives to promote economically efficient behaviour on the other. Finally, in paper IV individuals' valuation of reducing the negative impacts of landslides, namely, impacts on life, impacts on the environment, impacts on infrastructure, and impacts on important societal services, were analysed, using the choice experiment method. We also evaluated whether individuals valuations were sensitive to the level of risk of landslides. Data was collected via a web panel, the final data sample consisted of 504 responses. We found that reducing

the risk of landslides had an overall a positive impact on individuals' utility. The results also showed that individuals' valuations were sensitive to risk: individuals' willingness to contribute financially to policy programs aimed at reducing the risk of landslides increased when the probability of landslides increased. This study was reviewed because it addresses the economic impacts of floods and landslides.

Mac *et al* (2011) researched on Information Needs for Water Resource and Risk Management: Hydro-Meteorological Data Value and Non-Traditional Information in Data availability is extremely important for water management Uppsala University. Without data it would not be possible to know how much water is available or how often extreme events are likely to occur. The usually available hydro-meteorological data often have a limited representativeness and are affected by errors and uncertainties. Additionally, their collection is resource-intensive and, thus, many areas of the world are severely under-monitored. Other areas are seeing an unprecedented – yet local – wealth of data in the last decades. Additionally, the spread of new technologies together with the integration of different approaches to water management science and practice have uncovered a large amount of soft information that can potentially complement and expand the possibilities of water management. This thesis presents a series of studies that address data opportunities for water management. Firstly, the hydro-meteorological data needs for correctly estimating key processes for water resource management such as precipitation and discharge were evaluated. Secondly, the use of non-traditional sources of information such as social media and human behaviour to improve the efficiency of flood mitigation actions were explored. The results obtained provide guidelines for determining basic hydro-meteorological data needs. For instance, an upper density of 24 rain gauges per 1000 km2 for spatial precipitation estimation beyond which improvements are negligible was found. Additionally, a larger relative value of discharge data respect to precipitation data for calibrating hydrological models was observed. Regarding non-traditional sources of information, social memory of past flooding events was found to be a relevant factor determining the efficiency of flood early warning systems and therefore their damage mitigation potential. Finally, a new methodology to use social media data for probabilistic estimates of flood extent was put forward and shown to achieve results comparable to traditional approaches. This study significantly contributes to integrated water management by improving the understanding of data needs and opportunities of new sources of information thus making water management more efficient and useful for society. This study was reviewed because it addresses the information needs for water resource and risk management.

Diana *et al* (2011) researched on flood hazard assessment in data-scarce basins: use of alternative data and modelling techniques in Uppsala University. Flooding is of great concern world-wide, causing damage to infrastructure, property and loss of life. Low-income countries, in particular, can be negatively affected by flood events due to their inherent vulnerabilities. Moreover, data to perform studies for flood risk management in low-income regions are often scarce or lacking sufficient quality. This thesis proposes new methodologies and explores the use of unconventional sources of information in flood hazard assessment in areas where the quantity or sufficient quality of traditional hydrometrical data are lacking. One method was developed to account for errors in spatially averaged rainfall, from a sparse rain-gauge network, used as input to a rainfall-runoff model. A spatially-averaged and event-dependent rainfall depth multiplier led to improvements of the hydrographs at calibration. And by using a distribution of the multiplier, identified from previous events in the catchment, improvement in predictions could also be obtained. A second method explored the possibility of reproducing an unmeasured extreme flood event using a combination of models, post-event data, precipitation and an uncertainty-analysis framework. This combination allowed the identification of likelihood-associated parameter sets from which the flood hazard map for the extreme event could be obtained. A third and fourth study made at the regional scale explored the value of catchment similarities, and the effects of climate on the hydrological response of catchments. Flood frequency curves were estimated for 36 basins, assumed ungauged, using regional information of short flow records, and local

information about the frequency of the storm. In the second regional study, hydro-climatic information provided great value to constrain predictions of series of daily flow from a hydrological model. Previously described methods, used in combination with unconventional information within an uncertainty analysis, proven to be useful for flood hazard assessment at basins with data limitations. The explored data included: post-event measurements of an extreme flood event, hydro-climate regional information and local precipitation data. The methods presented in this thesis are expected to support development of hydrological studies underpinning flood-risk reduction in data-poor areas. This study is in line with the present research since it is aim at flood hazard assessment in data-scarce Basins.

Johanna (2000) conducted a study on Urban, pluvial flooding: Blue-green infrastructure as a strategy for resilience in Tekniska University. This thesis investigates urban, pluvial flooding and if blue-green infrastructure, for handling of storm water in urban green spaces, can be used as a strategy for resilient flood risk management. Spatial analyses of flood claims from insurance companies and the water utility company of Malmö are used to better understand the mechanisms and characteristics of pluvial flooding and how blue-green infrastructure impacts flood risk. It was found that flooding during intense rainfall often is located closely to the main overland flow paths and the main sewers, while flooding during rainfall with longer duration seem to be more randomly distributed. Combined sewers are more affected by flooding than separate sewers. Blue-green infrastructure can reduce urban, pluvial flooding. The large-scale spatial distribution of flooding with respect to urban flow paths and drainage system are discussed in relation to the small-scale impact of surface water detention in e.g. detention basins and concave green spaces. Based on transition theory, socio-technical transition towards wide-spread implementation of such measures are examined through interviews with municipal and water utility officials. Legal, organizational and financial changes are suggested. A framework for management of spatial data in the strategic planning of blue-green infrastructure is also presented. The thesis consists of a summary and five appended papers, where the first paper serves as a background for the thesis. This study share similarity with the present research due to Urban, pluvial flooding: Blue-green infrastructure as a strategy for resilience.

2.1.3 Appraisal of Literature Review

The appraisal of literature review highlights the followingFlooding, prevalence, physical hazards, psychosocial hazards, chemical hazards, biological hazards, response to the flooding and review of variables of the study. It explains approaches to tackling the hazards of flood at local, state, national and multilateral levels. This factors are capable of influencing the objective variables for this research. The subject of sustainable development is also discussed in the literature. Views of scholars and their approaches to the issues are examined in this chapter. Natural disasters such as flood, erosion, desertification, drought, hurricanes, amongst others happen in many parts of the world. They have long-standing history of occurrence. There have been attempts to address the problem by governments, agencies and organizations. Oosthoek (2020), reviewing the Dutch River System avers that after the surge flood of 1953, the Dutch water authorities decided to embark upon an ambitious plan to reinforce and increase the height of all dikes and levies in Netherlands. This was one of the major steps introduced to tackle the challenge of the flood faced at the time. As the situation changed, the government evolved a dynamic approach to solving the problem. From Oosthek's point of view, it seems each century presented itself with a peculiar problem and the response was fashioned according to the peculiarity of the situation. It was obvious that the government avoided a situation in which the wrong approach was used to tackle a problem. Most of the study reviewed used questionnaire as instruments for data collection, the questionnaire item were designed to sort the opinion or respondents of prevalence, physical, psychosocial, chemical and biological hazards associated with flooding in two senatorial district in Rivers State. For instance, in the 18th century, the overflow and lateral diversion system became central to flood management in the Dutch River System and spill ways, channels and retention basins were carefully planned. As the nature of flood Problems changed, a new approach

was adopted.

CHAPTER THREE

METHODOLOGY

Understanding the health and environmental problems associated with flooding among residents in two senatorial district in Rivers State. The study triangulated at different stages of the work, including the research design, area of the study, population of the study, sample and sampling techniques, instrument for data collection, validation of instrument, reliability of the instrument, methods of data collection and analysis. This is based on the overall need and importance of both qualitative and quantitative data in addressing the objectives and the research questions.

3.1 Research Design

The study adopted a historical analysis research design. This design carefully describe, expatiateand analyze the past events and behavior of the sample based on the events in a natural situation. According to Elendu, (2010) Historical Analysis is the examination of evidence for Arriving at a conclusion of a past Event. It is an artifact like Evidence which is included in a document. As to buttress further Why the need for Historical Analysis is the fact that it help to gain Adequate knowledge of the understanding of past in relation to the present and future events about Life. *It involves collecting data in order to test hypotheses about the current state of affairs of the subject under study.* Weiwei. D. et al., (2010) adopted a historical research study in their work titled: Health Impacts of Floods Queensland University of Technology. Floods are the most common hazard to cause disasters and have led to extensive morbidity and mortality throughout the world. The impact of floods on the human community is related directly to the location and topography of the area, as well as human demographics and characteristics of the built environment.

3.2 Study Area

Rivers State also known simply as Rivers, is a state in the Niger Delta region of southern Nigeria. Formed in 1967, when it split from the former Eastern Region, Rivers State boundary Imo and Abia States to the north, Akwa Ibom State to the east, and Bayelsa and Delta states to the west. The state capital, Port Harcourt, is a metropolis that is considered the commercial center of the Nigerian oil industry.

With a population of 5,198,716 as of the 2006 census, Rivers State is the 6th most populous state in Nigeria. Rivers State is a diverse state that is home to many minority ethnic groups, including the Ogoni, Ikwerre, Ijaw, and people. The state is particularly noted for its linguistic diversity, with 28 indigenous languages being said to be spoken in Rivers State. The 26th largest state by area, Rivers State's geography is dominated by the numerous rivers that flow through it, including the Bonny River.

The economy of Rivers State is dominated by the state's booming petroleum industry. Though the rise of the oil industry has led to increased revenue for the state government, mismanagement and corruption have prevented the state from meaningfully tackling rampant poverty. During the 2000s, Rivers State saw a rise in the number of cult killings committed within the state. In 2019, Governor Ezenwo Nyesom Wike controversially declared Rivers State to be a Christian state. Rivers State, named after the many rivers that boundary its territory, was part of the Oil Rivers Protectorate from 1885 till 1893 when it became part of the Niger Coast Protectorate. In 1900, the region was merged with the chartered territories of the Royal Niger Company to form the colony of Southern Nigeria. The state was formed in 1967 with the split of the Eastern Region of Nigeria. In 1996 the state lost territory to form Bayelsa State. Rivers State is made up different ethnic groups there are four major languages in Rivers State which are; Ikwerre, Ijaw, Kana, Gokana and other minor groups are, Abua, Andoni, Ekpeye, Kalabari, Ndoni, Bille, Okrika, Ogoni, Engenni, Etche, Ibani, Ogba, Egbema etc. These

groups has been in centuries before the state came into existence.

Rivers state has a rich cultural-heritage, they are friendly and known for their hospitality. It is on recorded that Port Harcourt is the second biggest commercial, agriculture and busiest Airport & seaport in Nigeria. There are also oil produces. The executive branch is headed by the Governor, assisted by the Deputy Governor, both elected for a term of 4 years (maximum of 2 terms). The governor appoints commissioners responsible for each of the ministries and appoints the heads of parastatals, and the state-owned bodies with specific regulatory or administrative duties. In some cases, a governor may be replaced or removed for example, through death, impeachment or if an election is annulled by a competent court of law or by a two-thirds majority of the House of Assembly and 23 administrative Local Government Area.

3.3 Population of the Study

The study focused on Senatorial districts that are usually affected by floods in Rivers West, Rivers East and Rivers South.

The population area in the Rivers state is 11, 015, 676. This is the sum of the population of the three (3) senatorial districts under study. The breakdown, according to 2019 review National Population Census figures is as follows: Rivers East-5,198, 716; Rivers South-1,704, 515; Rivers West- 4,112,445. The Census figures give a community by community breakdown of the population. Choice of states is based on geography and the topography of the Region while the choice of the population area is based on non- probability sampling. This enabled the researcher to deliberately choose the sample from the population as representative of the population.

The non-probability sampling technique comprises of quota, accidental, snowball and the purposive or judgment sampling. The researcher is of the view that these senatorial districts serve as a representation of the local governments affected by the foods during the period under study because the geography of the States, located at the Deltaic region of the country wherein the two major rivers in the country, the Niger and Benue Rivers flow into the Atlantic Ocean.

3.3 Sample Size

Sample size of this study consist of residents of the two senatorial district in Rivers State which is *Rivers West Senatorial district, Rivers East Senatorial district that were affected with flooding.*The sample for the study is 1,200 individuals from the various Local Government areas across the three senatorial district in the state, being studied in this research. This figure was arrived at using the Taro Yamene's (1969) statistical Model was applied. That is S= N/1+ Nα 2

Where N= Population Size

S= required sample size

A= level of significance or error margin tolerable (0.005)

RIVERS EAST = $\frac{5,198,716}{1+5,198,716x000.25}$

$\frac{5,198,716}{1 + 12996.79}$

$\frac{}{+ 5198,716}$

12997.76

=399,969

= 600

RIVERS WEST $\frac{1704,515}{1 +1704515x0.0025}$

$\frac{1,705,515}{1+4261.2875}$

1,704,515

4262, 2875

= 399, 906

= 600

The sample size for each Senatorial district in the State is 600

Therefore the total sample size for the study is 600+600 = 1,200.

3.4 Instrument for Data Collection

Research instruments are the means or tools used for data collection. They include questionnaires, interviews and published materials. The researcher administered questionnaires and relied on records/information from ministries, agencies, as well as departments governments, related to this research as major instruments of the field work. The structure of the questionnaire adopted was the open-ended and the pre-coded questions. The instruments were used to highlight the Health and environmental hazards associated with flooding among citizen in two senatorial district in Rivers States under study. The questionnaire for collecting data for this study was designed after carefully reviewing some literature relating to the study for ascertaining the hazards associated with flooding. A total of 1, 200 questionnaires were distributed through research assistants across the two senatorial district in the state.

3.4 Validity of the Instrument

To ascertain the face and validity of the instrument, the researcher consulted the research supervisor and three other lecturers in the Department of Human Kinetics, Health and Safety Education. Copies of the instrument accompanied with the objectives, research questions and hypotheses were given to them for vetting. Their suggestions and contributions were effected on the questionnaire which was used to develop the final copy.

3.5 Reliability of the Instrument

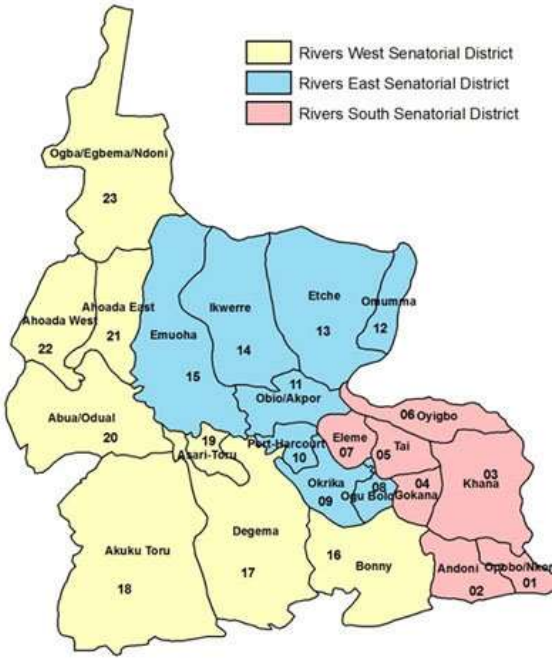
The researcher carried out a test-retest on 90 settlers using 90 copies of the questionnaire to the two senatorial district in Rivers State which is Rivers West Senatorial district, Rivers East Senatorial district. Firstly, 90 copies of the instruments were issued to 90 settlers during the pre-test followed by the re-issuance of the same questionnaire to the same set of settlers after five weeks' period.

3.6 Method of Data Collection:

Ethical approval was obtained for the study from the Head of department of Human Kinetics, Health and Safety Studies of Ignatius Ajuru University of Education Port Harcourt to seek for consent of heads of institutions and agencies in control of flood associated disaster for administering the questionnaires to flood victims and settlers. The instruments was administered to respondents during visits to flood affected *three senatorial district in Rivers State which is Rivers West Senatorial district, Rivers East Senatorial district and Rivers South Senatorial district* in Rivers State over a period of five weeks with the aid of twenty four 24 research assistance that were trained on how to interpret and record the response of respondents on the questionnaire to local language to the uneducated respondents and those who are not confident to fill the questionnaires.

3.7 **Method of Data Analysis**

Data collected was analyzed using Statistical Package for Social Sciences version 25.0 with the use of frequency count, mean and percentage score as descriptive statistical tools while analysis of variance (ANOVA), t-test, z-test were used to test hypothesis at 05 level of significance.



Map of Rivers State

CHAPTER FOUR

RESULTS AND FINDING

Table 4.1: Socio-demographic Data

Variables	Frequency (n=1000)	Percentages
Age		
20-30 years	166	16.6
31-40 years	199	19.9
41-50 years	297	29.7
51-60 years	138	13.8
61 years and above	200	20.0
Gender		
Male	464	46.4
Female	536	53.6
Religious affiliation		
Christianity	861	86.1
Islam	81	8.1
Others	58	5.8
Educational level		
Primary	205	20.5
Secondary	373	37.3
Tertiary	263	26.3
None	159	15.9
Socio-economic		
Employed	547	54.7
Unemployed	136	13.6
Self-employed	317	31.7
Location		
10,000km-20,000km	128	12.8
21,000km-30,000km	401	40.1
31,000km-40,000km	372	37.2
50,000km and above	99	9.9
Marital status		
Single	320	32.0
Married	640	64.0
Separated	20	2.0
Divorced	20	2.0

Table 4.1 shows the socio-demographic data of respondents. The results shows that 166(16.6%) were aged 20-30 years, 199(19.9%) 31-40 years, 297(29.7%) 41-50 years, 138(13.8%) 51-60 years and 200(20.0%) were aged 60 years and above. For gender, 464(46.4%) were males while 536(53.6%) were females. About 861(86.1%) were Christians, 81(8.1%) were Muslims and 58(5.8%) were of other religions. For educational status, 205(20.5%) had primary

education, 373(37.3%) had secondary education, 263(26.3%) had tertiary education and 159(15.9%) had no formal education. for socio-economic status, 547(54.7%) were employed, 136(13.6%) were unemployed and 317(31.7%) were self-employed. For location, 128(12.8%) live within 10,000-20,000, 401(40.1%) 21,000-30,000, 372(37.2%) 31,000-40,000 and 99(9.9%) 50,000 and above.

Research question 1: What is the prevalence of flooding in Rivers State?

Table 4.2: Prevalence of flooding

S/N	Items	A	DA
		Freq %	Freq %
1	Does the flooding in Rivers State affect you?	685(68.5)	315(31.5)
2.	Have you lived in the affected resident for long?	761(76.1)	239(23.9)
3.	Does the flooding come every year?	781(78.1)	219(21.9)
4.	Is there any IDP camp close to your affected L.G.A?	234(23.4)	766(76.6)
5.	Do you receive relief materials during flooding?	181(18.1)	819(81.9)
6.	Does Rivers State government come to your rescue during flooding?	214(21.4)	786(78.6)
7.	Do you have media team in your IDP camp during flooding?	153(15.3)	847(84.7)
8.	Where you given relief materials 3 months after flooding?	141(14.1)	852(85.2)
9.	Do you fumigate your houses after flooding?	183(18.3)	817(81.7)
10.	Do you carry out medical checkup after flooding?	363(36.3)	637(63.7)
11.	Do you borrow to start up your business after flooding?	133(13.3)	867(86.7)
12.	Where there Federal, State or local government official visit to your IDP camp during flooding?	409(40.9)	591(59.1)
	Grand total	**338(33.8)**	**662(66.2)**

Table 4.2 shows the prevalence of flooding. The results showed that 338(33.8%) of the population indicated that they had regular flooding. The results also indicated that 685(68.5%) agreed that flooding affects them, seven hundred and sixty one (76.1%) indicated that they have lived in the affected resident for long and 781(78.1%) also agreed that flooding occurs every year.

Research question 2: What is the physical hazards associated with flooding in two senatorial district Rivers State?

Table 4.3: Physical hazards associated with flooding

S/N	Items	Mean	Standard Deviation
1.	The materials provided made significant impact in cushioning the effect of the flooding on the affected individual.	1.59	0.49
2.	Rivers State Government has criteria at addressing the negative effects of	1.78	1.00

	natural disaster such as flooding.		
3.	There is no much government impact in the affected LGA,	1.76	0.92
4.	There is no enough relief materials during flooding for the affected LGAs	1.61	0.90
5.	Businesses usually crash down.	2.00	0.51
6.	Flooding usually increase hunger among the people	2.38	1.35
7.	Flooding causes inflations of goods and services	1.90	0.70
8.	Flooding causes death	2.11	1.25
9.	Flooding increase illness	1.27	0.63
10.	Flooding increase crime among youths	1.68	0.83
	Grand total	**1.80**	**0.85**

Table 4.3 showed the physical hazards associated with flooding. The table showed that the grand mean = 1.80 is greater than the criterion mean = 1.50. This indicates that physical hazards are associated with flooding. However, among the physical health problems, majority indicated that flooding increases hunger among the people (2.38+1.35).

Research question 3: What is the psychosocial hazards associated with flooding in Rivers State?

Table 4.4: Psychosocial hazards associated with flooding

S/N	Items	Yes	No
		Freq %	Freq %
1.	Was there trauma among flood victims?	599(59.9)	401(40.1)
2.	Was there stressed affected illness as a result of the flooding?	838(83.8)	162(16.2)
3.	Was there raping among affected persons in IDP camps?	599(59.9)	401(40.1)
4.	Were there incidents of crimes among persons?	862(86.2)	138(13.8)
5.	Was there insecurity among the people?	599(59.9)	401(40.1)
6.	Was there school opening for children during flooding?	100(10.0)	900(90.0)
7.	Were there any teachers in IDP camps to teach the children?	599(59.9)	401(40.1)
8.	Was the environment conducive for the children to learn?	393(39.3)	607(60.7)
9.	Were there insecticides or mosquito net in IDP camps?	599(59.9)	401(40.1)
10.	Was there comfort of sleeping in IDP camps?	143(14.3)	857(85.7)
	Grand total	**613(61.3)**	**387(38.7)**

Table 4.4 shows the psychosocial hazards associated with flooding in Rivers State. The results indicated that 613(61.3%) agreed that psychosocial hazards associated with flooding. However, majority of the respondents 862(86.2%) indicated that there were incidents of crime and that stress affected illness as a result of the flooding 838(83.8%).

Research question 4: What is the chemical hazards associated with flooding in two senatorial district in Rivers State?

Table 4.5: Chemical hazards associated with flooding among residents

S/N	Items	Yes	No
		Freq %	Freq %
1.	Were there fumigation?	440(40.0)	860(86.0)
2.	Were there personal hygiene?	118(11.8)	882(88.2)
3.	Were there explosive substances in camp?	168(16.8)	832(83.2)
4.	Were there gas cooker?	265(26.5)	735(73.5)
5.	Were there fire wood?	112(12.2)	888(88.8)
6.	There was no space for athletics in IDP camps?	848(84.8)	152(15.2)
	Grand total	**325(32.5)**	**675(67.5)**

Table 4.5 shows the chemical hazards associated with flooding in two senatorial district in Rivers State. The results showed that 325(32.5%) indicated that chemical hazards are associated with flooding among residents.

Research question 5: What is the environmental health problems associated with flooding in Rivers State?

Table 4.6: Biological problems associated with flooding

S/N	Items	Yes	No
		Freq %	Freq %
1.	Was there several heartbreak of sickness after flooding?	599(59.9)	401(40.1)
2.	Was there erosion after flooding?	868(86.8)	132(13.2)
3.	Was there earth tremor after flooding in residential or official buildings?	809(80.9)	191(19.1)
4.	Were there enough aquatic organisms after flooding?	599(59.9)	401(40.1)
5.	Where there reptiles in residential homes after flooding?	841(84.1)	159(15.9)
6	Where there left over crops after flooding?	207(20.7)	793(79.3)
7.	Where there any plantations farms after flooding?	294(29.4)	706(70.6)
	Grand total	**602(60.2)**	**398(39.8)**

Table 4.6 shows the biological hazards associated with flooding in Rivers State. The results showed that 602(60.2%) indicated that flooding is associated with biological hazards.

AN EMPIRICAL ASSESSMENT OF FLOOD DISASTER IN NIGERIA: A CASE STUDY

OF JIBIA FLOOD DISASTER KATSINA STATE

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Testing of Hypotheses:

Hypothesis 1: There is no significance difference between prevalence of flooding and socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.

Table 4.7: Chi-square test showing significant difference between prevalence of flooding and level of education among residents in two senatorial district Rivers State

Variables	Prevalence of flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Educational level					
Primary	127(62.0)	78(38.0)	205(100)	3	74.132
Secondary	275(73.7)	98(26.3)	373(100)		0.000*
Tertiary	202(76.8)	61(23.2)	263(100)		
None	159(100)	0(0.0)	159(100)		
Total	763(76.3)	237(23.7)	1000(100)		

*Significant. p<0.05

Table 4.7 shows the chi-square test of significant difference between prevalence of flooding and level of education among residents in Rivers State. The result showed that there is a significant difference between prevalence of flooding and level of education among residents in Rivers State (X^2-value= 74.132; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between prevalence of flooding and level of education among residents in Rivers State was rejected.

Table 4.8: Chi-square test showing significant difference between prevalence of flooding and age among residents in two senatorial district in Rivers State

Variables	Prevalence of flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Age					
20-30 years	128(77.1)	38(22.9)	166(100)	4	64.905
31-40 years	159(79.9)	40(20.1)	199(100)		0.000*
41-50 years	196(66.0)	101(34.0)	297(100)		
51-60 years	138(100)	0(0.0)	138(100)		
61 years and above	142(71.0)	58(29.0)	200(100)		
Total	763(76.3)	237(23.7)	1000(100)		

*Significant. p<0.05

Table 4.8 shows the chi-square test of significant difference between prevalence of flooding and age among residents in Rivers State. The result showed that there is a significant difference between prevalence of flooding and age among residents in Rivers State (X^2-value= 64.905; df =4; p<0.05). Thus, the null hypothesis which states that there is no significant difference between prevalence of flooding and age among residents in Rivers State was rejected

Table 4.9: Chi-square test showing significant difference between prevalence of flooding and gender among residents in two senatorial district Rivers State

Variables	Prevalence of flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Gender				1	0.809
Male	348(75.0)	116(25.0)	464(100)		0.368
Female	415(77.4)	121(22.6)	536(100)		
Total	763(76.3)	237(23.7)	1000(100)		

*Not Significant. P>0.05

Table 4.9 shows the chi-square test of significant difference between prevalence of flooding and gender among residents in Rivers State. The result showed that there is a significant difference between prevalence of flooding and gender among residents in Rivers State (X^2-value= 0.809; df =1; p>0.05). Thus, the null hypothesis which states that there is no significant difference between prevalence of flooding and gender among residents in Rivers State was accepted.

Table 4.10: Chi-square test showing significant difference between prevalence of flooding and marital status among residents in two senatorial district in Rivers State

Variables	Prevalence of flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Marital status					
Single	262(81.9)	58(18.1)	320(100)	3	76.564
Married	481(75.2)	159(24.8)	640(100)		0.000*
Separated	20(100)	0(0.0)	20(100)		
Divorced	0(0.0)	20(100)	20(100)		
Total	763(76.3)	237(23.7)	1000(100)		

*Significant. p<0.05

Table 4.10 shows the chi-square test of significant difference between prevalence of flooding and marital status among residents in Rivers State. The result showed that there is a significant difference between prevalence of flooding and marital status among residents in Rivers State (X^2-value= 76.564; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between prevalence of flooding and marital status among residents in Rivers State was rejected.

Table 4.11: Chi-square test showing significant difference between prevalence of flooding and location among residents in two senatorial district in Rivers State

Variables	Prevalence of flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Location					
10,000 km -20,000km	108(84.4)	20(15.6)	128(100)	3	220.155
21,000 km -30,000 km	361(90.0)	40(10.0)	401(100)		0.000*
31,000 km -40,000 km	274(73.7)	98(26.3)	372(100)		
50,000 km and above	20(20.2)	79(79.8)	99(100)		
Total	763(76.3)	237(23.7)	1000(100)		

*Significant. p<0.05

Table 4.11 shows the chi-square test of significant difference between prevalence of flooding and location among residents in Rivers State. The result showed that there is a significant difference between prevalence of flooding and location among residents in Rivers State (X^2-value= 220.155; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between prevalence of flooding and location among residents in Rivers State was rejected.

Hypothesis 2: There is no significance difference between physical hazards associated with flooding and socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.

Table 4.12: Chi-square test showing significant difference between physical hazards associated with flooding and level of education among residents in two senatorial district Rivers State.

Variables	Physical hazards associated with flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Educational level					
Primary	205(100)	0(0.0)	205(100)	3	323.737
Secondary	292(78.3)	81(21.7)	373(100)		0.000*
Tertiary	229(87.1)	34(12.9)	263(100)		
None	38(23.9)	121(76.1)	159(100)		
Total	764(76.4)	236(23.6)	1000(100)		

*Significant. p<0.05

Table 4.12 shows the chi-square test of significant difference between physical hazards associated with flooding and level of education among residents in two senatorial district in Rivers State. The result showed that there is a significant difference between physical health problems associated with flooding and level of education among

residents in Rivers State (X^2-value= 323.737; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between physical hazards associated with flooding and level of education among residents in two senatorial district in Rivers State was rejected.

Table 4.13: Chi-square test showing significant difference between physical hazards associated with flooding and age among residents in Rivers State

Variables	Physical hazards associated with flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Age					
20-30 years	166(100)	0(0.0)	166(100)	4	166.051
31-40 years	178()	21(10.6)	199(100)		0.000*
41-50 years	223(75.1)	74(24.9)	297(100)		
51-60 years	58(42.0)	80(58.0)	138(100)		
61 years and above	139(69.5)	61(30.5)	200(100)		
Total	764(76.4)	236(23.6)	1000(100)		

*Significant. p<0.05

Table 4.13 shows the chi-square test of significant difference between physical hazards associated with flooding and age among residents in two senatorial district in Rivers State. The result showed that there is a significant difference between physical hazards associated with flooding and age among residents in Rivers State (X^2-value= 166.051; df =4; p<0.05). Thus, the null hypothesis which states that there is no significant difference between physical hazards associated with flooding and age among residents in two senatorial district in Rivers State was rejected.

Table 4.14: Chi-square test showing significant difference between physical health problems associated with flooding and gender among residents in two senatorial district Rivers State

Variables	Physical hazards associated with flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Gender					
Male	464(100)	0(0.0)	464(100)	1	267.406
Female	300(56.0)	236(44.0)	536(100)		0.000*
Total	764(76.4)	236(23.6)	1000(100)		

*Significant. p<0.05

Table 4.14 shows the chi-square test of significant difference between physical hazards associated with flooding and gender among residents in two senatorial district in Rivers State. The result showed that there is a significant difference between physical hazards associated with flooding and gender among residents in two senatorial district in Rivers State (X^2-value= 267.406; df =1; p<0.05). Thus, the null hypothesis which states that there is no significant

difference between physical hazards associated with flooding and gender among residents in two senatorial district Rivers State was rejected.

Table 4.15: Chi-square test showing significant difference between physical hazards associated with flooding and marital status among residents in two senatorial districts in Rivers State

Variables	Physical hazards associated with flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Marital status					
Single	246(76.9)	74(23.1)	320(100)	3	71.672
Married	498(77.8)	142(22.2)	640(100)		0.000*
Separated	20(100)	0(0.0)	20(100)		
Divorced	0(0.0)	20(100)	20(100)		
Total	764(76.4)	236(23.6)	1000(100)		

*Significant. p<0.05

Table 4.15 shows the chi-square test of significant difference between physical hazards associated with flooding and marital status among residents in two senatorial district Rivers State. The result showed that there is a significant difference between physical hazards associated with flooding and marital status among residents in two senatorial district Rivers State (X^2-value= 71.672; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between physical hazards associated with flooding and marital status among residents in two senatorial district Rivers State was rejected.

Table 4.16: Chi-square test showing significant difference between physical hazards associated with flooding and location among residents in two senatorial district in Rivers State

Variables	Physical hazards associated with flooding		Total	Df	χ^2
	Yes	No			P-value
	Freq %	Freq %			
Location					
10,000km-20,000km	128(100)	0(0.0)	128(100)	3	461.425
21,000km-30,000km	165(41.1)	236(58.9)	401(100)		0.000*
31,000km-40,000km	372(100)	0(0.0)	372(100)		
50,000km and above	99(100)	0(0.0)	99(100)		
Total	764(76.4)	236(23.6)	1000(100)		

*Significant. p<0.05

Table 4.16 shows the chi-square test of significant difference between physical hazards associated with flooding and location among residents in Rivers State. The result showed that there is a significant difference between physical hazards associated with flooding and location among residents in Rivers State (X^2-value= 461.425; df =3; p<0.05). Thus, the null hypothesis which states that there is no significant difference between physical hazards associated with flooding and location among residents in two senatorial district Rivers State was rejected.

Hypothesis 3: There is no significance difference between psychosocial hazards associated with flooding and socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in Rivers State.

Table 4.17: Anova test showing significant difference between psychosocial hazards associated with flooding and level of education among residents in two senatorial district in Rivers State

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	52.666	3	17.555	98.378	0.000*
Within Groups	177.734	996	.178		
Total	230.400	999			

*Significant. p<0.05

Table 4.17 shows the One-Way ANOVA of significant difference between psychosocial hazards associated with flooding and level of education among residents in Rivers State. The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and level of education among residents in Rivers State [F(3,996) = 98.378; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween psychosocial hazards associated with flooding and level of education among residents in two senatorial district in Rivers State was rejected.

Table 4.18: Anova test showing significant difference between psychosocial hazards associated with flooding and age among residents in two senatorial district in Rivers State

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	61.763	4	15.441	91.104	0.000*
Within Groups	168.637	995	.169		
Total	230.400	999			

*Significant. p<0.05

Table 4.18 shows the One-Way ANOVA of significant difference between psychosocial hazards associated with flooding and age among residents in two senatorial district in Rivers State. The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and age among residents in Rivers State [F(4,995) = 91.104; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween psychosocial hazards associated with flooding and age among residents in Rivers State was rejected.

Table 4.19: Anova test showing significant difference between psychosocial hazards associated with flooding and gender among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	112.191	1	112.191	947.193	0.000*
Within Groups	118.209	998	.118		
Total	230.400	999			

*Significant. p<0.05

Table 4.19 shows the One-Way ANOVA of significant difference between psychosocial hazards associated with flooding and gender among residents in Rivers State. The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and gender among residents in Rivers State [F(1,998) = 947.193; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween psychosocial hazards associated with flooding and gender among residents in Rivers State was rejected

Table 4.20: Anova test showing significant difference between psychosocial associated with flooding and marital status among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	12.819	3	4.273	19.560	0.000*
Within Groups	217.581	996	.218		
Total	230.400	999			

*Significant. p<0.05

Table 4.20 shows the One-Way ANOVA of significant difference between psychosocial hazards associated with flooding and marital status among residents in Rivers State. The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and marital status among residents in Rivers State [F(3,996) = 19.560; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween psychosocial associated with flooding and marital status among residents in two senatorial disrict Rivers State was rejected.

Table 4.21: Anova test showing significant difference between psychosocial hazards associated with flooding and location among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	193.592	3	64.531	1746.158	0.000*
Within Groups	36.808	996	.037		

Total	230.400	999

*Significant. p<0.05

Table 4.21 shows the One-Way ANOVA of significant difference between psychosocial hazards associated with flooding and location among residents in two senatorial district in Rivers State. The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and location among residents in Rivers State [F(3,996) = 1746.158; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween psychosocial hazards associated with flooding and location among residents in two senatorial district Rivers State was rejected.

Hypothesis 4: There is no significance difference between chemical hazards associated with flooding base and socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in Rivers State.

Table 4.22: Anova test showing significant difference between chemical hazards associated with flooding and level of education among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	52.662	3	17.554	123.435	0.000*
Within Groups	141.642	996	.142		
Total	194.304	999			

*Significant. p<0.05

Table 4.22 shows the One-Way ANOVA of significant difference between chemical hazards associated with flooding and level of education among residents in Rivers State. The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and level of education among residents in Rivers State [F(3,996) = 17.554; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween chemical hazards associated with flooding and level of education among residents in Rivers State was rejected.

Table 4.23: Anova test showing significant difference between chemical hazards associated with flooding and age among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	16.983	4	4.246	23.824	0.000*
Within Groups	177.321	995	.178		
Total	194.304	999			

*Significant. p<0.05

Table 4.23 shows the One-Way ANOVA of significant difference between chemical hazards associated with flooding and age among residents in Rivers State. The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and age among residents in Rivers State [F(4,995) = 23.824; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween chemical hazards associated

with flooding and age among residents in Rivers State was rejected.

Table 4.24: Anova test showing significant difference between chemical hazards associated with flooding and gender among residents in two senatorial district Rivers State

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.707	1	28.707	173.009	0.000*
Within Groups	165.597	998	.166		
Total	194.304	999			

*Significant. p<0.05

Table 4.24 shows the One-Way ANOVA of significant difference between chemical hazards associated with flooding and gender among residents in Rivers State. The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and gender among residents in Rivers State [F(1,998) = 173.009; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween chemical hazards associated with flooding and gender among residents in Rivers State was rejected.

Table 4.25: Anova test showing significant difference between chemical hazards associated with flooding and marital status among residents in two senatorial district in Rivers State

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.123	3	2.374	12.633	0.000*
Within Groups	187.181	996	.188		
Total	194.304	999			

*Significant. p<0.05

Table 4.25 shows the One-Way ANOVA of significant difference between chemical hazards associated with flooding and marital status among residents in Rivers State. The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and marital status among residents in Rivers State [F(3,996) = 12.633; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween chemical hazards associated with flooding and marital status among residents in Rivers State was rejected.

Table 4.26: Anova test showing significant difference between chemical hazards associated with flooding and location among residents in two senatorial district in Rivers State

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	72.261	3	24.087	196.577	0.000*
Within Groups	122.043	996	.123		
Total	194.304	999			

*Significant. p<0.05

Table 4.26 shows the One-Way ANOVA of significant difference between chemical hazards associated with flooding and location among residents in Rivers State. The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and location among residents in Rivers State [F(3,996) = 196.577; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween chemical hazards associated with flooding and location among residents in Rivers State was rejected.

Hypothesis 5: There is no significance difference between biological hazards associated with flooding base on socio-demographic characteristics such as level of education, age, gender, marital status and location among residents in two senatorial district in Rivers State.

Table 4.27: Anova test showing significant difference between biological hazards associated with flooding and level of education among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	100.141	3	33.380	225.931	0.000*
Within Groups	147.155	996	.148		
Total	247.296	999			

*Significant. p<0.05

Table 4.27 shows the One-Way ANOVA of significant difference between biological hazards associated with flooding and level of education among residents in Rivers State. The finding of this study shows that there is a significant difference between biological hazards associated with flooding and level of education among residents in Rivers State [F(3,996) = 225.380; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween biological hazards associated with flooding and level of education among residents in Rivers State was rejected.

Table 4.28: Anova test showing significant difference between biological hazards associated with flooding and age among residents in two senatorial district Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	53.830	4	13.457	69.212	0.000*
Within Groups	193.466	995	.194		
Total	247.296	999			

*Significant. p<0.05

Table 4.28 shows the One-Way ANOVA of significant difference between biological hazards associated with flooding and age among residents in Rivers State. The finding of this study shows that there is a significant difference between environmental health problems associated with flooding and age among residents in Rivers State [F(4,995) = 69.212; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween biological hazards associated with flooding and age among residents in Rivers State was rejected.

Table 4.29: Anova test showing significant difference between biological hazards associated with flooding and gender among residents in two senatorial district in Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	130.461	1	130.461	1114.387	0.000*
Within Groups	116.835	998	.117		
Total	247.296	999			

*Significant. p<0.05

Table 4.29 shows the One-Way ANOVA of significant difference between biological hazards associated with flooding and gender among residents in Rivers State. The finding of this study shows that there is a significant difference between biological hazards associated with flooding and gender among residents in Rivers State [F(1,998) = 1114.387; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween biological hazards associated with flooding and gender among residents in Rivers State was rejected.

Table 4.30: Anova test showing significant difference between biological hazards associated with flooding and marital status among residents in two senatorial district Rivers State

Source	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	10.246	3	3.415	14.350	0.000*
Within Groups	237.050	996	.238		
Total	247.296	999			

*Significant. p<0.05

Table 4.31 shows the One-Way ANOVA of significant difference between biological hazards associated with flooding and marital status among residents in Rivers State. The finding of this study shows that there is a significant difference between biological hazards associated with flooding and marital status among residents in Rivers State [F(3,996) = 14.350; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween biological hazards associated with flooding and marital status among residents in Rivers State was rejected.

Table 4.31: Anova test showing significant difference between biological hazards associated with flooding and location among residents in two senatorial district in Rivers State

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	173.272	3	57.757	777.129	0.000*
Within Groups	74.024	996	.074		
Total	247.296	999			

*Significant. p<0.05

Table 4.31 shows the One-Way ANOVA of significant difference between biological hazards associated with flooding and location among residents in Rivers State. The finding of this study shows that there is a significant difference between biological hazards associated with flooding and location among residents in Rivers State [F(3,996) = 777.129; p<0.05]. Therefore, the null hypothesis which states that there is no significant differencebetween biological hazards associated with flooding and location among residents

in Rivers State was rejected.

Summary of findings

1) The results showed that 338(33.8%) of the population indicated that they had regular flooding. The results also indicated that 685(68.5%) agreed that flooding affects them, seven hundred and sixty one (76.1%) indicated that they have lived in the affected resident for long and 781(78.1%) also agreed that flooding occurs every year.
2) The finding showed that physical hazards are associated with flooding with majority of the participants indicating that flooding increases hunger among the people (2.38+1.35).
3) The results indicated that 613(61.3%) agreed that psychosocial hazards associated with flooding.
4) The results showed that 325(32.5%) indicated that chemical hazards are associated with flooding among residents.
5) The results showed that 602(60.2%) indicated that flooding is associated with biological hazards.
6) AN EMPIRICAL ASSESSMENT OF FLOOD DISASTER IN NIGERIA: A CASE STUDY
7) OF JIBIA FLOOD DISASTER KATSINA STATE
8) Suleiman Iguda Ladan
9) Department of Basic and Applied Sciences
10) College of Science and Technology
11) Hassan Usman Katsina Polytechnic, Katsina
6) The result showed that there is a significant difference between prevalence of flooding and level of education among residents in Rivers State (X^2-value= 74.132; df =3; p<0.05).
7) The result showed that there is a significant difference between prevalence of flooding and age among residents in Rivers State (X^2-value= 64.905; df =4; p<0.05).
8) The result showed that there is a no significant difference between prevalence of flooding and gender among residents in Rivers State (X^2-value= 0.809; df =1; p>0.05).
9) The result showed that there is a significant difference between prevalence of flooding and marital status among residents in Rivers State (X^2-value= 76.564; df =3; p<0.05).
10) The result showed that there is a significant difference between prevalence of flooding and location among residents in Rivers State (X^2-value= 220.155; df =3; p<0.05).
11) The result showed that there is a significant difference between physical hazards associated with flooding and level of education among residents in Rivers State (X^2-value= 323.737; df =3; p<0.05).
12) The result showed that there is a significant difference between physical hazards associated with flooding and age among residents in Rivers State (X^2-value= 166.051; df =4; p<0.05).
13) The result showed that there is a significant difference between physical hazards associated with flooding and marital status among residents in Rivers State (X^2-value= 71.672; df =3; p<0.05).
14) The result showed that there is a significant difference between physical hazards associated with flooding and location among residents in Rivers State (X^2-value= 461.425; df =3; p<0.05).
15) The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and level of education among residents in Rivers State [F(3,996) = 98.378; p<0.05].
16) The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and age among residents in Rivers State [F(4,995) = 91.104; p<0.05].
17) The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and gender among residents in Rivers State [F(1,998) = 947.193; p<0.05].
18) The finding of this study shows that there is a significant difference between psychosocial hazards associated with flooding and marital status among residents in Rivers State [F(3,996) = 19.560; p<0.05].
19) The finding of this study shows that there is a significant difference between psychosocial

hazards associated with flooding and location among residents in Rivers State [F(3,996) = 1746.158; p<0.05].

20) The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and level of education among residents in Rivers State [F(3,996) = 17.554; p<0.05].
21) The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and age among residents in Rivers State [F(4,995) = 23.824; p<0.05].
22) The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and gender among residents in Rivers State [F(1,998) = 173.009; p<0.05].
23) The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and marital status among residents in Rivers State [F(3,996) = 12.633; p<0.05].
24) The finding of this study shows that there is a significant difference between chemical hazards associated with flooding and location among residents in Rivers State [F(3,996) = 196.577; p<0.05].
25) The finding of this study shows that there is a significant difference between biological hazards associated with flooding and level of education among residents in Rivers State [F(3,996) = 225.380; p<0.05].
26) The finding of this study shows that there is a significant difference between biological hazards associated with flooding and age among residents in Rivers State [F(4,995) = 69.212; p<0.05].
27) The finding of this study shows that there is a significant difference between biological hazards associated with flooding and gender among residents in Rivers State [F(1,998) = 1114.387; p<0.05].
28) The finding of this study shows that there is a significant difference between biological hazards associated with flooding and marital status among residents in Rivers State [F(3,996) = 14.350; p<0.05].
29) The finding of this study shows that there is a significant difference between biological hazards associated with flooding and location among residents in Rivers State [F(3,996) = 777.129; p<0.05].

4.2 Empirical Review

4.2.1 Prevalence of flooding

The finding of the study showed that less than half of the population indicated that they had regular flooding, more than half agreed that flooding affects them with majority indicating that they have lived in the affected resident for long as flooding occurs every year. This shows that flooding has been a regular occurrence around Nigeria, especially in the Niger Delta part including Rivers State. The finding of the study corroborates with that of Abrahim *et al* (2011), Agbonkhele *et al* (2014) and Michael and Oyewale (2013) whose studies reported that there were regular flooding in their study areas. However, most of this flooding occurred in locations very close to water bodies while others were as a result of human activities such as blocking of water ways with either houses or other construction thereby obstructing water movement.

The finding of the study is also in keeping with that of NEMA (2012), Sussan *et al* (2012) and Uchenna (2018). Their studies discovered that there was the prevalence of flooding in their study areas. The finding of the study is also consistent with that of Vimalkumar (2005), Karin *et al* (2016) and Zahra *et al* (2005) whose studies was able to record high prevalence of flooding in study areas. Hence, by implication, it shows that flooding can occur any point in time especially with the recent environmental degradation and rise in temperature leading to rise in the volume of water the sea and other water bodies can accumulate. However, the result of this study also indicated a significant difference between prevalence of flooding and education, age, gender, marital status and location. This also indicates that some of these independent variables can actually influence the prevalence of flooding in some areas.

For example, education can help individual know that building on water bodies can obstruct water movement thereby leading to flooding. Again, location seems to be an important factor in the prevalence of flooding. A case study is when individuals decide to build and live in areas very close to water bodies or areas of low lands that can be occupied by water at any point in time. Hence, there is need for the Government and relevant stake holders to sensitize the public on the importance of preventing flooding with their little efforts. The similarities as reported between these studies might be attributed to the fact that flooding is a natural occurrence. Hence, it can occur at anytime and anywhere if strategies are not put in place for prompt prevention and intervention.

4.2.2 Physical hazards associated with flooding

The finding of the study showed that physical hazards are associated with flooding with majority of the participants indicating that flooding increases hunger among the people. This shows that during flooding, individuals are exposed to some conditions that may harm them physically. The finding of the study is similar to that of Weiwei *et al* (2010), Paola *et al* (2014) and Carmen *et al* (2015) whose studies reported that flooding is associated with physical hazards. The finding of the study is also in view with that of Euripides and Virginia (2004), Katarzyna *et al* (2012) and Lowe *et al* (2013). These studies reported that flooding are associated with physical hazards especially that of injuries and drowning.

The finding of the study corroborates that of Erik (2000) and Wei *et al* (2014) whose studies reported disaster as a major physical hazards associated with flooding. By implication, this shows that there is a lot of physical hazards associated with flooding. Hence, the similarities reported between these studies. However, the finding of this study also indicated that variables such as education, age, gender, marital status and location contribute to the physical health problems experienced during flooding. For example, during disaster, men are opportune to protect themselves against physical harm compared to the women. This is because they have the physical strength to do that. Hence, for the fact that physical hazards will occur during flooding, there is need for relevant agencies especially designated agencies such as National Environmental Protection Agency to be prepared for quick intervention in order to save lives during flooding.

4.2.3 Psychosocial hazards associated with flooding

The finding of the study showed that more than half of the respondents agreed that psychosocial hazards are associated with flooding. This indicates that individual in flooding affected zones are always suffering from psychosocial issues during flooding. The finding of the study is in keeping with that of Carla *et al* (2012), Ana *et al* (2015), Ai *et al* (2017) and Lamond (2014). Their studies reported that flooding contributes to psychosocial hazards among affected individuals. The finding of the study also correspond with the findings of Daiga *et al* (2018), Sebastien *et al* (2017), Tabasson *et al* (2021) and Hector (2014) whose studies discovered that those affected with flooding usually come down with psychosocial issues.

However, the result of this study added that independent variables such as education level, age, gender etc can significantly influence psychosocial hazards during flooding. By implication, the major essence for mental health problems encountered by affected individuals during flooding is simply because flooding moves with destructions of properties and sources of livelihood. Hence, when affected individual discover they have no other sources to depend on, they begin to think and develop psychosocial hazards (Sebastien *et al.,* 2017). This psychosocial hazards can increase or become serious when the Government and society fail to support those that have been affected with the dangers of flooding. In some cases, affected individuals can also be displaced making them or forcing them live in internally displaced camps which may further increase their psychological problems.

4.2.4 Chemical hazards associated with flooding

The finding of the study showed that less than half of the population indicated that social health problems are associated with flooding among residents. By implication, this shows that flooding affects the social health of individuals in the affected zones. The finding of this study is in view with the studies of Sylvia *et al* (2006), Ase *et al* (2000) and Vidya et al (2019). Their findings reported that flooding has been well known to

disrupt social activities in affected zones. The finding of the study is also similar to the studies of WHO (2017), and Jiseon *et al* (2020). They discovered that flooding contributes to the stoppage of social activities as a result of the effect caused on the environment such as over flow of water in social environments and places used for social gathering.

The finding of this study corroborates that of Lisa and Stockholms (2005) and Roozbeh (2018) whose studies reported that flooding is associated with chemical hazards as it has forced social activities to be restricted. The similarities reported between these studies might be due to the fact that flooding is the same around the world. However, the consequence it comes along with depends on its volume. Hence, there is need for emergency preparedness in response to the flooding should it occur. There is also the need for specialised agencies to monitor and follow up metrological warnings regarding environmental disasters.

4.2.5 Biological hazards associated with flooding

The finding of the study showed that majority of the population indicated that flooding is associated with biological hazards. This means that all flooding will come with an effect on the environment when it occurs. The finding of this study is similar to that of Tonje *et al* (2000), Denis *et al* (2011) and Elin *et al* (2017) whose studies reported that flooding is associated with environmental problems such as erosion, environmental pollution of water bodies and destruction of agriculture produce and farm lands including the extinction of water animals.

The finding of the study is in keeping with that of Mac *et al* (2011), Diana *et al* (2011) and Johanna (2000). These studies noted that flooding has contributed to the destruction of the environment. By implication, flooding has been known around the world as one of the natural disasters can affect the environment negatively. The similarities as reported between the present and previous studies is due to the fact that flooding is used to wash away of the top soil and causing erosion including the destruction of agricultural produce which may also lead to food insecurity in the society. However, human factor has been known to contribute to environmental problems which have also helped in the prevalence of flooding. This includes activities that encourage the burning of the ozone layers given rise to high temperature etc.

1) AN EMPIRICAL ASSESSMENT OF FLOOD DISASTER IN NIGERIA: A CASE STUDY
2) OF JIBIA FLOOD DISASTER KATSINA STATE
3) Suleiman Iguda Ladan
4) Department of Basic and Applied Sciences
5) College of Science and Technology
6) Hassan Usman Katsina Polytechnic, Katsi

SPSS OUTPUT

```
RELIABILITY
  /VARIABLES=q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18
  q19 q20 q21 q22 q23 q24 q25 q26 q27 q28 q29 q30 q31 q32 q33 q34 q35 q36
  q37 q38 q39 q40 q41 q42 q43 q44 q45 q46 q47 q48 q49 q50 q51 q52 q53
  /SCALE('ALL VARIABLES') ALL/MODEL=ALPHA.
```

Reliability

[DataSet0]

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	50	100.0
	Excluded(a)	0	.0
	Total	50	100.0

a Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.787	53

Frequency Table

age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30 years	166	16.6	16.6	16.6
	31-40 years	199	19.9	19.9	36.5
	41-50 years	297	29.7	29.7	66.2
	51-60 years	138	13.8	13.8	80.0
	61 years and above	200	20.0	20.0	100.0
	Total	1000	100.0	100.0	

gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	464	46.4	46.4	46.4
	female	536	53.6	53.6	100.0
	Total	1000	100.0	100.0	

religious affiliation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	christianity	861	86.1	86.1	86.1
	islam	81	8.1	8.1	94.2
	others	58	5.8	5.8	100.0
	Total	1000	100.0	100.0	

educational level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	primary	205	20.5	20.5	20.5
	secondary	373	37.3	37.3	57.8

	tertiary	263	26.3	26.3	84.1
	none	159	15.9	15.9	100.0
	Total	1000	100.0	100.0	

socio-economic status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	employed	547	54.7	54.7	54.7
	unemployed	136	13.6	13.6	68.3
	self-employed	317	31.7	31.7	100.0
	Total	1000	100.0	100.0	

location level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10,000-20,000	128	12.8	12.8	12.8
	21,000-30,000	401	40.1	40.1	52.9
	31,000-40,000	372	37.2	37.2	90.1
	50,000 and above	99	9.9	9.9	100.0
	Total	1000	100.0	100.0	

marital status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	single	320	32.0	32.0	32.0
	married	640	64.0	64.0	96.0
	separated	20	2.0	2.0	98.0
	divorced	20	2.0	2.0	100.0
	Total	1000	100.0	100.0	

Do the flooding in Rivers State affect you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	685	68.5	68.5	68.5

	no	315	31.5	31.5	100.0
	Total	1000	100.0	100.0	

Have you lived in the affected resident for long?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	761	76.1	76.1	76.1
	no	239	23.9	23.9	100.0
	Total	1000	100.0	100.0	

Do the flooding come every year?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	781	78.1	78.1	78.1
	no	219	21.9	21.9	100.0
	Total	1000	100.0	100.0	

Is there any IDP camp close to your affected L.G.A?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	234	23.4	23.4	23.4
	no	766	76.6	76.6	100.0
	Total	1000	100.0	100.0	

Do you receive relief materials during flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	181	18.1	18.1	18.1
	no	819	81.9	81.9	100.0
	Total	1000	100.0	100.0	

Do Rivers State government come to your rescue during flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	214	21.4	21.4	21.4
	no	786	78.6	78.6	100.0
	Total	1000	100.0	100.0	

Do you have media team in your IDP camp during flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	153	15.3	15.3	15.3
	no	847	84.7	84.7	100.0
	Total	1000	100.0	100.0	

Where you given relief materials 3 months after flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	141	14.1	14.1	14.1
	no	859	85.9	85.9	100.0
	Total	1000	100.0	100.0	

Do you fumigate your houses after flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	148	14.8	14.8	14.8
	no	852	85.2	85.2	100.0
	Total	1000	100.0	100.0	

Do you carry out medical checkup after flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	183	18.3	18.3	18.3
	no	817	81.7	81.7	100.0
	Total	1000	100.0	100.0	

Do you borrow to start up your business after flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	363	36.3	36.3	36.3
	no	637	63.7	63.7	100.0
	Total	1000	100.0	100.0	

Do any government optical visit your LGA during and after flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	133	13.3	13.3	13.3
	no	867	86.7	86.7	100.0
	Total	1000	100.0	100.0	

Where there Federal, State or local government official visit to your IDP camp during flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	409	40.9	40.9	40.9
	no	591	59.1	59.1	100.0
	Total	1000	100.0	100.0	

Descriptive Statistics

	N	Mean	Std. Deviation
Where there Federal, State or local government official visit to your IDP camp during flooding	1000	1.5910	.49190
The materials provided made significant impact in cushioning the effect of the flooding on the affected individual	1000	1.7860	1.00360
Rivers State government has a criteria at addressing the negative effects of natural disaster such as flooding	1000	1.7620	.92963
There is no much government impact in the affected LGA	1000	1.6150	.90199
There is no enough relief materials during flooding for the affected LGAs	1000	2.0070	.51109
Businesses usually crash down	1000	2.3830	1.35431
Flooding usually increase hunger among the people	1000	1.9080	.70855

Flooding causes inflations of goods and services	1000	2.1130	1.25850
Flooding causes death	1000	1.2790	.63369
Flooding increase illness	1000	1.6890	.83844
Valid N (listwise)	1000		

Was there trauma among flood victims?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	599	59.9	59.9	59.9
	no	401	40.1	40.1	100.0
	Total	1000	100.0	100.0	

Was there stressed affected illness as a result of the flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	838	83.8	83.8	83.8
	no	162	16.2	16.2	100.0
	Total	1000	100.0	100.0	

Was there raping among affected persons in IDP camps?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	599	59.9	59.9	59.9
	no	401	40.1	40.1	100.0
	Total	1000	100.0	100.0	

Was there incidents of crimes among persons?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	862	86.2	86.2	86.2
	no	138	13.8	13.8	100.0
	Total	1000	100.0	100.0	

Was there insecurity among the people?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	599	59.9	59.9	59.9
	no	401	40.1	40.1	100.0
	Total	1000	100.0	100.0	

Was there school opening for children during flooding?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	900	90.0	90.0	90.0
	no	100	10.0	10.0	100.0
	Total	1000	100.0	100.0	

Was there any teachers in IDP camps to teach the children?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	599	59.9	59.9	59.9
	no	401	40.1	40.1	100.0
	Total	1000	100.0	100.0	

Was the environment conducive for the children to learn?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	393	39.3	39.3	39.3
	no	607	60.7	60.7	100.0
	Total	1000	100.0	100.0	

Was there insecticides or mosquito net in IDP camps?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	599	59.9	59.9	59.9
	no	401	40.1	40.1	100.0
	Total	1000	100.0	100.0	

Was there comfort of sleeping in IDP camps?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	143	14.3	14.3	14.3
	no	857	85.7	85.7	100.0
	Total	1000	100.0	100.0	

Was there room for couple to have sex?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	440	44.0	44.0	44.0
	no	560	56.0	56.0	100.0
	Total	1000	100.0	100.0	

Do they practice personal hygiene?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	118	11.8	11.8	11.8
	no	882	88.2	88.2	100.0
	Total	1000	100.0	100.0	

Was there room for cultural festival?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	168	16.8	16.8	16.8
	no	832	83.2	83.2	100.0
	Total	1000	100.0	100.0	

Was there room for religious activities?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	265	26.5	26.5	26.5
	no	735	73.5	73.5	100.0
	Total	1000	100.0	100.0	

Was there room for market places?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	112	11.2	11.2	11.2
	no	888	88.8	88.8	100.0
	Total	1000	100.0	100.0	

Was there space for athletics in IDP camps?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	848	84.8	84.8	84.8
	no	152	15.2	15.2	100.0
	Total	1000	100.0	100.0	

Educational level * prevalence of flooding Crosstabulation

			prevalence of flooding		Total
			present	absent	present
educational level	primary	Count	127	78	205
		% within educational level	62.0%	38.0%	100.0%
	secondary	Count	275	98	373
		% within educational level	73.7%	26.3%	100.0%
	tertiary	Count	202	61	263
		% within educational level	76.8%	23.2%	100.0%
	none	Count	159	0	159
		% within educational level	100.0%	.0%	100.0%
Total		Count	763	237	1000
		% within educational level	76.3%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)

Pearson Chi-Square	74.132(a)	3	.000
Likelihood Ratio	108.324	3	.000
Linear-by-Linear Association	64.620	1	.000
N of Valid Cases	1000		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 37.68.

age * prevalence of flooding Crosstabulation

			prevalence of flooding		Total
			present	absent	present
age	20-30 years	Count	128	38	166
		% within age	77.1%	22.9%	100.0%
	31-40 years	Count	159	40	199
		% within age	79.9%	20.1%	100.0%
	41-50 years	Count	196	101	297
		% within age	66.0%	34.0%	100.0%
	51-60 years	Count	138	0	138
		% within age	100.0%	.0%	100.0%
	61 years and above	Count	142	58	200
		% within age	71.0%	29.0%	100.0%
Total		Count	763	237	1000
		% within age	76.3%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	64.905(a)	4	.000
Likelihood Ratio	95.215	4	.000
Linear-by-Linear Association	.008	1	.927
N of Valid Cases	1000		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.71.

gender * prevalence of flooding Crosstabulation

		prevalence of flooding	Total

			present	absent	present
gender	male	Count	348	116	464
		% within gender	75.0%	25.0%	100.0%
	female	Count	415	121	536
		% within gender	77.4%	22.6%	100.0%
Total		Count	763	237	1000
		% within gender	76.3%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.809(b)	1	.368		
Continuity Correction(a)	.680	1	.409		
Likelihood Ratio	.808	1	.369		
Fisher's Exact Test				.372	.205
Linear-by-Linear Association	.808	1	.369		
N of Valid Cases	1000				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 109.97.

marital status * prevalence of flooding Crosstabulation

			prevalence of flooding		Total
			present	absent	present
marital status	single	Count	262	58	320
		% within marital status	81.9%	18.1%	100.0%
	married	Count	481	159	640
		% within marital status	75.2%	24.8%	100.0%
	separated	Count	20	0	20
		% within marital status	100.0%	.0%	100.0%
	divorced	Count	0	20	20
		% within marital status	.0%	100.0%	100.0%
Total		Count	763	237	1000

	% within marital status	76.3%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	76.564(a)	3	.000
Likelihood Ratio	74.709	3	.000
Linear-by-Linear Association	29.828	1	.000
N of Valid Cases	1000		

a 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.74.

location level * prevalence of flooding Crosstabulation

			prevalence of flooding		Total
			present	absent	present
location level	10,000-20,000	Count	108	20	128
		% within location level	84.4%	15.6%	100.0%
	21,000-30,000	Count	361	40	401
		% within location level	90.0%	10.0%	100.0%
	31,000-40,000	Count	274	98	372
		% within location level	73.7%	26.3%	100.0%
	50,000 and above	Count	20	79	99
		% within location level	20.2%	79.8%	100.0%
Total		Count	763	237	1000
		% within location level	76.3%	23.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	220.115(a)	3	.000
Likelihood Ratio	195.326	3	.000
Linear-by-Linear Association	135.823	1	.000
N of Valid Cases	1000		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.46.

educational level * physical problems associated with flooding Crosstabulation

			physical problems associated with flooding		Total
			present	absent	present
educational level	primary	Count	205	0	205
		% within educational level	100.0%	.0%	100.0%
	secondary	Count	292	81	373
		% within educational level	78.3%	21.7%	100.0%
	tertiary	Count	229	34	263
		% within educational level	87.1%	12.9%	100.0%
	none	Count	38	121	159
		% within educational level	23.9%	76.1%	100.0%
Total		Count	764	236	1000
		% within educational level	76.4%	23.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	323.737(a)	3	.000
Likelihood Ratio	325.088	3	.000
Linear-by-Linear Association	201.842	1	.000
N of Valid Cases	1000		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 37.52.

age * physical problems associated with flooding Crosstabulation

			physical problems associated with flooding		Total

			present	absent	present
age	20-30 years	Count	166	0	166
		% within age	100.0%	.0%	100.0%
	31-40 years	Count	178	21	199
		% within age	89.4%	10.6%	100.0%
	41-50 years	Count	223	74	297
		% within age	75.1%	24.9%	100.0%
	51-60 years	Count	58	80	138
		% within age	42.0%	58.0%	100.0%
	61 years and above	Count	139	61	200
		% within age	69.5%	30.5%	100.0%
Total		Count	764	236	1000
		% within age	76.4%	23.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	166.051(a)	4	.000
Likelihood Ratio	191.420	4	.000
Linear-by-Linear Association	98.958	1	.000
N of Valid Cases	1000		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.57.

gender * physical problems associated with flooding Crosstabulation

			physical problems associated with flooding		Total
			present	absent	present
gender	male	Count	464	0	464
		% within gender	100.0%	.0%	100.0%
	female	Count	300	236	536
		% within gender	56.0%	44.0%	100.0%
Total		Count	764	236	1000

	% within gender	76.4%	23.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	267.406(b)	1	.000		
Continuity Correction(a)	264.970	1	.000		
Likelihood Ratio	357.457	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	267.139	1	.000		
N of Valid Cases	1000				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 109.50.

marital status * physical problems associated with flooding Crosstabulation

			physical problems associated with flooding		Total
			present	absent	present
marital status	single	Count	246	74	320
		% within marital status	76.9%	23.1%	100.0%
	married	Count	498	142	640
		% within marital status	77.8%	22.2%	100.0%
	separated	Count	20	0	20
		% within marital status	100.0%	.0%	100.0%
	divorced	Count	0	20	20
		% within marital status	.0%	100.0%	100.0%
Total		Count	764	236	1000
		% within marital status	76.4%	23.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	71.672(a)	3	.000

Likelihood Ratio	69.283	3	.000
Linear-by-Linear Association	11.769	1	.001
N of Valid Cases	1000		

a 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.72.

location level * physical problems associated with flooding Crosstabulation

			physical problems associated with flooding		Total
			present	absent	present
location level	10,000-20,000	Count	128	0	128
		% within location level	100.0%	.0%	100.0%
	21,000-30,000	Count	165	236	401
		% within location level	41.1%	58.9%	100.0%
	31,000-40,000	Count	372	0	372
		% within location level	100.0%	.0%	100.0%
	50,000 and above	Count	99	0	99
		% within location level	100.0%	.0%	100.0%
Total		Count	764	236	1000
		% within location level	76.4%	23.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	461.425(a)	3	.000
Likelihood Ratio	549.584	3	.000
Linear-by-Linear Association	86.047	1	.000
N of Valid Cases	1000		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.36.

ANOVA

Mental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	52.666	3	17.555	98.378	.000
Within Groups	177.734	996	.178		
Total	230.400	999			

ANOVA

Mental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	61.763	4	15.441	91.104	.000
Within Groups	168.637	995	.169		
Total	230.400	999			

ANOVA

Mental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	112.191	1	112.191	947.193	.000
Within Groups	118.209	998	.118		
Total	230.400	999			

ANOVA

Mental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.819	3	4.273	19.560	.000
Within Groups	217.581	996	.218		
Total	230.400	999			

ANOVA

Mental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	193.592	3	64.531	1746.158	.000
Within Groups	36.808	996	.037		
Total	230.400	999			

ANOVA

Social problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	52.662	3	17.554	123.435	.000
Within Groups	141.642	996	.142		
Total	194.304	999			

ANOVA

Social problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.983	4	4.246	23.824	.000
Within Groups	177.321	995	.178		
Total	194.304	999			

ANOVA

Social problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.707	1	28.707	173.009	.000
Within Groups	165.597	998	.166		
Total	194.304	999			

ANOVA

Social problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.123	3	2.374	12.633	.000
Within Groups	187.181	996	.188		
Total	194.304	999			

ANOVA

Social problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	72.261	3	24.087	196.577	.000
Within Groups	122.043	996	.123		
Total	194.304	999			

ANOVA

Environmental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	100.141	3	33.380	225.931	.000
Within Groups	147.155	996	.148		
Total	247.296	999			

ANOVA

Environmental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	53.830	4	13.457	69.212	.000
Within Groups	193.466	995	.194		
Total	247.296	999			

ANOVA

Environmental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	130.461	1	130.461	1114.387	.000
Within Groups	116.835	998	.117		
Total	247.296	999			

ANOVA

Environmental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.246	3	3.415	14.350	.000
Within Groups	237.050	996	.238		
Total	247.296	999			

ANOVA

Environmental problems associated with flooding

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	173.272	3	57.757	777.129	.000
Within Groups	74.024	996	.074		
Total	247.296	999			

Versally experienced natural hazard particularly in settlements around water bodies and Nigeria, floods are common environmental problem which represent a major risk to river side populations and along flood plains. From the year 2010 to date, series of flood disasters have occurred in different parts of the country. The floods in this year 2018 were devastating to the extent that the National Emergency Management Agency has declared a 'national disaster' after many people died as a result of floods across the country.

This paper is undertaking an empirical assessment of the flood disaster that occurred at the border town of Jibia, northern Nigeria. Data for the study were gathered through direct observational technique that involved field visits to the affected parts of the town and interview with the local people and the officials concerned.

The results have shown that the floods were caused by unprecedented heavy rains, stream diversion and silting of stream pool, blockage of flood waters by River Jibia, silting of the Jibia dam, inadequate drainages and construction of houses close to the storm drainage.

The impacts of the flood were devastating as 68 people

died and 498 houses were damaged by the flood waters including house hold properties and items. A total of 2,604 persons comprising mainly children and women were displaced according to official figures.

The disaster response measures taken by the Government include creation of camps for displaced persons, provision of relief materials, medical assistance and assessment of the disaster affected areas.

This paper recommends prompt repairs of damaged infrastructures, dredging and de-silting of the Jibia dam and stream pool, construction of wider and deeper drainages and re-location of houses away from the storm drainage as flood disaster prevention measures.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary:

The study examined the health and environmental hazards associated with flooding among residents in two senatorial district Rivers State. It explored the prevalence, physical, psychosocial, chemical and biological hazards that associate with flooding. The study assessed the prevalence of victims in Rivers South East, Rivers South West and senatorial district all in Rivers States and explained controlled towards addressing the hazards in Rivers State.. Although, over 2/3 of the state were affected by different types of flood, three senatorial districts were chosen as case study in this research.

They are Rivers East, Rivers West and Rivers South senatorial districts. A total of 1200 persons were chosen for the study using the Taro Yamene's 1963 statistical model with data presentedin tables and charts. Simple percentage method was used in analyzing the data obtained from the field with regards to the victims of the incident, while the descriptive method was adopted to explain the responses obtain from the relevant ministries/ agencies in Rivers State. The flood that affected the state under study was mainly as a result of the release of water from the Lagos Dam in northern Cameroon. The release of this water as a result of executive rainfall saw the flow of water from the River Benue down to the lower Niger region. Then the geography and topography of the area, it permitted the flow of water into the tributaries that emptied themselves to the Atlantic Ocean.

The response agencies made frantic efforts to respond to the Problems through evacuation of the victims out of the flooded' areas and setting up Internally Displaced Persons (IDPs) camps, provision of food and non-food items. However, the activities of these agencies were hampered through a number of factors which were internal and external in nature.

5.2 Conclusion:

The 2019/2020 flood caused severe social and economic consequences to victims. Although, Rivers State and Federal government has a policy on natural disasters such as flood and erosion, the implementation of these policies has been problematic. This challenges cuts across various organs of implementation of government policies. The response of Rivers State government and agencies is reactionary rather than being proactive. It therefore cost both government and victims huge economic losses and is saddled with making plans for recovery in the various sectors affected in order to ameliorate the plight of the victims. In addition, Rivers State Government and agencies at both the federal and state levels were hampered by internal and external factors, which largely include bureaucratic bottle neck in accessing funds to carry out their responsibilities.

5.3 Recommendations:

From the analysis made in the course of this study, the Researcher makes the following recommendations:

Governments at the Federal and State levels should restructure and strengthen relevant Ministries and Agencies to enable them fully implement natural disaster management policies in Nigeria.

Response agencies should create effective and efficient early warning systems to ensure government' and residents proper response to impending natural disasters in order to reduce socio-economic impacts.

The Federal Government and Rivers State should adopt a comprehensive plan to add ecological structures/infrastructure to complement engineering infrastructure- specifically to expand wetlands and reactivate flood plains so as to mitigate future flood risks.

Local government authorities should be directed to set up Local Emergency Management Agency (LEMA) as prescribed by NEMA. This would go a long way to addressing the problems suffered by victims at the local level. Since the local government is the government nearest to the people, they stand at a better position to addressing emergencies arising from natural disasters. Their proximity makes them the first point of response in the event of emergencies. It should be made an impeachable offence for any local government chairman not to have a local emergency authority put in place. This would go a long way to ensure that his regulation is complied with.

There is the need to enlighten the citizenry on ways of preventing and mitigating the effects of flood in the environment. Most residents, particularly those in the urban areas do not reckon with the fact that the blockage of drains would be detrimental to the environment as it would not make way for the free flow of water during the rains. When the water is unable to find its cause, it overflows and results to flood. In this regard, the National Orientation Agency should be well equipped to carry out mobilization and orientation of residents on natural disasters such as flood. It would make it easier for government to control the activities of residents regarding the indiscriminate blockage of drainages, as well as respond to the need, for evacuation of vulnerable persons on the alert by early warning signals.

There is the need to critically examine how the Ecological Fund provided by the Constitution is managed by both the Federal and State Governments. There should be laws and regulations that should guide the operation of the Ecological Fund accounts and clearly spell out the purposes for the release of the funds, as well as how it was used. Checks and balances of its usage should also be applied. This would go a long way to stem the practice in which the Fund is left solely at the discretion of the President as to how the Fund is to be used. It is obvious that judicious application of such fund to address Problems of flood would go a long way in mitigating its effects on the citizenry. There should be strict implementation and enforcement of government policies and laws regarding the environment. Residents who deliberately block drainages should be prosecuted and punished for their actions. This would serve as a deterrent to others.

There should be the political will to construct dams in areas that are necessary, as well as maintain them in order to stem the tide of increase in water released from the Lagos dam.

As the government agency with the primary responsibility to address issues of natural disasters in the country, the Federal and Rivers State Government should increase the funding appropriated to the National Emergency Management Agency (NEMA) to carry out its responsibilities.

Government should also engage and strictly abide by the town and urban planning guidelines. By this, issues regarding the regulation and supervision of constructions in order to prevent the environment from being overrun by flash floods would be checked.

In the event of future occurrence, the Federal Government should be able to seek assistance from the international community to address the situation. This is against the background that Problems such as flooding are too burdensome for a country to tackle alone. With technical and financial support from international agencies, the country would be able to mage the difficulties associated with flood.

5.3 Contributions to Knowledge:

This study has been able to add to the body of knowledge in a number of ways:

First, it has been able to explain how the victims of flooding perceived the response of government towards their plight.

It has also been able to explain how relevant

ministries/agencies carried out their responsibilities regarding mitigating the effects of flooding.

It has been able to give reasons for the success or failure in the implementation of government policies, regarding natural disasters such as flooding.

It has been able to interrogate the effectiveness of government agencies/organizations responsible for implementation of policies on flooding.

Finally, global and regional organizations such as the United Nations, European Union, as well as African Union would gain insight on the problem of implementing public policies in developing countries.

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Ignatius Ajuru University of Education Port Harcourt.

Dear Respondent,

I am a postgraduate student of the Ignatius Ajuru University of Education Port Harcourt. Carrying-out a research on: health and environmental hazards associated with flooding among residents in two senatorial district in Rivers State.
Kindly spare a little of your precious time to fill this questionnaire to enable me obtain relevant data needed for writing up the report of the study. Please note that all information provided by you will be treated with utmost confidence and will be used only for the purpose of this research.

Thank you.

Righteous, Innime

(Researcher)

APPENDIX II

QUESTIONNAIRE FORM

Section A: Demography Information

Instruction: please tick (√) in the space as it applies to you.

1. Age at last birth ……. ☐
2. Religious affiliation: Christianity ☐ Islamic ☐ Others specific ☐
3. Educational status: Primary ☐ Secondary ☐ Tertiary ☐ None ☐
4. Socio-economic status: Employed ☐ Unemployed ☐ Self-employed ☐

   Location level: 10 – 20, 000 ☐ 21, 000 – 30,000 ☐ 31,000–50,000 ☐ rs-specific
5. Family t☐ Monogamy Polygamy Single Parenthood
6. Marital status: Single ☐ Married ☐ Separated ☐ Divorced ☐
7. No of children: 0 – 1 ☐ 2-3 ☐ 4-6 ☐ 7 – 10 ☐ ☐

Instruction: please Tick (√) in the space as it applies to you.

Section B: Ascertain the prevalence of flooding in River State

S/N	Questionnaire Items	Yes	No
8.	Do The Flooding in Rivers State affect you?		
9.	Have you lived in the affected resident for long?		
10.	Do the flooding come every year?		
11.	Is there any IDP camp close to your affected L.G.A?		
12.	Do you received relief materials during flooding?		

13.	Do Rivers State government come to your rescue during flooding?		
14.	Do you have media team in your IDP camp during flooding?		
15.	Where you given relief materials 3 months after flooding?		
16.	Do you fumigate your houses after flooding?		
17.	Do you carry out medical checkup after flooding?		
18.	Do you borrow to start up your business after flooding?		
19.	Do any government optical visit your LGA during and after flooding?		
20.	Where there Federal, State or local government official visit to your IDP camp during flooding?		

Section C: Identify physical health problems associated with flooding

S/N	Questionnaire Items	SA	A	D	SD
21.	The materials provided made significant impact in cushioning the effect of the flooding on the affected individual.				
22.	Rivers State government has a criteria at addressing the negative effects of natural disaster such as flooding.				
23.	There is no much government impact in the affected LGA,				
24.	There is no enough relief materials during flooding for the affected LGAs				
25.	Businesses usually crash down.				
26.	Flooding usually increase hunger among the people				
27.	Flooding causes inflations of goods and services				
28.	Flooding causes death				
29.	Flooding increase illness				
30.	Flooding increase crime among youths				

Section D: investigate mental health problems associated with flooding among others of Rivers state.

S/N	Questionnaire Items	Yes	No
31.	Was there trauma among flood victims?		
32.	Was there stressed affected illness as a result of the flooding?		
33.	Was there raping among affected persons in IDP camps?		
34.	Was there incidents of crimes among persons?		
35.	Was there insecurity among the people?		
36.	Was there school opening for children during flooding?		
37.	Was there any teachers in IDP camps to teach the children?		
38.	Was the environment conducive for the children to learn?		
39.	Was there insecticides or mosquito net in IDP camps?		
40.	Was there comfort of sleeping in IDP camps?		

Section E: Investigate social health problems associated with flooding among residents of Rivers State

S/N	Questionnaire Items	Yes	No
41.	Was there room for couple to have sex?		
42.	Do they practices personal hygiene?		
43.	Was there room for cultural festival?		
44.	Was there room for religious activities?		
45.	Was there room for market places?		
46.	Was there space for athletics in IDP camps?		

Section F: Determine the environmental health problems associated with flooding among residents in Rivers State.

S/N	Questionnaire Items	Yes	No
47.	Was there several heartbreak of sicknesses after flooding?		
48.	Was there erosion after flooding?		
49.	Was there earth tremor after flooding in residential or official buildings?		
50.	Was there enough aquatic organism after flooding?		
51.	Where there reptiles in residential homes after flooding?		
52	Where there left over crops after flooding?		
53.	Where there any plantations farms after flooding?		

APPENDIX

FLOOD SCENES

PLATE I. People being ferried to safety in Asaba, Delta State Source: Tell Magazine, 2020.

PLATE 2: A flooded community in delta state

Source: Tell Magazine, 2020

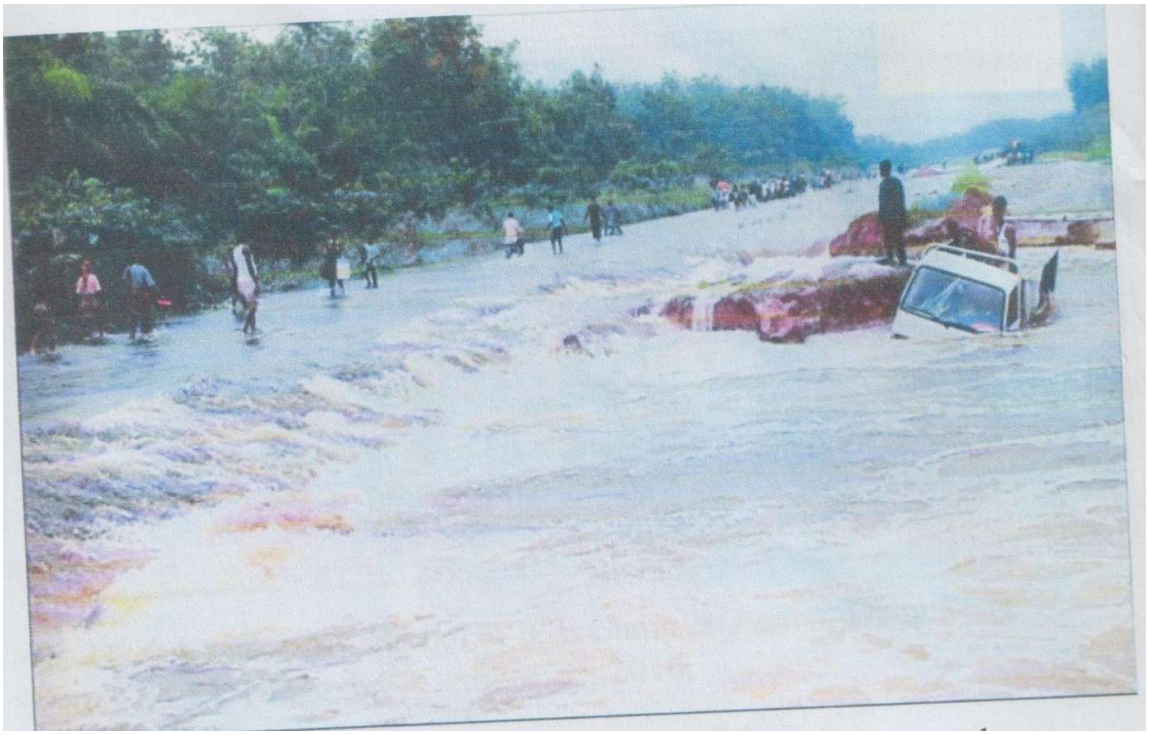

Plate 3: A submerged portion of Ughelli-Port Harcourt Road

Source: Tell Magazine, 2020.

PLATE 4. Flooded Ikwerre Road in Port Harcourt, Rivers State

Source: Tell magazine, 2020

PLATE 5: A Makeshift school at ICE Camp in Asaba, Delta State

Source: Tell Magazine, 2020.