

**EFFECTS OF ENVIRONMENTAL EDUCATION ON KNOWLEDGE,
ATTITUDE AND PRACTICES OF FLOOD DISASTER PREVENTION AMONG
RESIDENTS IN THE IBADAN METROPOLIS, NIGERIA**

BY

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CERTIFICATION

I certify that this thesis was carried out by Kafilat Adefunke, Hamzat (Matriculation Number 147852) in the Department of Human Kinetics and Health Education, Faculty of Education, University of Ibadan, Ibadan, Nigeria, under my supervision.

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DEDICATION

To

Almighty God

AND

The Souls of all Nigerians that lost their lives to flood disasters. May their souls continue to rest in perfect peace. (AMEN)

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ABSTRACT

Flood disaster prevention is vital to avoid its grave consequences on individuals, communities and the nation. However, reports have shown that residents of the Ibadan metropolis had poor knowledge, with bad attitude and practices of Flood Disaster Prevention (FDP), which mostly accounts for their inability to prevent floods. Previous studies focused largely on the causes, vulnerability factors and its effects on lives and properties, with little attention paid to intervention through Environmental Education (EE). This study, therefore, examined the effects of EE on knowledge, attitude and practices of FDP among residents in the Ibadan metropolis, Nigeria. The moderating effects of gender and Flood Disaster Experience (FDE) were also examined.

Health Belief Model provided the framework, while the pretest-posttest control group quasi-experimental research design of $2 \times 2 \times 2$ factorial matrix was adopted. The multi-stage procedure was used. Two Local Government Areas-LGAs (Ibadan South East and Ibadan South West) with high flood vulnerability were purposively selected. Ten flood-prone communities were purposively selected from each of the two LGAs including Kudeti, Oranyan, Elere, Believers stream, Idi-Odo. The simple random sampling technique was used to select 120 participants from volunteered members of Landlords' Association of the 20 communities. The participants were randomly assigned to EE (60) and control (60) groups. The treatment lasted eight weeks. The instruments used were FDP Knowledge ($r=0.88$), FDP Attitude ($r=0.76$) and FDP Practices ($r=0.79$) scales, and instructional guides. Data were analysed using descriptive statistics and Multivariate Analysis of covariance at 0.05 level of significance.

Most of the participants were male (56.0%). The participants that experienced direct and indirect FDE were (57.0%) and (43.0%) respectively. There were significant main effects of treatment on FDP knowledge ($F_{(1,108)}=25.56$, partial $\eta^2=0.19$), attitude towards FDP ($F_{(1,108)}=24.22$, partial $\eta^2=0.18$) and practices of FDP ($F_{(1,108)}=7.36$, partial $\eta^2=0.06$). The participants exposed to EE on knowledge of FDP ($\bar{x} = 23.61$), attitude towards FDP ($\bar{x} = 30.30$) and practices of FDP ($\bar{x} = 15.15$) outperformed their counterparts in control group on knowledge of FDP ($\bar{x} = 20.21$), attitude towards FDP ($\bar{x} = 19.86$) and FDP practices ($\bar{x} = 13.31$) respectively. Gender had a significant main effect on knowledge of FDP ($F_{(1,108)}=5.52$, partial $\eta^2=0.05$). The male participants ($\bar{x} = 22.61$) outperformed their female counterparts ($\bar{x} = 21.22$) in knowledge of FDP. FDE had significant main effect on knowledge of FDP ($F_{(1,108)}=10.85$, partial $\eta^2=0.09$) and attitude towards FDP ($F_{(1,108)}=13.929$, partial $\eta^2=0.11$). The participants with direct FDE ($\bar{x} = 22.88$; $\bar{x} = 28.55$) outperformed their counterparts with indirect FDE ($\bar{x} = 20.94$; $\bar{x} = 21.62$) on knowledge and attitude respectively. The two-way interaction effects of treatment and FDE was significant on FDP knowledge ($F_{(1,108)}=8.63$, partial $\eta^2=0.07$) in favour of the participants exposed to EE with direct FDE. The two-way interaction effects of treatment and gender, and FDE and gender were not significant. The three-way interaction effect was significant on the practices of FDP ($F_{(1,108)}=2.104$, partial $\eta^2=0.02$) in favour of female participants exposed to EE with direct FDE.

Environmental education enhanced the knowledge, attitude and practices of FDP among residents in the Ibadan metropolis. Therefore, EE should be provided for residents in flood prone communities for improved FDP.

Keywords:Environmental education,Flood disaster experience, Flood prone communities, Flood disaster prevention in Ibadan.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Environmental education is considered essential to ensure environmental quality for sustainable development. It is a process that has cognitive, affective, conative (action) and skill objectives as well as interdisciplinary in nature. Upa and Iyortyer (2013) defines environmental education as a process involving life-long learning as we come to understand the complexity of our natural world and environmental issues, using various approaches for individual and societal decision-making based on knowledge integrated from various disciplines, and resulting in our own attitudes and actions so as to make a difference in the world. By providing knowledge to people through environmental education, it is expected to promote awareness and develop their positive attitude and practices towards the environment, thus prevent environmental disasters.

Environmental disasters are catastrophic or disastrous events resulting from human activities, against the natural environment. They usually have severe detrimental effects on ecosystem. Flood, earthquake, slides, inferno and hurricane have created concern across the globe for preparedness, and the signs of their effects are just too apparent to be ignored. Flood disaster is the most common environmental problem in Nigeria and has posed tremendous danger to people's lives and properties. (Agbonkhese, Agbonkhese, Aka, Joe-Abaya, Ocholi, and Adekunle 2014). The impacts of flood have increasingly assumed from significant to threatening proportions. Apart from houses that are usually swept off or badly destroyed by flood, school buildings and bridges sometimes collapse as well; markets places and farmlands are submerged for weeks and sometimes are washed away.

On a global basis, there are evidences that the number of people affected and the socio-economic damages resulting from flooding are on the rise at an alarming rate

(Olasunkanmi, 2013). In view of this, society must move from the current paradigm of post-disaster response, plans and efforts must be taken to break the current event- disaster cycle. In disaster management, prevention is better and cheaper due to the fact that if care is not taken, once there is a disaster the entire budget of a country may be diverted to curtail it. To corroborate this, an estimated cost of five billion, seven hundred and eighty two million naira was lost to flood disaster by University of Ibadan in 2011 (Agbola, Raji-Oyelade, Aderinto, Adeosun, Akinpelu, Faraia and Saanu 2011).

More than ever, there is the need for decision makers to adopt holistic approach for the prevention of flood disaster. Otherwise, the developmental vision of Nigeria to be among the first top twenty nations with leading economy by the year 2025 may be a mirage, if lives and properties are not safe from the frequent occurrence of flood in the country. Flood disaster management according to National Emergency Management Agency (NEMA) (2012) involves preventive measures against flood, preparing for it before it occurs as well as supporting and rebuilding society, it also extends to fine-tuning preventive measures against recurrence. Meanwhile, over the years two patterns or tradition of flood disaster management have been obtained in Nigeria. These according to James (2000) have been represented as the “vulture concept” and the “eagle concepts”. The vulture concept is reactive, while the eagle concept is proactive. However, in line with the prevailing global direction, NEMA has launched paradigm shift from the abiding reactive tradition of flood disaster management to a proactive pattern (prevention).

There are some schools of thought about the preponderance of floods all over the globe especially in the tropics. A school of thought is of the view that there have been a lot of abuses heaped on the physical environment of man, and that the environment is only responding to the abuses heaped on it. The abuses include but not limited to poor planning of the physical environment, poor management of wastes, inadequate drains for the built up areas and others. Ologunorisa (2004) asserted that construction of building along flood plains, large scale encroachment into the river flood plains, large scale road construction with excessive land reclamation, mining in mountainous and hilly area,

deforestation, and reclamation of land in alluvial plains result in flood. Meanwhile, it is very obvious that blockage of few existing drains with municipal wastes and refuse with eroded soil sediment in the drainage channel always result in back flow of water to cause flood in most Nigeria urban cities like Lagos, Warri, Abeokuta, Ibadan etc.

Flood disaster is a recurrent environmental problem in Ibadan and destructions emanating from it are quite enormous going by reports of the experiences of the disasters that occurred in 1955, 1961, 1964, 1969, 1978, 1980, 1985, 1987, 1990, 1997, 2011 and 2013. (Amori, Awomeso, Idowu and Makinde, 2012). Ajayi (2017) reported that buildings, roads, vehicles and household items were swept away by flood at Orogun, Olodo, Gbekuba, Oke Ayo, Odo ona, Gada and Omi Adio in Ibadan. Several reasons abound to explain the regular occurrence of floods in Ibadan in the last three decades. Prominent among them according to Olasunkanmi (2013) are the prevalence of torrential rainstorms, poor sewage management and disposal, poor urban planning and control as shown in the unplanned layout, and public apathy to environmental sanitation.

A survey conducted in Ibadan, Oyo state, Nigeria by Adejuwon and Aina (2014) reported that, 52.8% of the respondent strongly agreed that the flood disaster was caused by an act of man, 29.0% agreed, 6.3% were undecided, 9.3% disagree while 2.8% strongly disagree, so it was evident that the act of man is contributing majorly to Ibadan flood. Adetunji and Oyeleye (2013) also reported that out of 156 respondents, 145, 120 and 156 agreed that blocking of drainage with wastes, building along water channels, poor waste management respectively were responsible for 2013 Apete flood disaster. To corroborate this, Ibadan Urban Flood Management Project (IUFMP) (2012) reported that 26,553 buildings found within the statutory set-backs of various streams and rivers within Ibadan metropolis. However, most developed nations of the world had flood preparedness plans; provide awesome educative, relief programme and engineering preventive measures of flood disasters. But most Nigeria government agencies focus on the distribution of relief materials and engineering measures like road channelization, repair of damaged culvert or bridges after flooding, the educative part that ought to have brought sustainable measures to prevent future occurrence, is always neglected or poorly funded. In response to the

increasing incidents of flooding and the negative effects it poses to the security of lives and properties, successive governments in Oyo State, have devised several measures aimed at preventing and managing flood in the city such as establishment of Oyo State Emergency Management Agency (OYSEMA) as directed by the Federal government, establishment of World Bank Assisted Project named Ibadan Urban Flood Management Project, (IUFMP) in 2011.

Meanwhile, it was observed that most of the documented implemented programmes of those agencies are disaster relief and response in nature. It is worthy to note that flood disaster prevention is better than any disaster relief and response programme. Meanwhile, the compassionate international disaster response appeals and media reports are giving the public the mistaken impression that disasters are inevitable. These messages obscured the more important message, that there are significant man-made elements in making flood hazard turn to a disaster, and that understanding this, is a necessary prerequisite for attacking the root causes and preventing them. Moreover, taking flood disasters as social, rather than natural phenomena has implication of allowing for proactive, rather than reactive strategies, thus, it is possible to take actions or inaction towards its prevention.

Flood disaster prevention strategies will succeed if governments, specialists, leaders and citizens understand that flood disaster is an evidence of their own neglected responsibilities rather than the presumed consequence of natural forces or some other-worldly act of gods or river's evil spirit. Once this basic understanding is acknowledged, further awareness is needed concerning the various options to prevent flood disasters. Oriola (2000) submitted that when people lack ecological knowledge, environmental management systems are less effective due to unintentional harmful practices of the uninformed public.

Adequate knowledge is important to man's existence, particularly in flood disaster prevention. Knowledge of flood disaster can be regarded to as facts, information, skill and understanding one acquires through experience or education. Ibimilua and Ibimilua (2014) opined that knowledge is much more than a collection of facts, it relates to the whole

system of concepts, beliefs, and perceptions that people hold about the world around them. This includes the way people observe and measure what is around them, how they go about solving problems, and how they validate new information. It also includes the process whereby idea is generated, stored, applied, and transmitted to others (communication). Environmental knowledge creates awareness, improves skills, values, experiences and determination which can help people solve different environmental problems like flooding.

Attitude is an interest of specific intense in a particular course of action by an individual towards some issues and it indicates the readiness to act in a certain direction in a given situation like flood prevention. Udoh (2006) defines attitude as person's tendency, predisposition or readiness which is organized through exposure, to respond towards objects, things, persons or situations either in positive or negative way. Such tendency has its basis in cultural, social and personal experiences. Development of attitude towards environment starts early in life and persist throughout life in individual. Essentially, environmental attitudes are formed through a learning process, which occurs in a number of ways such as observational learning, workshop, role play, drama, experience and intervention programmes. It serves the primary function of bringing together the various experiences that ginger action or inaction in relating to ones environment, with or without consciousness of causing environmental problems such as flooding.

Meanwhile, as important as knowledge and attitude are, they are not enough for establishment of positive environmental practices, even if people are well informed, some forms of commitment by the people, are still required to put the information into practice. Ones knowledge as well as attitude towards a thing is exemplified in what one does; the way one does something (action) as well as why one fails to do a thing (inaction). The risky practices that causes flood includes: encroachment into the river course such as construction of structure within a flood plain, blockage of natural or artificial drainage channels with debris, sand, container or any structure, land degradation and deforestation, poor waste management, the contributions of all these risky practices to flood disaster cannot be overemphasized.

Gender determines what is expected, allowed and valued in a woman or man, in a given context. It determines opportunities, responsibilities and resources, as well as powers associated with being male and female. Both women and men are part of the same society, which, as we know, does not mean we have the same rights, education and options to manage, neither in normal times, nor when a disaster strikes. For instance, women play key roles in relation to waste generation and disposal from households, and these roles are tied to their traditional cultural gender (female) roles and status. Fothergill (1996) opined that disaster risk appears to be a gendered phenomenon, and that it shapes capacity as well as vulnerability. IUFMP (2012) reported that women own most of the buildings in flood plain areas in Ibadan and that most of them bought the land during the peak of dry season. Meanwhile, women according to Khondker (1996) are active and resourceful disaster responders but often regarded as helpless victims, added that women are more disaster risk averse than men.

Ezemonye and Emeribe (2014) concluded that, gender was found to contribute uniquely to the prediction of disaster risk perception and disaster management; they added that male dominance in disaster decision-making undermines women's greater willingness to mitigate the effects of known hazards. Meanwhile, Amori, Awomeso, Idowu and Makinde (2012) submitted that, people do not differ in their perception of flood management measures taken along Ogunpa River in Ibadan on the basis of gender. Gender however is considered by Heckenberg, and Johnston, (2012) to powerfully shape human responses to disaster, either directly or indirectly, so gender is considered a focus in flood disaster management issues. Experience is a product of exposure gathered through repeated encounter over a period. Emily, Jean, Cherry, Eliza and Polly (2014) discovered that, in a multi-hazard environment, people who have been previously exposed to disaster are far more aware than people without the disaster experience. They also stressed the importance of previous disaster experiences in people's judgments about risk. Moreover, researches have shown that more intense personal experiences such as suffering damage, results in elevated perceptions of risk and prevention of disasters (Barnett and Breakwell 2001,

Lindell and Perry 2000).Meanwhile, distinction is often made between direct personal experience and vicarious experience. Direct personal experiences are more accessible in memory, and this gives it a greater potential to influence perceived personal risk and preparedness measures to prevent disaster. Report of findings of Sattler, Kaiser, Hittner (2000) indicated that previous direct disaster experiences were significantly associated with perception of disaster risk, prevention and preparedness.

NEMA, (2009) believed that man's safety against flood disaster depends on environmental facts, knowledge, attitudes and ultimately good environmental practices. This presupposes that safety tips are readily available, only need to be known and reflects in man's attitude and practices. Unfortunately, knowledge of common practices that predisposes people to flood is not widespread as one might imagine. Meanwhile, partial environmental information merely breeds indifference, inordinate ambition towards potential or obvious hazards in man's environment. Ezemonye and Emeribe (2014) concluded in their study that the erroneous idea that flood is "an act of god" and any preparedness measure to mitigate it amounts to exhibition of lack of faith needs to be addressed through creating awareness utilizing education achievable through conferences.

Capacity building of the community is one of the important aspects of human resource management, people need competencies in knowledge, attitude and practices to perform tasks in disaster prevention. Sadiq (2012) asserted that success of any disaster prevention mostly depends upon efficient capacity building of the society. He stated further that, there is urgent need to adopt multi-dimensional, multi-disciplinary and multi-sectoral approach to reduce losses of flood disaster. As part of means of promoting sustainable livelihood, Kawuwa, Adamu and Umar (2015) submitted that Community-Based Disaster Mitigation (CBDM) now preaches joint efforts of Non-Governmental Organisations, Government agencies likewise the affected communities as one of the important approaches in reducing disaster risks. This is because where the impacts of disasters are felt more is the community level and it is also where the risks can be reduced by the people themselves. When the risks are reduced through community efforts, they feel responsible for getting involved in the disaster prevention process and this may lead to more effective and

sustainable prevention of the flood disaster, thus contribute to achieving the overall goal of sustainable development. The International Federation of Red Cross and Red Crescent Movement (2009) emphasized that people must be aware of disaster prevention strategies, gain knowledge through environmental education to implement safety practices in their environment thus prevent disaster. Moreover, there are some theoretical and empirical reports that asserted that vulnerability to flood disaster and its associated consequences could be reduced in those at risk, if some forms of attitudinal and behavioural changes are facilitated through education.

In view of the foregoing, it is pertinent to find out the level of awareness of flood disaster prevention among the vulnerable population, identify their flood prevention practices, design a programme to educate them on the harmful effects of bad environmental attitude and practices, make the people realize their roles and responsibilities, empower them with environmental knowledge and skills for prevention of flood disaster. Premised on the aforementioned, the researcher found out the effects of environmental education programme on knowledge, attitude and practices of Ibadan residents towards flood disaster prevention in Ibadan metropolis, Nigeria.

Ibadan city, the capital of Oyo state in Nigeria, a large city in Africa, lies within longitudes 30°45' and 40°05' East and latitudes 70°10' and 70°30' North (Oseheye, 2016). The city is naturally drained by four rivers with many tributaries viz: Ona River in the North and West; Ogbere River towards the East; Ogunpa River flowing through the city and Kudeti River in the Central part of the metropolis. Ibadan is a city that is growing amorously and characterized by traditional and spontaneous slums, heavily overcrowded and the environment is largely degraded.(Adetunji and Oyeleye 2013). Adefisan, Abdulkareem and Orimoloye (2015) submitted that areas lying along the banks of River Ona and Ogunpa are at locations that are most vulnerable to flood hazards with vulnerability of the town to flood decreasing towards the northern part. They added that much of the area is built up and this gives rise to high vulnerability to flood hazards. Most parts of the city, particularly the inner core and south-eastern section, are

unplanned and lack basic facilities due to the inability of municipal governments to keep pace with the level of infrastructural needs and the speed of growth (Ajayi, 2012).

1.2 Statement of the Problem

There are evidences that the number of people affected and economic damages resulted from flood disasters are on the rise at an alarming rate. Report of NEMA in 2012 stated that between June and September 2012, over 363 lives were lost and about 1.2 million Nigerians were displaced. The report also declared that, if no precautionary measures are taken, over one million Nigerians may die due to the effects of floods before the end 2025(NEMA 2019). While flood disaster attracted a lot of academic and non-academic attentions, the phenomenon still occur in high frequency and problematic in Ibadan; findings revealed that Ibadan metropolis experienced flood disasters in 1960, 1961, 1963,1969,1978,1980,1987,1999,2011, 2013, 2015, 2016 and 2017. Looking at the frequency of flood disaster Ibadan, it is evident the phenomenum is becoming pandemic, which annually leaves many casualties plus material loss and social infrastructural damages.

However, vulnerability of humans to the impact of flood hazard is to a significant extent determined by human action or inaction, one would have imagined that government and non-governmental organizations media campaign against flood disaster prevention had significant positive impact on the frequency of the phenomenon in Ibadan metropolis, but the unresponsive attitude of the people, repels significant impact of those efforts. Such attitude results to blockage of the river beds\ flood plain and drainage channels which always results to back flow of water to aggravate flooding in most areas of Ibadan metropolis. Oluwatayo and Olatunji (2015) submitted that the main causes of flood disaster in Ibadan is obstruction of water channels with structures and poor waste management, that people dump refuse in nearby gutters, drainages, streets, road medians, stream and rivers or directly from the houses into gushing drain water in street gutters when it is raining.IUFMP (2012) also reported that 26,553 buildings were found within

the statutory set-backs of various streams and rivers within Ibadan metropolis, so it is evident that anthropogenic factors contribute majorly to Ibadan floods.

Meanwhile, much of the research efforts on flood disaster in Ibadan metropolis are survey, with more emphasis on causes, effects, and vulnerability factors of flood disasters in Ibadan metropolis. However, reports from those empirical survey studies unravel the anthropogenic factors, particularly with respect to their contributions to Ibadan floods, moreover, the researchers recommended aggressive awareness creation and education of the vulnerable groups as one of the major strategies for achieving sustainable flood disaster management. This implies that there is gap in the body of knowledge, concerning the impacts of participatory education of the vulnerable population in form of an organized environmental education intervention to empower people with knowledge and skills, to encourage attitudinal change towards environment, thus prevent flood hazard from resulting to disasters in Ibadan. Therefore, this study was prompted by the paucity of intervention study that could build the capacity of the residents of Ibadan towards flood disaster prevention so the study determined the impacts of environmental education on knowledge, attitude and practices of Ibadan residents towards flood disaster prevention in the Ibadan metropolis, Nigeria.

1.3 General Objective of the Study

The study mainly determined the effects of environmental education on knowledge, attitude and practices of Ibadan residents towards prevention of flood disasters in Ibadan metropolis.

1.3.1 Specific Objectives of the Study

The study accomplished the following specific objectives:

- (1) Determined the effects of environmental education on the participants' knowledge, attitude and practices towards prevention of flood disasters in Ibadan metropolis.
- (2) Examined the moderating effects of gender on participants' knowledge, attitude and practices towards prevention of flood disaster in Ibadan metropolis.
- (3) Determined the moderating effects of disaster experience on the participants' knowledge, attitude and practices towards prevention of flood disaster in Ibadan metropolis.

- (4) Determined the interaction effects of environmental education and gender on the participants' knowledge, attitude and practices towards flood disaster prevention in Ibadan metropolis. .
- (5) Established the interaction effects of environmental education and disaster experience on participants' knowledge, attitude and practices towards prevention of flood disaster in Ibadan metropolis..
- (6) Examined interaction effect of gender and disaster experience on participants' knowledge, attitude and practices towards prevention of flood disaster in Ibadan metropolis..
- (7) Ascertained the interaction effects of environmental education, gender and disaster experience on participants' knowledge, attitude and practices towards, prevention of flood disaster in Ibadan metropolis.

1.4 Research Questions

The study answered the following research questions:

1. Do the residents in the Ibadan metropolis have knowledge of flood disaster prevention?
2. What are the attitudes of residents Ibadan metropolis towards prevention of flood disaster?

1.5 Research Hypotheses

The following hypotheses were tested in the study

1. There will be no significant main effects of treatment on
 - a. Knowledge
 - b. Attitude
 - c. Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria
2. There will be no significant effect of gender on
 - a. Knowledge
 - b. Attitude
 - c. Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria
3. There will be no significant main effect of disaster experience on

- a Knowledge
 - b Attitude
 - c Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria.
- 4 There will be no significant 2-way interaction effect of treatment and gender on
- a Knowledge
 - b Attitude
 - c Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria.
- 5 There will be no significant 2-way interaction effect of treatment and disaster experience on
- a Knowledge
 - b Attitude
 - c Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria
- 6 There will be no significant 2-way interaction effect of gender and disaster experience on
- a Knowledge
 - b Attitude
 - c Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria
- 7 There will be no significant 3-way interaction effect of treatment, gender and disaster experience on
- a Knowledge
 - b Attitude
 - c Practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria.

1.6 Scope of the Study

The study was carried out within the following scope;

1. Pretest-posttest control group quasi-experimental research design
2. All residents of flood prone areas in Ibadan metropolis, Nigeria .

3. Independent variable of environmental education
4. Dependent variables of knowledge, attitude and practices of flood disaster prevention
5. Environmental education and Nutrition education training packages with a self structured questionnaire as instruments for data collection.
6. Multi-stage sampling procedures
7. Descriptive statistics of frequency counts, percentages, pie charts and bar charts were used to analyze the demographic data and answer research questions, while inferential statistics of Multivariate Analysis of Covariance (MANCOVA) was used for testing the hypotheses at 0.05 levels of significance.
8. Eight (8) weeks of training programme
9. Ten (10) trained research assistants

1.7 Limitations of the Study

The limitations encountered in the course of this study include:

Data collected, most particularly the practices of the participants are self expressed, the participants might not be sincere with the actual practice of their normal life, despite assurance of their response confidentiality by the researcher. It was also difficult to take care of some extraneous variables such as television viewing, internet searching, since the participants were not camped. Moreover, there was irregular attendance of some participants but this was taken care of by extra recruited participants

1.8 Significance of the Study

The outcomes of this study would confirm the effectiveness of Environmental education on knowledge, attitude and practices of flood disaster prevention; this should be considered by policy makers, politicians, bureaucrats to shift their funding priorities from emergency aids to preventives measures against flooding, through environmental education. Also the study enhanced acquisition of knowledge, change of beliefs and creation of worthy positive attitude amongst the people towards the environment, this should lead to inculcation of flood disaster prevention skills, attitudinal and behavioral change among people and peradventure bridge the gap between what is practiced and what is ideal among people.

It would also assist health and safety educator specialists in planning and designing awareness programmes to educate members of the public through the use of cost effective environmental education about their roles and responsibilities in flood disaster prevention and the importance of compliance with environmental and building regulations. This research work would serve as database for further studies on knowledge, attitude, and practices of prevention of flood disasters. Furthermore, the findings of this study would add to the existing body of knowledge, serve as reference points in other parts of the nation, and to future researchers in this area of study.

1.9 Operational Definition of Terms

- **Environmental education:** A direct instructional programme designed for the participants to facilitate their knowledge of flood disaster prevention, positively influence environmental attitude and change dangerous environmental practices that contribute to flood disasters.
- **Flood:** Overflow of runoff water from river or other body of water or sewers, due to excessive rainfall or other inputs.
- **Flood disaster:** Flooding of substantial extent of causing significant physical damage or destruction of lives and properties or sometimes permanent damage to the natural environment and infrastructures like road and culverts.
- **Flood disaster management:** All efforts to prevent and mitigate the effect of flood disasters.
- **Flood disaster prevention:** All activities or efforts that stop or keep flood hazard from becoming a disaster.
- **Flood Vulnerability:** Susceptibility to flood disaster or most likely to be exposed to the chance of being attacked by flood
- **Flood prevention practices:** All environmental practices which substantially reduce the chances of flood disaster.
- **Flood plain:** The surface of the earth that is meant for natural drainage channels and accelerates runoff.
- **Flood disaster experience:** Series of direct or indirect exposure of the participants to impacts of flood disasters.

- **Direct flood disaster experience:** Effects of flood disasters such as death of relations and damages, personally experienced by the participants.
- **Indirect flood disaster experience:** Hearing or reading about flood disaster impacts affecting friends, relatives, neighbor or communal effects of flood disasters.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviewed literatures under the following sub headings;

2.1 Conceptual framework

2.2 Theoretical Model

- Health belief model (HBM)

2.3 Conceptual review.

- i. Concept of flood disaster
- ii. Overview of causes of flood disaster
- iii. Overview of effects of flood disaster.
- iv. Incidences of flood disaster in Nigeria.
- v. Incidences of flood disaster in Ibadan.
- vi. Overview of flood disaster vulnerability
- vii. Flood disaster vulnerability in Nigeria.
- viii. Flood disaster vulnerability in Ibadan.
- ix. Relationship between Climate change, Global warming and flood disaster.
- x. Overview of flood disaster management
 - a) Prevention of flood disaster
 - b) Preparedness and Mitigation of flood disaster
 - c) Response, relief and reconstruction during flood disaster
- xi. Overview of flood disaster risk reduction and strategies
- xii. Flood risk practices of Ibadan residents.
- xiii. Overview of impacts of environmental regulatory agencies, ministries and departments on flood disaster in Nigeria.
- xiv. Community capacity building to reduce vulnerability, incidence and fatality of flood disaster.
- xv. Environmental education and environmental hazard prevention.

2.4 Empirical Review

- i. Environmental education and knowledge of causes, effects and prevention of flood disaster.
- ii. Environmental education and attitude towards flood disaster prevention.
- iii. Effects of flood risk practices on flood disaster.
- iv. Gender and flood disaster prevention
- v. Impact of disaster experience on flood disaster prevention.
- vi. Other related innovative studies on flood disaster.

2.5 Appraisal of Literature

CONCEPTUAL FRAMEWORK OF THE STUDY

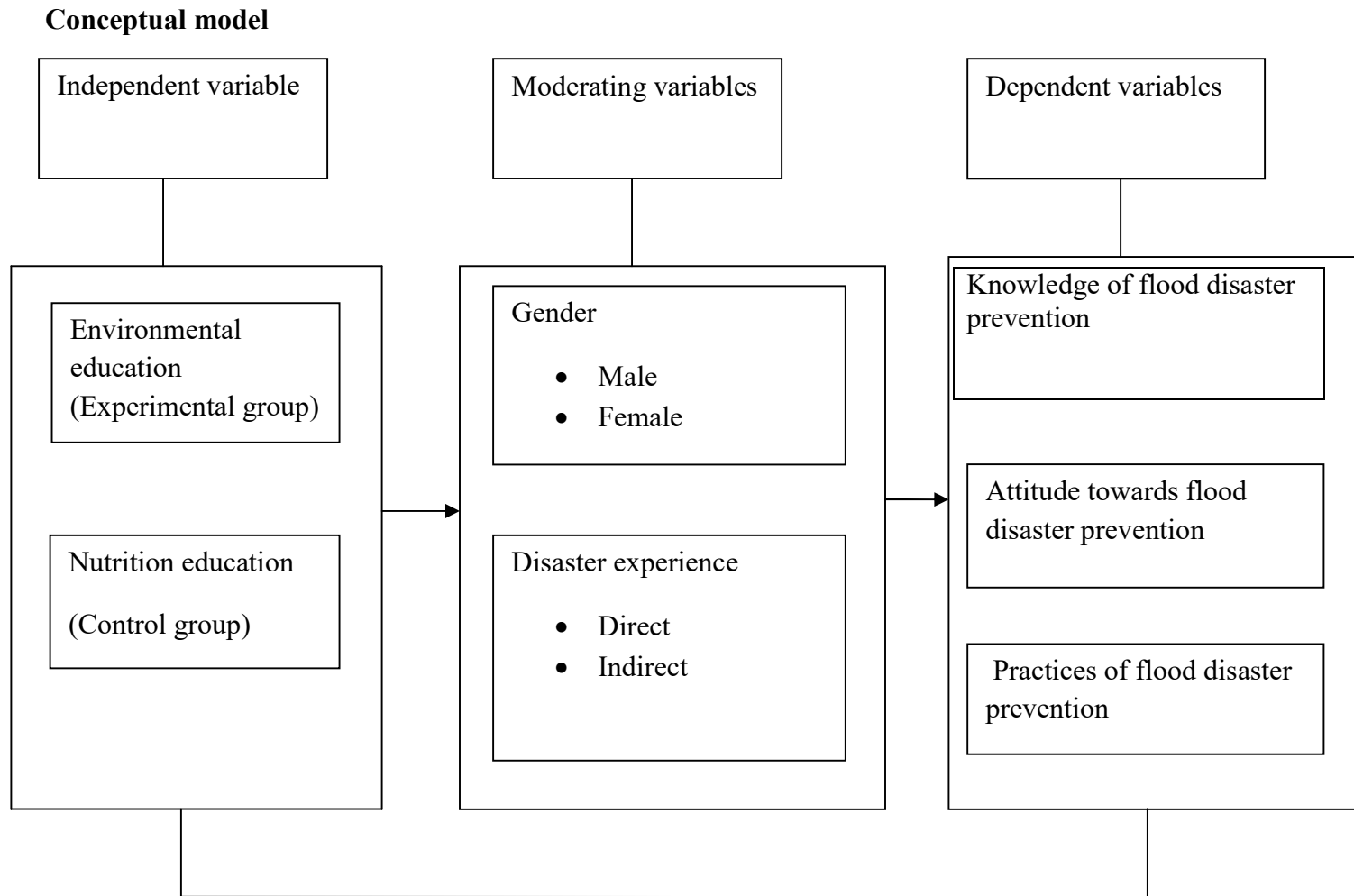


Figure 2.1; Source: Self developed for the study.

2.1 Conceptual Framework

The conceptual framework developed by the researcher, on which the study was based and the process by which the research was done is conceptualized. It was conceptualized in this research study that environmental education interventions brought about changes in knowledge, environmental attitude and practices towards flood disaster prevention among Ibadan residents in Nigeria. The independent variable that was manipulated in the study was expressed at two levels. Environmental education and Nutrition education for experimental and control group respectively. While the two moderating variables that are significant enough to be observed and measured, which might affect the outcome of the study, are gender and flood disaster experience. The result of the effects of the independent and moderating variables were measured on the dependent variables of participant's knowledge of flood disaster prevention, attitude towards flood disaster prevention and flood prevention practices.

2.2 Theoretical Model

This study examined the effects of environmental education intervention on knowledge, attitude and practices towards flood disaster prevention among Ibadan residents, Nigeria and the theory adopted was Health belief model (HBM).

2.2.1 The Health Belief Model and its application to the study

The health belief model (HBM) is a psychological health behavior change model developed to explain and predict health related behaviors. The health belief model was developed in the 1950s by social psychologists in the United States Public Health Service and remains one of the best known and most widely used theories in health behavior research. The HBM is generally used to demonstrate why people change or continue a particular health behavior. The HBM uses a cognitive approach to which the goal is to recognize patterns of health behaviors. The basic assumption of the HBM is that people with better information make better decisions with each step in the decision making process dependent on the previous decision or beliefs. According to the HBM, people's beliefs about problems, perceived benefits of action and barriers to action and self efficacy explain engagement (or lack of engagement) in health promoting behavior.

To find an answer, social psychologists examined what encourages or discourages people from participating in a program. They theorized that people's belief about whether or not they are susceptible to health problem, and their perceptions of the benefits of trying to avoid it, influenced their readiness to act. In ensuing years, researchers expanded upon this theory, eventually concluded that six main constructs influence people's decisions about whether to take action to prevent and control the problem. They argued that people are ready to act if they:

- Believe they are susceptible to the condition (perceived susceptibility)
- Believe the condition has a serious consequences on them (perceived severity)
- Believe taking action would reduce their susceptibility to the condition or its severity (perceived benefits)
- Believe costs of taking action (perceived barriers) are outweighed by the benefits.
- Are exposed to factors that prompt action (e.g., a television and or a reminder from health personnel or educator) (cue to action)
- Are confident in their ability to successfully perform an action (self-efficacy)

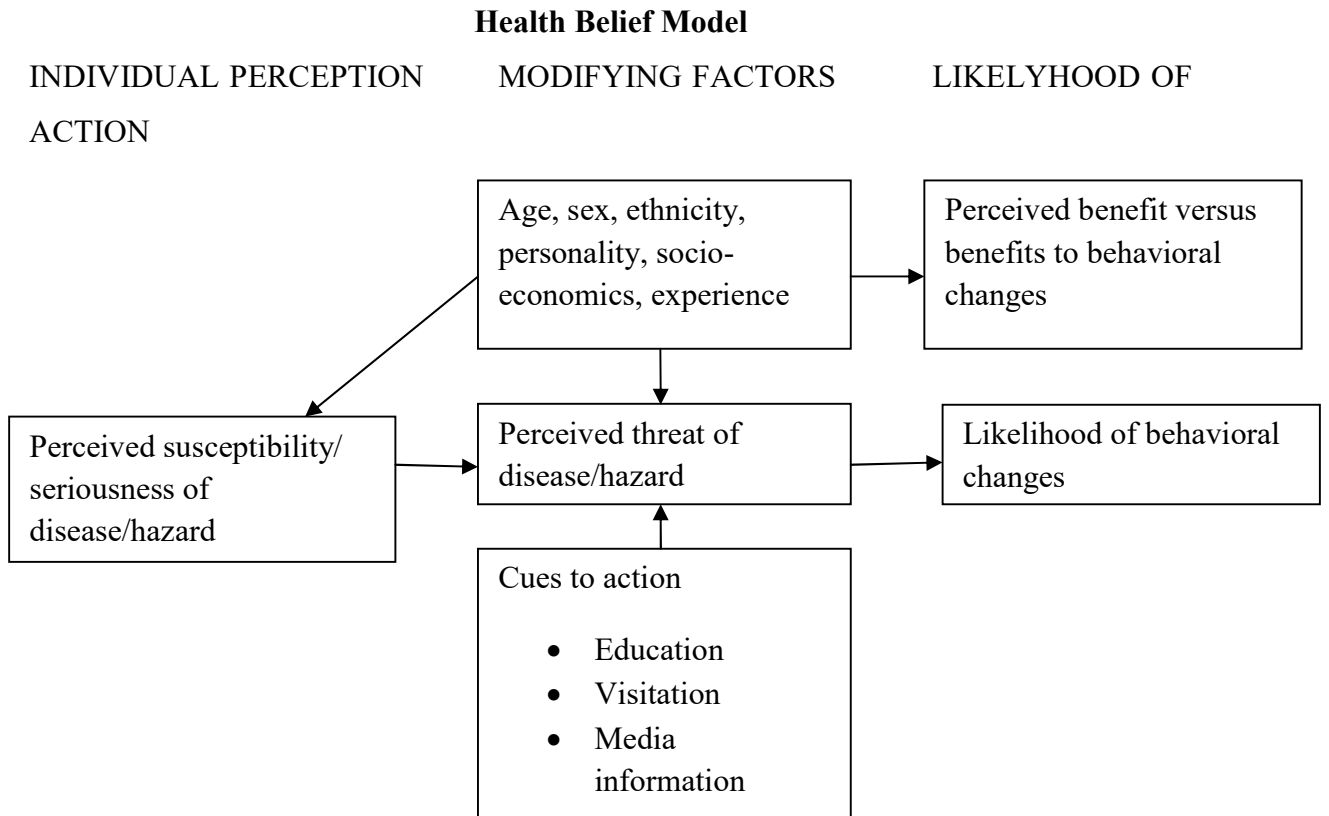


Figure 2.2; Source: Glanz, Rimer, Jossey-Bass, (2002)

The study examined the effects of environmental education training programme on knowledge, attitude and practices of flood disaster prevention in Ibadan metropolis of Nigeria. Among other objectives accomplished in the study are improvement of knowledge, change in attitude and practices towards flood disaster prevention. Going by the concept of HBM which stated that people will be ready to abide and take actions towards positive behavior when the target population believe they are susceptible to problems like flood disasters (perceived susceptibility) and the severity of its effects and consequences is on their lives and properties (perceived severity). Also, when they know that taking positive environmental action may reduce or even prevent them from being susceptible to flood disasters (perceived benefits), at the same time people will take and change to positive environmental attitude when they know that the actions taken to prevent susceptibility to flood disasters even outweighs the constraints or barrier they might envisage such as proper waste management practices (perceived barriers). Based on the concept of HBM, people will take and change to positive attitude if they are exposed to stimulus like environmental education that will sensitize them to take action, which can later be supplemented with flood prevention jingles on radio and television, flood management handbill and posters as reminder, also, concurrent visit of environmentalist and flood manager to remind them (cue to action). This will eventually build the confidence of the people's ability to successfully prevent flood disaster in their community (self efficacy).

2.3 CONCEPTUAL REVIEW

2.3.1 Concept of Flood Disaster

Excess water itself is not a problem rather, the impacts are felt when this water interacts with natural and human-made environments in a negative sense in form of flood, causing damage, death and destruction. What makes flood a disaster is when flood waters occur in areas populated by humans and in areas of significant human development. Flooding can be viewed as temporary inundation of all or part of the floodplain or temporary localized inundation occurring when surface water runoff moves via surface flow, gutters and sewers. Furthermore it can also be defined as a condition, where wastewater and (or)

surface water escapes from or cannot enter into a drain or sewer system and either remains on the surface or enter into buildings. According to Bradshaw (2007), flood is defined as an overflow of water that submerges which later dries off gradually whereas European Union (EU) described flood as a covering of land by large volume of water(Alexander,2007). Adio Moses, Adigun, Onifade, Oguntunji and Ogungboye (2014) stressed that flood usually occurs when water runoff from the land exceeds the capacity of the stream channel.

Federal Capital Territory Emergency Management Agency (FEMA)(2012) defined flood as a temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from overflow of inland or tidal waters or unusual and rapid accumulation or runoff of surface water from any source or mudflow. It also could be seen as a collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood. Etuonovbe (2011) added that flood happens without warning but with a surprise package of havoc.

Raheem (2011) reported that flood is the most devastating disaster all over the world, claiming more lives and causing more property damage than any other natural or man-made phenomena. Flood is the most reoccurring, widespread, disastrous and frequent natural hazards of the world (Odunuga, Oyebande and Omojola 2012). In Nigeria, flooding and means of addressing its challenges are critical issues. Evidently, the country has experienced devastating floods which affected millions of people and caused fiscal losses amounting to billions of naira. This hazard is generally linked to poor urban planning and climate change especially in increased frequency and intensity of rainfall.

In the urban centres, the event of climate change impact the environment either directly or indirectly via changes in water flows. Hydrological changes within the river systems are cause for concerns due to related increase in flood incidence or significant changes in base flows. In many cities in Nigeria there is inadequate infrastructural provisions to curb flooding. Tingsanchali (2012) submitted that urban areas in Nigeria are particularly vulnerable to flooding due to inadequate capacity of drainage structures; changes to ecosystem through the replacement of natural and absorptive soil cover with concrete; and

deforestation of hillsides, which has the effect of increasing the quantity and rate of runoff, and through soil erosion and the silting up of drainage channels. Samson and Afeez (2016) submitted that in an urbanizing environment, the infiltration capacity is reduced by the replacement of ground cover with impervious urban surfaces. Large parts of the ground are covered with roofs, roads and pavements, obstructing sections of natural channels and building drains that ensure that water moves to rivers faster than it did under natural conditions. Walker and Burningham (2011) also submitted that urbanization exacerbates the damages caused by flooding by restricting where flood or storm waters can go. According to Action Aids (2006) flood hazards are natural phenomena, but damage and losses from floods are the consequence of human action. Flash flooding /urban flooding destroys the produce e.g. crop, rice paddy, fruit tree and vegetables thereby posing the risk of hunger to those engaged in subsistence farming and great loss to those engaged at a commercial scale (Kolawole, Olayemi, and Ajayi 2011). Fagbemi (2011) reviewed questions that people are concerned about in Nigeria, the questions are; Is government really enforcing laws guiding people from indiscriminate dumping of wastes? Is it inadequate drainage facilities that are responsible for flood? Are the public not well enlightened on the causes and effects of flood while they carry out various activities that result to flood, like building along the water channels, indiscriminate dumping inter alia? So he later concluded that those questions demand immediate answers and follow up actions to arrest the ugly condition.

2.3.2 Overview of Causes of Flood disaster

Indiscriminate dumping of refuse: Dumping of solid wastes inside the stream and river channels, surface drain, municipal wastes on the flood plain and placement of refuse drum or container result in flood disaster (Sarah, 2007). It was also opined by David (2004) that flood disaster could result from dumping of refuse on the road side, if runoff water flushes the debris to the drainage, to silt up the drainage.

Uncontrolled urbanization: James (2000) asserted that construction of building along flood plains, large scale encroachment into the river flood plains, large scale road construction with excessive land reclamation lead to flood disaster. He added that mining in mountainous and hilly area, deforestation, reclamation of land in alluvial plains result in

flood. Ajayi (2012) claimed that construction of structures along river course led to flood disaster on the night of 26th August, 2011 in Ibadan. He stressed that, there will be no flood disaster if human beings stay away from the flood plain and stop dumping waste in stream and river channels. Inadequacy and poor maintenance of drainage facilities: Odunola, and Balogun (2015) identified that insufficient surface drains, inadequate culverts result into the flood. They further explained that blockage of existing drains with municipal wastes and refuse with eroded soil sediment in the drainage channel always result in flood. Other Causes of Flood Disaster as identified by Prosser, Rutherford, Olley, Young, Wallbrink, and Moran, (2001), Ajayi, Agboola and Olokesusi (2012); Geoscience (2016) are:

Typhoon and Monsoon: Typhoons may cause flooding to coastal areas. When there is a typhoon, the atmospheric pressure is low. Sea level rises and affects the volume of water flowing from the river to the sea, this indirectly leads to flooding. As reported by Pelling (2004) in 1991, a strong typhoon blew towards Bangladesh, the strong wind, at a speed of 240 kilometers per hour, pushed the seawater from the Bay of Bengal to the coastal areas. It created a storm surge, the water from the sea was 7.5 meters high and the coastal area was flooded. **Tides and Storms along Coastal Areas:** Flooding always occurs in coastal areas, because whenever there are high tides or storms, the sea level will rise. If the sea level is higher than the level of the coastal lowland, flooding will occur.

Snowmelt: According to Samson and Afeez (2016), when the river level is raised, flooding may occur, they explained further that because of the global warming, the recent years temperature is higher than the temperature of many years ago, the ice caps melt in spring, a lot of water goes into the river, makes the river level raised.

Heavy Rainfall: Heavy rainfall raises the water level. When the water level is higher than the river banks or the dams, the water comes out from the river, there will be flooding. As reported by Prosser, Rutherford, Olley, Young, Wallbrink, and Moran, (2001), the areas near Chang Jiang have heavy rainfall and because the areas near Chang Jiang is the southeast of China is closed to the sea, the on shore wind may push the rain to the areas near Chang Jiang. **Poor Water Management:** When the dams are poorly constructed or maintained, they may easily collapse and these results in flooding. Such as more than 240

people were killed and 150 were listed missing after a dam burst in China's northwestern Qinghai province.(Tas, Tas, Durak, and Atenur 2013).

Deforestation: Large areas of forests near the rivers have been cleared. The lands were used to make rooms for settlements, roads and farmlands. Less vegetation protect the soil, the soil is quickly lost to rivers and sea. This raises the river bed, so the river overflows its banks easily. IUFMP (2012) identified deforestation as a contributory factor to the flood problem in Ibadan. Adejuwon and Aina (2014), stressed that destruction of natural forests (as in the Eleyele-Apete axis where the teak plantation buffering the River Ona has almost been totally depleted) has aided flooding in Ibadan metropolis due to the reduction of the infiltration and retention capacity of these areas.Bradshaw (2007) summarized how deforestation leads to flooding as follows:

- No trees to soak up water, so more water flows into the rivers.
- No trees to bind the soil together, so soil erosion takes place, large amounts of soil are washed by rain into the rivers.
- Because of silting, riverbed shallower, the water volume increases, the river cannot hold the water again thus overflows its banks.

Blasting: This causes landslides in the slopes of hills and mountains which may result in the unintentional damming of rivers and streams.

Construction of temporary dams: This produces an impediment to the flow of a river or stream which then results in an overflow.

Failure of hydraulic and other control structures: Accidents like the breaking of a dike results in the entry of an enormous quantity of water in a protected area.

2.3.3 Overview of Effects of Flood disaster

Floods impact on both individuals and communities, and have social, economic, and environmental consequences. The consequences of floods, both negative and positive, vary greatly depending on the location and extent of flooding and the vulnerability and value of the natural and constructed environments they affect (Apan, Keogh, King, Thomas, Mushtaq and Baddiley, 2010). The negative effects of flooding can be multi-dimensional and inflicting long-term “injuries” on lives and properties in affected areas. Typical effects include loss of lives, property and means of livelihoods, severe social

dislocations, as well as the destruction of the environment, including wild life sanctuary. Flooding also precipitates environmental health hazards, such as the outbreak of diseases, arising from drinking surface water and well water which have been polluted as a result of flooding. In the absence of timely intervention by the government and relief agencies, the effects of flooding can be very traumatic on the victims. During the recent flooding at Ibadan, some residents were trapped by floods and could not leave their houses for several days until the floodwater receded. Many residents lost their loved ones and their entire means of livelihood to the flooding. Furthermore, the disaster caused a lot of damage to urban infrastructures such as roads, culverts and bridges. For instance, during August, 2011 flood disaster in Ibadan, the Eleyele Waterworks was badly affected with most of the treatment works covered by water, the spillway of the waterworks was also badly damaged (Oyo State Government, 2011). The University of Ibadan suffered huge infrastructural damage with loss in property worth US\$65 million. The report continues that the university's teaching and research farm, with different species of fish valued at about \$19 million, books estimated to be worth about \$13million, etc. were destroyed.

Atedhor, Odjugo, and Uriri, (2011) stressed that recurring floods and other disasters have been identified as a serious threat to sustainable development. In the last four decades, economic losses due to, floods disasters have increased in folds and have also resulted in major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as environmental damages during this period. Hualou, (2011) also affirmed that floods cause about one third of all deaths, one third of all injuries and one third of all damage from natural disasters. Flood disasters according to Jonkman, Maaskant, Boud, and Levitan, (2009) when they occur usually result in pains and huge losses to the economy and in most cases; it is always difficult to quantify the actual cost damages and recovery. A single case of flood disaster such as the one that occurred in Ibadan, Nigeria on August 26, 2011 actually destroyed several years of developmental efforts. In flood disaster, there is loss of lives, destruction of public utilities and disruption in the smooth functioning of the system that renders fear and uncertainties among the populace. In addition, there was the loss of livelihoods, damage to the environment, financial loss, and diversion of resources, epidemics, migration, food shortages and displacement of the people. The impact can be very high in the urban areas, because the

areas affected are densely populated and contain vital infrastructure. A more disturbing issue is the lack of attention to the promotion of sustainable environmental management especially in disaster prone areas resulting in devastations which could have been averted. In 2003, severe flooding resulting from dam failure submerged farmlands in Zamfara State (Aribigbola 2008). In Taraba State the flood which occurred in October 2012 affected 111,255 people (Nkeki, Henah and Ojeh, 2013). About 28, 511 people were internally displaced with 29 internally displaced persons (IDPs) camps in different parts of the State. The flood also destroyed about 83,722 farmlands and 11,178 houses(Federal Ministry of Environment, 2012). Nigeria also experienced heavy flood in 2010 that devastated the people and destroyed their property in the South-west States of Lagos, Oyo, Ogun, Ondo and Ekiti. Apart from causing the loss of lives, flood disaster has the effect of destabilizing people when their property such as houses and crops are destroyed by flood (Adebayo, 2014).

Another effect of flood is the damage to roads, bridges and culverts with the consequences of disrupting free flow of traffic. The floods in Sokoto State washed away several kilometers of access road and a bridge to the University of Sokoto town (The Nation News, 2010). Flooding has the negative impacts of rendering people jobless; people engaged in the agricultural sector are usually rendered jobless during the period of severe flood. The loss of job in agricultural sector invariably leads to shortage of food in the society. For example, in Jigawa State, about 90,000 hectares of farmland were destroyed by flood as at September 2010. Farm produce such as rice, guinea corn, millet, beans, maize were washed away by the flood. Meanwhile, as dangerous as flood is to people lives and properties, it is still beneficial, Clement (2013) identified the beneficial effect of flood has when the river overflows, and the flood waters flow into the banks, sand, silt and debris are deposited into the surrounding land. After the river water subsided and go back to its normal flow, the deposited materials will help to make the land richer or more fertile. The organic materials and minerals deposited by the river water keep the soil fertile and productive. Also according to Cline (2007) flooding adds a lot of nutrients to lakes and rivers which leads to improved fisheries for a few years, also because of the suitability of a floodplain for spawning (little predation and a lot of nutrients). Fish like the weather fish

make use of floods to reach new habitats. Together with fish also birds profit from the boost in production caused by flooding.

2.3.3.1 Social effects on communities and individuals

As most people are well aware, the immediate impacts of flooding include loss of human life, damage to property, destruction of crops, loss of livestock, and deterioration of health conditions owing to waterborne diseases. As communication links and infrastructure such as power plants, roads and bridges are damaged and disrupted, some economic activities may come to a standstill, people are forced to leave their homes and normal life is disrupted. Similarly, disruption to industry can lead to loss of livelihoods. Damage to infrastructure also causes long-term impacts, such as disruptions to supplies of clean water, wastewater treatment, electricity, transport, communication, education and health care. Loss of livelihoods, reduction in purchasing power and loss of land value in the floodplains can leave communities economically vulnerable (Bunn and Arthington, 2002). Floods can also traumatise victims and their families for long periods of time, the loss of loved ones has deep impacts, especially on children. Displacement from one's home, loss of property and disruption to business and social affairs can cause continuing stress. Semi, (2010) reported that for some people the psychological impacts can be long lasting. Askew, (1999) stressed that damage to public infrastructure affects a far greater proportion of the population than those whose homes or businesses are directly inundated by the flood. In particular, flood damage to roads, rail networks and key transport hubs, such as shipping ports, can have significant impacts on regional and national economies. Short-term downturns in regional tourism are often experienced after a flooding event. While the impact on tourism infrastructure and the time needed to return to full operating capacity may be minimal, images of flood affected areas often lead to cancellations in bookings and a significant reduction in tourist numbers. Flooding of urban areas can result in significant damage to private property, including homes and businesses. Losses occur due to damage to both the structure and contents of buildings. Meanwhile, Kingsford, (2000) submitted that insurance of the structure and its contents against flooding can reduce the impacts of floods on individuals or companies.

2.3.3.2 Effects on agricultural production

According to Douglas, Bunn and Davies (2005), flooding in key agricultural production areas can lead to widespread damage to crops and loss of livestock. Crop losses through rain damage, waterlogged soils, and delays in harvesting are further intensified by transport problems due to flooded roads and damaged infrastructure. The flow-on effects of reduced agricultural production can often impact well outside the production area as food prices increase due to shortages in supply. Ajayi, Agboola, and Olokesusi (2012) submitted that, on the other hand, flood events can result in long-term benefits to agricultural production by recharging water resource storages, especially in drier, inland areas, and by rejuvenating soil fertility in silt deposition.

2.3.3.3 Environmental Effects

In many natural systems, floods play an important role in maintaining key ecosystem functions and biodiversity. They link the river with the land surrounding it, recharge groundwater systems, fill wetlands, increase the connectivity between aquatic habitats, and move both sediment and nutrients around the landscape, and into the marine environment. For many species, floods trigger breeding events, migration, and dispersal. These natural systems are resilient to the effects of all but the largest floods. According to Kingsford, (2000) the environmental benefits of flooding can also help the economy through things such as increased fish production, recharge of groundwater resources, and maintenance of recreational environments.

Areas that have been highly modified by human activity tend to suffer more deleterious effects from flooding; floods tend to further degrade already degraded systems. Removal of vegetation in and around rivers, increased channel size, dams, levee bank and catchment clearing all work to degrade the hill-slopes, rivers and floodplains, and increase the erosion and transfer of both sediment and nutrients. While cycling of sediments and nutrients is essential for a healthy system, too much sediment and nutrient entering a waterway has negative impacts on downstream water quality. Other negative effects according to Allan, Palmer, Hart, Richter, Arthington, Rogers, Meyer and Stanford, (2003) include loss of habitat, dispersal of weed species, and the release of pollutants, lower fish production, and loss of wetlands function and loss of recreational areas.

Prosser, Rutherford, Olley, Young, Wallbrink and Moran (2001) asserted that many of our coastal resources, including fish and other forms of marine production, are dependent on the nutrients supplied from the land during floods. The negative effects of floodwaters on coastal marine environments are mainly due to the introduction of excess sediment and nutrients, and pollutants such as chemicals, heavy metals and debris. These can degrade aquatic habitats, lower water quality, reduce coastal production, and contaminate coastal food resources. So they later remarked that, there is an urgent need to evaluate the causes of flood, and also diagnose ways to avert its future occurrence in Nigeria

2.3.4 Incidences of Flood Disaster in Nigeria

Flood in Nigeria has been perilous to people, communities and institutions (Etuonovbe, 2011). It has claimed many lives and millions of properties got lost due to its occurrences. One prominent feature about it is that flood disaster does not discriminate, but marginalizes whosoever refuses to prepare for its occurrence. Flooding in Nigeria has been due to natural and artificial factors. Etuonovbe (2011) reported that flood has been experienced in the Niger through Benue basin and Sokoto-basin in the flooding years of 1987, 1991 and 1994 and this affected agricultural land use to a great extent on the other hand the ocean inflow in Victoria Island and that of Ibadan urban area by Ogunpa stream. In Northern States of Nigeria, Taiwo (2010) reported flooding in a place called Kagara (a small village near Goronyo town) and how significantly the inhabitants of the village suffered a great destruction of their houses, crops and their storage of food. In August 2008, the residents of Makurdi were thrown out of their residences and their farmlands left impoverished after two days of heavy down pour of rainfall.

According to the report of BBC (2012) in late July 2012, at least 39 people died due to flood in the central part of Nigeria, Plateau State. Heavy rainfall caused the Lamingo dam to overflow near Jos, sweeping across a number of neighbourhood in Jos and approximately 200 houses were submerged and destroyed. In addition, at least 35 people were missed and 3000 people were rendered homeless (Adio-Moses, Adigun, Onifade, Oguntunji and Ogungboye 2014). Lagos State recorded first flood in early 1970s and since then it has become an annual occurrence till date. Bayelsa and Delta first experienced hazardous flood in 1999 and continued annually till date (Etuonovbe, 2011).

Emeribeole (2015) reported the following flood occurrences, Abia, Adamawa and Akwa-Ibom States experienced a flood disaster in which 5000 people were affected in 2001. In the same year Zamfara State suffered a great flood that led to displacement of 12,300 people; In year 2005, Taraba State witnessed flood disaster that resulted to displacement of 50, 000 people: In the year 2008, Imo State suffered similar flood disaster experience that made 12,250 people became displaced; In year 2008, Edo state had the same experience which led to collapse of 20 houses and death of four people.

According to Adekunle (2015), on the 2nd September, 2012 at Ilorin, flood disaster dragged many vehicles off the road and swept many people into the river leading to their death. Another flood disaster was also reported in Ilorin at Gaa-akanbi; Adisco, Royal Shekinah, Pipeline offGarage, Unity areas in the metropolis where many electricity poles, shops and vehicles were destroyed. Samson and Afeez,(2015) reported how thousands of Lagos and Ogun residents were displaced and properties estimated at billions of naira destroyed as a result of flood.

The residents of areas such as testing ground, Rasco, Oke-onitea, Fiwasaye, Gbomi and Iladin in Osogbo counted their losses as the rain came down heavily for three hours causing flood (Channels Television, 2016). Ogundele, Arohunsoro, Jegede, and Oni (2016) reported the occurrence of flood in Ekiti State that ravaged many houses, shops and especially churches at Adere along Ilawe road in June 15, 2016 while many victims were lamenting over big losses. So they all later remarked that, there is an urgent need to evaluate the causes of flood, and also diagnose ways to avert its future occurrence in Nigeria.

2.3.5 Incidences of Flood Disaster in Ibadan

The most catastrophic and most publicized flood that hit Ibadan occurred on August 13th 2011, the seven and a half hours of rainfall witnessed in Ibadan from the evening of Friday, 26th August 2011 to the early hours of Saturday, 27th August, 2011, caused serious flooding that devastated most parts of the city and its environs. Over one hundred lives were reportedly lost with property damage estimated in billions of naira (Ayoade

2012). The major areas affected were Odo-Ona, Odo-Ona Elewe, Orogun, Agbowo, Apata, Ajibode, University of Ibadan, Ogbere-Babanla, Ogbere Moradeyo, Onipepeye and Eleyele Dam/ Water Works. The total length of streams and rivers found in the eleven local government areas is 3,168.64 km (Oyo State Government, 2011). The immediate anthropogenic and hydrological causes of flooding in Ibadan have been attributed mainly to land use factors. Notable among these factors is the indiscriminate and relentless construction of buildings on flood plains with 26,553 buildings found within the statutory set-backs of various streams and rivers and 2,105 buildings that were flooded by the heavy downpour of 26th August 2011 (Oyo State Government, 2011). Deforestation was identified by Oseheye, (2016) as another contributory factor to the flooding problem in Ibadan. The destruction of natural forest, typical example in Eleyele-Apete axis where the teak plantation buffering the River Ona has almost been totally depleted, has aided flooding in Ibadan metropolis due to the reduction of the infiltration and retention capacity of these areas. According to IUFMP (2012) indiscriminate dumping of solid waste in streams and rivers is a common practice in Ibadan metropolis. These wastes hinder the free flow of water downstream; the resultant blockage of the river beds and drainage channels with refuse and solid wastes is the most important cause of aggravated flooding along the channels of River Ogunpa and River Kudeti, and indeed most areas in Ibadan metropolis. There are urban design features that have also contributed to the flooding problems such as reduction in urban green space, increased density of development and increased barriers to flood flows, such as road embankments, narrow bridges and culverts. Ola (2014) recorded another flood disaster in Ibadan in 2013 while some residents lost their lives in the flood that swept Carpet bus-stop at Galilee area of Olodo and Apete area damaged properties worth millions of naira. Oseheye (2016) equally reported a flood tragedy that stuck in different parts of Ibadan city on June 2nd 2016 at Odo-ona, Oke-ayo, Apata and Omi-adio where many residents were sacked by the flood; he reported hundreds lost of lives. Meanwhile, tracing back the history of Ibadan flood, it goes back to the 1940s. The first flood recorded in the city, according to Agbola, Ajayi, Taiwo and Wahab (2012) occurred in 1948 when the Gege-river which flows through a section of the city drowned the houses of those living in the first and second stratum of the river (bank). In 1963 a two-days heavy down pour between July 9th and 10th respectively caused

considerable damage to property along the banks of the major rivers that pass through the city. Trees, vehicles and houses were swept away in June 1978 by the flood that followed a two-day heavy rainfall that totaled 137mm. On 17th August 1980, the city was again ravaged by the flood waters of swollen rivers and streams when many lives were lost, over 1000 people were rendered homeless, and property estimated at over four hundred and seven million naira (#407m) damaged (Agbola, Ajayi, Taiwo, and Wahab 2012). In addition, damages were done to roads, railways, bridges, motor parks, and markets. Again in late August 1985, Olawumi, Popoola, Bolukale, Eluyele and Adegoke, (2015) reported a more devastating flood that occurred causing damage to property worth over two hundred million naira (#200m). They continued by narrating same story in May 1987 with floods damaging property worth over #151million. Flooding was not witnessed in the city again, until three years later. The flood that took place in April 1990 destroyed the structures, worth over two hundred million naira, (#200m) near the major rivers in the city while more than 30 lives were lost, 100 houses damaged, and over 15,000 rendered homeless. Others floods in Ibadan were those of 1995, 1998, 2001, 2003, 2007 April 2010.

2.3.6 Overview of Flood Disaster Vulnerability

The concept of vulnerability is oriented towards the perception of disaster risk and has a wide range of interpretations. Multiple definitions and different conceptual frameworks of vulnerability exist because several distinct groups have different views on vulnerability. Vulnerability can be understood to mean the potential of people to be killed, injured or otherwise harmed by the direct or indirect impacts of disaster. (Adelekan 2010) opined that vulnerability to flood disasters describes the degree to which a socio-economic system or physical assets are either susceptible or resilient to the impact of natural hazards. Schanze, Zeman and Maarsalek (2007) defined flood disaster vulnerability as “the degree of loss to a given element at risk or set of elements at risk resulting from the occurrence of a natural phenomenon of a given magnitude and expressed on a scale from 0 (no damage) to 1 (total damage)”. Emeribeole, (2015)., on the other hand defined vulnerability as the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from impacts of a hazard”, while Raheem (2011) opined that it is “human

condition or process resulting from physical, social, economic and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard”.

Vulnerability according to Tas, Tas, Durak and Atenu (2013) is the degree of susceptibility or sensitivity of people, assets, and infrastructure to suffer damages, it is determined by a combination of several factors, including awareness of hazards, the condition of human settlements and infrastructure, public policy and administration, the wealth of a given society and organized abilities in all fields of disaster and risk management. Recent studies especially in developed countries have emphasized the significance of people's vulnerability to hazards, rather than retaining a narrow focus on the hazards themselves (Adelekan 2010; Tunstall, Tapsell, Green, Floyd and George 2006). In addition, Ologunorisa (2004) stressed that it is vital and crucial to recognize that vulnerability is balanced by peoples' capabilities and resilience, and that if they are perceived only or mainly as victims then the problem of what causes vulnerability may be evaded. IFRC World Disaster Report, (2006) reiterated that disasters frequently occur across the world, affecting both developed and developing countries. However some populations are clearly more vulnerable than others. Different communities and countries are more susceptible to the impact of these hazards. The vast majority of lives both lost and affected between poverty and vulnerability to disaster. The earth is a hazardous place and natural disasters will continue to occur, but it is mainly in poorer countries that they lead to humanitarian disasters. The vast majorities claimed by flood disasters are such countries and survivors often lose their livelihoods in the aftermath and forced into more extreme levels of poverty.

According to Chris (2016), the developed countries suffer short term economic losses, because they always have mechanisms in place to avoid loss of life, have immediate emergency and medical relief infrastructure which reduces casualty numbers and insurance against property and infrastructural losses. In developing countries, according to William and Havidan (2016) disaster causes setback to long-term economic and social development of the country, because of lack of resources for early warning system; inflicts massive casualties due to lack of relief infrastructural and resources; and that they are

forced to divert funds from development programmes to emergency relief and recovery.

Akintola and Ikwuyatum (2012) submitted that rapid urbanization has led poorer people being marginalized from safe and legal areas in many countries, forcing many to live in high risk locations, such as flood plains, river banks, steep slopes and reclaimed land. In these unplanned squatter settlements, homes are not built to withstand such natural forces. Many of these settlements lack even the most basic infrastructure, such as health and fire services and fresh water and sanitation. According to Environment Agency (2010), following the Asian tsunami crisis in 2004, the International Labour Organization (ILO) argued that women are more vulnerable during disasters because they have less access to resources, are victims of gendered division of labour and are the primary caregivers to children, the elderly and disabled. As a group, the elderly are often among the most neglected in disaster relief programme, even though they are among the most at risk (IFRC World Disaster Report, 2006).

Garba, Ismail, Ibrahim, Ahmed and Faustinus (2013) opined that floods are anticipated to happen more strictly and regulating in the future because climate change, unplanned rapid urbanization, change in land use pattern, poor water watershed management and decline recharge of groundwater by extension of impermeable surfaces in urban areas. This means that many urban areas across the globe are likely to be under serious threat of floods, the adverse impacts of which are already believed, only next to that of earthquakes. In his own perspectives, Aribigbola (2008), opined that the vulnerability of a place on the earth surface to flood is a function of the region's exposure to the hazard (natural event) and the anthropogenic activities carried out within the catchment area, which impedes the free flow of water.

Nasiri, Mohd and Mohammad, (2016) reported that most of empirical studies highlight that floods disproportionately affect households with lower-socioeconomic status households. Furthermore, disaster vulnerability and poverty according to Donahue and Joyce (2001) are mutually reinforcing. Factors such as low income, poor housing and public services, lack of social security and insurance coverage force the poor to behave in ways that expose them to greater risk. As the impacts of natural disasters tend to fall

disproportionately on the poor, specific policies are required to tackle the link between poverty and disaster vulnerability, the impact and response phase of a flood event but also during recovery and rebuilding processes (Fothergill and Peek, 2004). The quality and pace of recovery following an event, for instance, is influenced by access to timely and sufficient external assistance depends on power relations, social connections and the relief (Schmidtlein, Deutch, Piegorsch and Cutter, 2008). These are often beyond the reach of poor and marginalized populations likewise, preparedness and mitigation activities and the ability to evacuate requires access to economy and social resources that are often lacking (Fothergill and Peek, 2004). The poor are more likely to be working in primary economic activities or doing domestic work that further hinders their ability to recover from flood disaster. Flood disasters often reveal larger societal inequalities, even if there remain some debates on the root causes of uneven post-disaster outcome. Birkmann and Fernando (2008) reported that flooding adversely affects mortality, physical health and mental health where the most substantial impact on health from floods is death by drowning. Jonkman, Masskant, Bods and Levitann, (2009) also reported in their study that approximately one-third of all death during flood events occur away from flood-waters, however, and are the result of dehydration, stroke, lack of medical supplies and health issues that are often overlooked prior to flood events.

A neighbourhood's population density, urbanicity and legitimacy of settlements according to Walker and Burningham (2011) also impact vulnerability to floods. Some authors (Aberin, Kovat, Winkson, Few and Mutthies, 2005; Alderman, Turner and Tong, 2012) question the historic bias towards positioning and permitting lower income housing in floodplain areas and it may be impossible for populations occupying lower income housing in floodplain areas to return following a damaging flood event. Chomsri and Sherer, (2013) stated that informal or uncontrolled settlements generate mental suffering, especially in flood prone areas, with populations having a general feeling of being neglected. Managing flood with the aim of safety and wellbeing of people and their environment saving is one of the main responsibility of government authorities, to achieve this goal, vulnerability study to identify vulnerable areas and adopting effective measures is very essential. Indeed urban flood vulnerability as various in time to time and in adverse

places because of environmental conditions, human activities and the culture of society in face of the threats. Ahmad and Simonovic, (2013) expressed that increasing assessment methods and improving the understanding about flood risk vulnerability can support decision makers in decreasing damage and mortalities.

Vulnerability is affected by numerous factors such as settlements conditions, infrastructure, authority's policy and capacities social inequities, economic patterns to mention a few, so flood vulnerability is varied for people in diverse circumstances. Adelekan (2010) stated that human systems are vulnerable to flood due to three vital aspects: exposure, susceptibility and resilience.

Pelling (2004) refers exposure to people and their surrounding and every element present in flood prone area being exposed to the flood, impacts as a subject to potential loses. Susceptibility as people, environment and infrastructure tending to influence by hazard because of fragility of community or ecosystem while resilience as coping and adaptation ability of a system in addressing disaster stress.



Figure 2: 3 Relationships of vulnerability, flood hazard and flood disaster

A disaster occurs when hazards and vulnerability meet

Source; Nasiri, Mohd, and Mohammad (2016)

2.3.7 Flood Disaster Vulnerability in Nigeria

Significantly, flood disasters result from human-created vulnerability which is an outcome of our interacting with the environment by some human activities such as designing and locating our infrastructure, exploiting natural resources, concentration of our population and so on (Hualou, 2011). The quality of the urban space is vital to sustainable livelihood; therefore, it is important to understand the relationship between sustainable development and disaster preparedness and management. Sustainable development is important and it has come to have an associated meaning (and sub-discipline, 'sustainability science'). In addition, it is the poor people that are more vulnerable to flood disasters. Adelekan (2010) affirmed that the poor in the society have been identified to be the most of the victims of flood, by having no choice, but to end up living in flood prone areas. In the view of Peduzzi, Dao, Herold and Mouton (2009), the loss of life due to flood is lower in developed countries compared to the developing countries. The assertions of Peduzzi, Dao, Herold and Mouton (2009) and Adelekan (2010) appeared to be right because in developing countries like Nigeria, there are absences of effective zoning regulations, flood controls, emergency response to infrastructure and effective early warning systems.

According to National Emergency Management Authority (2012), twelve states of the federation are declared high flood prone while other ten are reported to be moderately vulnerable to flood disaster in 2012. Bangladesh is also a developing country and one of the most susceptible countries to flood disasters in the world. Up to 30% of the country has been covered with flood waters. In 1991, more than 200,000 lives were lost due to flood in Bangladesh (Peduzzi, Dao, Herold and Mouton 2009). Continuous and increasing occurrence of devastating disaster events such as urban flooding often poses substantive danger to the achievement of both sustainable development and poverty-reduction initiatives, the fragile infrastructure of developing countries and the inability to support flood disaster prevention projects financially takes a toll on developing nations. Even disasters of a low magnitude can have extreme effects on ill prepared countries (Chris 2016). Balica (2007) reported that the poor in either developed or developing countries usually reside where the value of land is cheap, like river banks which are flood prone areas, thereby endangering their lives due to flood. These observations are applicable to

Nigeria. Nigeria is not an exception among developing nations of the world with the above stated characteristics. Despite the Capability Assessment for Readiness (CAR), which was developed by Federal capital territory emergency management agency (FEMA) and the National Emergency Management Authority (NEMA) in association with other international bodies, the problems associated with these populations, may have continued to hinder the capacity of developing countries like Nigeria to reduce vulnerability. Probably the foregoing justify the reason why Obeta (2014) remarked that there is need for more research to provide better understanding of the required preparedness which could positively influence people's response to warnings thereby mitigating flood disaster in emergency situations. Nwilo, Olayinka and Adzandeh (2012) submitted that flood disaster is one of the challenges facing a growing number of settlements in Nigeria. Either in rural or urban centres, this environmental catastrophe has become a recurring and increasingly formidable disaster, negatively affecting socio-economic activities. Flood disaster is rated by Obeta (2009) as an extremely devastating event within the natural and man-made environment causing huge economic, social and environmental losses in Nigeria. The occurrence of flood and windstorms disaster in many part of Nigeria is keeping many houses and environment in miserable condition. Flood disasters which tend to be a seasonal type of natural disaster in Nigeria affects and displaces people, destroying properties and farmlands in its wake. This has made commonly response in the process of informing the general population of the community, increasing levels of consciousness about risk and reducing unnecessary exposure to hazards to gain global significance. The negative effects of annual rainstorm and flood disasters has been exacerbated by uncontrolled and indiscriminate human activities, over time and space, having direct negative impact on the people and the welfare of cities (Walker and Burningham, 2011, Bashir, Oludare, Johnson and Aloysius 2012). It was observed that the vulnerability of people to disasters can be influenced by the location and the pattern of the dominant socio-economic activities in a particular environment. Areola (1998) stated that the lives and livelihood activities of the urban people are always hard hit by disasters even if the sad event were on a small scale compared to those that usually occur in rich countries. The observed unusually high impacts on these vulnerable environments could have emanated due to the low levels of mitigations employed or, as in most cases, the absence of any

effective disaster risk reduction (DRR) strategies witnessed in most impoverished settlements in developing countries like Nigeria (Adelekan 2010). The vulnerability of an individual or society to disaster can be alleviated through short-term coping strategies and long-term adaptations practices that adjust human activities to minimize risk impact and outcomes.

Most often the scenarios that often necessitated the needed adjustments can be influenced by effectiveness of disaster relief institutions and agencies operative in such environment. Fadairo and Ganiyu (2010) opined that effective disaster risk reduction can be achieved through the participation of the affected and potential victims of environment hazards in the planning and operations of disaster relief operations. However, it has to be stated that flood disaster events will continue to grow, if vulnerability is not reduced, and the economic impact will far exceed the cost of mitigation and preparedness by orders of magnitude. Large sums are expended on international emergency assistance after disasters that effectively transfer the risk (and responsibility) from the affected local area to the global community.

Adefisan, Abdulkareem and Orimoloye (2015) viewed vulnerability as the main construct in flood disaster management. One of the most significant aims of flood vulnerability assessment is to make a clear association between the theoretical conceptions of flood vulnerability and the daily administrative process. Variety of approaches has been introduced to assess vulnerability therefore selection of more appropriate methodology is vital for authorities. The more accepted assessing methods can be categorized in four groups; curve methods, disaster lose data method, computer modeling methods and indicator based methods (Nasiri, Mohd and Mohammad, 2016). Ahmad, Hussain, Riaz, Subhani, Haider, Alamgir and Shinwari (2013) and Blong (2003) concluded that flood vulnerability mapping can offer a hundred percent security against floods. The role of Geographic Information Systems (GIS) in disasters analysis and management is typically important in critical life saving measures and has been in use in developed countries in the last two decades. Advancements in remote sensing (RS) technology and GIS the help in real time monitoring, early warning system and quick damage assessment of flood and

drought disasters Ishaya, Ifatimehin, and Okafor (2008) defines Geographic Information System as a tool that can assist floodplain managers in identifying flood prone areas in their community. With Geographic Information System, geographical information is stored in a database that can be queried and graphically displayed for analysis. By overlaying or intersecting different geographical layers, flood prone areas can be identified and targeted for mitigation or stricter floodplain management practices. Remote Sensing according to Blong (2003) can be very effective for flood management in two ways; firstly by detailed mapping that is required for the production of hazard assessment hence for input to various types of hydrological models, and secondly by developing a larger scale view of the general flood situation within a river basin with the aim of identifying areas at greatest risk and in the need of immediate assistance. Ishaya, Ifatimehin and Okafor (2008) emphasized that remote sensing and GIS technique has successfully established its application in following areas of flood management such as flood inundation mapping, flood plain zoning and river morphological studies.

2.3.8 Flood Disaster Vulnerability in Ibadan

Vulnerability, according to Nasiri, Mohd, and Mohammad (2016) can be considered in terms of five components:

2.3.8.1 Initial well-being: This appraises the initial health status (both physical and mental) of people in everyday life that is, before the impact of a hazard. It is indicative of their capacity to cope with illness and some types of injury resulting from a hazard such as flood.

2.3.8.2 Livelihood resilience: It is a measure of the capacity of an individual and/or their household to cope with the aftermath of a given hazard impact, and to reinstate their earning or livelihood pattern. This might include their likely continued employment, level of savings, loss of welfare benefits, loss or injury of supportive family members, hazard damage to their normal livelihood activity (for example in floods this might include damage to agricultural land by sediment deposits, seawater incursion, toxic or sewage contamination, loss of dwelling place etc.).

2.3.8.3 Self-protection: This is concerned with the ability or willingness (readiness) of an individual and/or household (with a given level of knowledge of apparent risks) to provide

themselves with adequate protection, or to be able to avoid living or working in hazardous places. It will be influenced by the level of knowledge of physical measures, and the capacity of people to implement them.

2.3.8.4 Societal protection: This refers to the ability or willingness of social and political structures at political or social levels above the individual or household, to provide protection (especially structural and technical preparations) from particular hazards. This might include local government, state government, federal government, relevant organizations (e.g. environment ministries and departments, NEMA, FEMA, SEMA, NGOs), or community-based initiatives.

2.3.8.5 Social capital: This involves the 'soft' security provided by group or community capacities to enhance (or reduce) a person's resilience. This may include the degree of cohesion or rivalry that might affect rescue and recovery. There are various forms of social capital that may enhance or hinder recovery such as support networks (belonging to a church, mosque or other group), some of which may provide mutual aid in times of hardship. It should however, be noted that each one of these is crucially linked to the likely severity of impact of a given hazard, and yet primarily they are all determined by political, economic or social processes. They also contain the possibility of both vulnerabilities and capabilities, with these varying over time (as individuals and groups subsist and compete within given livelihood possibilities), and being affected in regard to different types of natural hazards. Ibadan Metropolis occupies a total area of 127.46km²; highly vulnerable area occupies 24.66% of the total area, moderately vulnerable occupies 44.87% and less vulnerable 30.47%. There are total of 128,182 houses in Ibadan Metropolis captured from the satellite image of Ibadan. Out of this, 17,168 houses occupy a highly vulnerable area, 100,007 houses occupy moderately vulnerable area and 11,007 houses occupy less vulnerable areas of Ibadan Metropolis (Oyo State Ministry of Urban and Regional Planning, 2014).

Adefisan, Abdulkareem, and Orimoloye (2015) used combined tools of RS and GIS techniques in identifying areas that are vulnerable to flooding within Ibadan metropolis. The analysis of the study shows that the lowest elevation was found around River Ona and River Ogunpa with an elevation of 150m above sea level in the South-western area and a

few areas in south-eastern part of Ibadan. The elevation of the town increases gradually up towards the northern part of the city with the highest elevation at about 230m above sea level. Considerable areas of Odo-Ona, Apata Ganga, Molete, Idi-Isin, Olopomewa and Eleyele with elevation less than 160m above sea level were mapped vulnerable to flood hazard. They added that the vulnerability of these areas to flood hazard is very disastrous, this was attributed to high degree of the planning violation in the areas, high population concentration, poor nature of materials used in building of the houses, old nature of the houses, solid waste disposal in streams and River Ona and Ogunpa. High level of concentration of houses around the streams and the two rivers draining the town cause serious constriction of the streams exacerbating an uneasy flow of surface water after a heavy down rainfall event, which usually brings about flash flood. One other important finding reported during verification of their study is that clogging of drains which are usually caused by dumping of solid waste in the drainage system is a usual thing in these areas which is actually a major factor contributing to flood vulnerability of the area.

2.3.9 Relationship between Climate Change, Global Warming and Flood Disaster

Nigeria is a disaster prone country (Raheem, 2011). The disasters which often result into environmental emergencies like flooding are worsened by the degradation of the country's environmental and natural resources. Floods, rainstorms and droughts affect households each year in Nigeria and contribute to endemic poverty in most parts. Climate change and anticipated increases in extreme weather events exacerbate this. Country level policies affect institutional preparedness and eventual adaptation options available during extreme weather events. One of the major challenges of dealing with climate change issues in Nigeria is how to address simultaneously, the different dimensions of vulnerability of human population that are exposed during a single disaster event. Climate change is one of the greatest socio-economic and biophysical challenges confronting the world in the 21st century. Human activity, particularly deforestation and the burning of fossil fuels is driving this change by increasing atmospheric concentrations of carbon dioxide and other greenhouse gases (GHGs). As a result, the world is experiencing greater weather extremes, changes in rainfall patterns, heat and cold waves and increasing drought and floods (United Nations Development Programme, 2009). Climate change has been the

resultant effect of prolonged heavy rain across the globe that usually results to floods. It is an attributed cause of flooding because when the climate is warmer it results to; heavy rains, relative sea level will continue to rise around most shoreline, extreme sea levels will be experienced more frequently.

Ali and, Hamidu (2014) submitted that floods, rainstorms and droughts affect households each year in Nigeria and contribute to endemic poverty in most parts. Climate change and anticipated increases in extreme weather events exacerbate this. Country level policies affect institutional preparedness and eventual adaptation options available during extreme weather events. One of the major challenges of dealing with climate change issues in developing countries is how to address, simultaneously, the different dimensions of vulnerability of human population that are exposed during a single disaster event.

It was noted by Gwary (2008) that the twin-issues of climate change and global warming have attained global dimensions evident by their recurrent discussion at the UN General Assembly, the Bali, Kyoto and other international meeting. Global climate change driven largely by anthropogenic activities a growing threat to human well-being in developing and industrialized nations alike leading to a conclusion that significant harm from climate change is already occurring and further damages are likely. One prediction indicates that Nigeria stands to lose up to US \$ 19 billion as a result of catastrophe while at least 80% of the inhabitants of Niger Delta are likely to face displacement (Ologunorisa and Adeyemo 2005).

2.3.10 Flood disaster management

Flood disaster management is a process of recognizing and effectively combating the risk associated with floods through a suite of planned actions. The process involves a number of activities that occur throughout a cycle, the activities includes preventive measures against flood such as vulnerability and risk reduction efforts, mitigating and preparedness efforts such as forecasting and early warnings and post disaster efforts such as disaster relief, response, rehabilitation and reconstruction. Flood disaster management according to NEMA (2012) involves preventive measures against flood, preparing for it before it occurs as well as supporting and rebuilding society after the disaster have occurred, and

also extend to fine-tuning preventive measures to prevent recurrence. Meanwhile, over the years two patterns or tradition of flood disaster management have been obtained in Nigeria. These according to James, (2010) have been represented as the “vulture concept” and the “eagle concepts”. The vulture concept is reactive in essence while the eagle concept is proactive. The former is likened to what is often referred to as “command and control approach” while the later could be referred to as “fire brigade approach” (James, 2010). However, in line with the prevailing global direction NEMA has launched paradigm shift from the abiding reactive tradition of flood disaster management to a proactive pattern. In the light of this, the National Disaster Management Framework (NDMF) defines flood disaster management as coordination and integration of all activities necessary to prevent, build, sustain, and improve the capacity to prepare for, protect against, respond to, and recover from the disaster (Tingsanchali, 2012). A change to proactive management of flood disasters requires an identification of the risk, the development of strategies to reduce that risk, and the creation of policies and programmes to put these strategies into effect. Meanwhile, IUFMP (2012) opined that to achieve the proactive pattern of flood management, more efforts should be designed towards creating awareness, understanding of causes and management of flood cum solid waste management, stimulate community participation, promote stakeholder engagement, motivate behavior change and sustain the resultant desired new behaviors. However, research findings indicate that promoting peoples participation is more effective when:

- People understand (rather than merely being aware of the problems) the harmful effects of their behavior and realize their roles and responsibilities.
- People are empowered with knowledge and skills.
- Motivation and interaction exists among all stakeholders. (Terungwa and Torkwase 2013).

2.3.10.1 Prevention of Flood Disaster

Prevention of disaster is defined by Donahue and Joyce (2001) as those activities taken to prevent a natural phenomenon or potential hazard from having harmful effects on either people or economic assets. Flood disaster prevention refers to measures taken to eliminate the root causes that make people vulnerable to flood disaster. It has to be re-emphasized that delayed preventive actions drain the economy and the resources for emergency

response. For developing nations, prevention is perhaps the most critical components in managing disasters, however, it is clearly identified as one of the most difficult to promote and fund. Prevention planning is based on two issues: hazard identification (identifying the actual threats facing a community) and vulnerability assessment (evaluating the risk and capacity of a community to handle the consequences of the disaster). Once these issues put in order of priority, emergency managers can determine the appropriate prevention strategies. Emeribeole, (2015) submitted that flood disaster prevention entails making necessary provisions to ensure that the community is less vulnerable to flood risk and danger, added that flood prevention activities may include; land use and planning; moving settlement away from areas susceptible to such risks and dangers such as flood and storm areas; and the establishment and enforcement of building code. Adeloye and Rustum (2011), Atedhor, Odjugo, and Uriri, (2011) reported that the best way to prevent flood disaster is to prevent development from occurring on flood-prone lands. Zoning of such lands is an effective approach, but generally should be coupled with the broader land-use planning mentioned above so that the land has a defined use. Zoning can be used to reduce damages from flooding and be flexible enough to recognize that other forms of land use are compatible. An example is agricultural use of lands in flood-prone areas where water velocities are low enough not to cause serious erosion.

According to Federal Ministry of Environment (2012) flood-prone lands can continue to be used for agricultural purposes, particularly in countries where the amount of agricultural land is limited and self-sufficiency in food supply is a national goal. It is important, however, to ensure that the supporting infrastructure such as buildings and houses are located away from the flood-prone area or are flood proofed. Management of activities within the flood prone area can significantly reduce flood damages to existing development and prevent the amount of damages from rising in the future. The most desirable approach is to prohibit new development in the flood plain and to flood proof existing structures, or to replace the existing development by alternative usage of the land. However, where the amount of present development is substantial or the flood plain is essential for the production of food or other key economic activities, alternate strategies such as flood proofing and protection can be considered. Any new construction permitted

in the flood plain should be flood proofed to reduce future damages. Akintola and Ikwuyatum (2012) recommended building codes to be developed to minimize flood damages by ensuring that beneficial uses of buildings are located above the design flood elevation. For example, buildings can be raised above the design flood level by placement of fill; stilts or piles used to elevate the structure; and building utilities can be located above the flood level. Flood proofing of existing structures can include rising of structures to prevent damage, relocation of utilities, changed building use, installation of protective walls and waterproof closures, and use of materials that are not damaged by water and can be easily cleaned after the flood event. Relocation of existing buildings and structures to an area that is not flood prone can also be an option. Kolawole, Olayemi and Ajayi (2011) opined that buy out and relocation programmes for a particularly vulnerable development should form a component of flood proofing initiatives. In many cases it may be more economical to buy out and relocate the existing use than to protect it. . It is worth mentioning that the issue of preparedness is rooted in the question of what capacity exists in the country as a whole to effectively deal with natural and human-made calamities. Emeribeole (2015) cited instance of the Global Facility for Disaster Reduction and Recovery, who is committed to helping developing countries reduce their vulnerability to natural hazards and adapt to climate change, however only fifteen African countries are currently involved (Nigeria not included yet). The Ecological fund which was established in 1981 through the Federation Account Act 1981 and modified by Decree 36 of 1984 and 106 of 1992 is devilled with several problems (Fagbemi, 2011).

The fund is mostly inadequate and often misapplied or misappropriated by successive state governments having to cope with these natural disasters amidst efforts to solve chronic economic problems of high unemployment, fiscal and balance of payment deficits. International Council for Science, (2008) submitted that the level of preparedness and the capability to reduce vulnerability to disaster largely depends on the developmental stage of a country or a community and the balance between the strengths and imperfections in the functioning of its sectors, structures and institutions. However, Ologunorisa and Adeyemo (2005) recommended the following as preventive measures for control of flooding:

- **Improve drainage efficiency:** Construct pumping stations, water gates and tunnels. Road gullies should be checked and cleaned frequently to ensure that they are not blocked or collapsed. Where there is a large area feeling towards a low spot, this area should be checked to ensure that there are adequate gullies and that they are effectively taking the water.
- **Construction of structures:** Flood barriers are effective means to stop excessive amount of water rushing into low grounds.
- **Retention basins:**In some of the existing water retention basins, although the capacity of draining water from the area is enough in normal circumstances, in time of excessive rainfall, it is necessary to allocate areas to be used as retention basins for detaining such amount of water to prevent flooding in low areas, road, and streets.
- **Avoidance of obstruction in waterways:**Land owner must not construct bridges, fences or other permanent structures across watercourses nor should they restrict the flow capacity by constructing erosion protection within the channel. Nothing should be stored on the banks in such a place or way that it may be washed away or fall in. Bradshaw (2007) added that watercourses must not be used to dispose of debris, even seemingly innocuous materials such as grass cuttings. Such debris may combine with windblown debris, twigs, etc. to cause blockage of grills and thus a flooding incident.

2.3.10.2 Preparedness and Mitigation of Flood Disaster

Mitigation entails making necessary provisions to ensure that the impact of disaster is reduced on lives and properties in any region vulnerable to known risks and danger. Mitigation includes recognizing that disasters will occur; attempts are made to reduce the harmful effects of a disaster, and to limit their impact on human suffering and economic assets. Obeta (2014) stated that hazard mitigation includes hazard source control, community protection works, and land use practices, building construction practices and building contents protection. Hazard source control acts directly on the hazard agent to reduce its magnitude or duration, for example, patching a hole in a leaking tank truck terminates the release of a toxic gas. Community protection works, which limit the impact

of a hazard agent on an entire community, include dams and levees that protect against floodwater. Land use practices reduce hazard vulnerability by avoiding construction in areas that are susceptible to hazard impact. Hazard mitigation can also be achieved through building construction practices that make individual structures less vulnerable to natural hazards – for example, using steel reinforced concrete rather than unreinforced masonry to construct apartment buildings. Finally, hazard mitigation can be achieved by contents protection strategies such as elevating appliances above the base flood elevation or bolting them to walls to resist seismic forces.

Nkwunonwo, Malcolm and Brian (2015) defines flood disaster preparedness practices as pre-impact actions that provide the human and material needed to support active responses at the time of hazard impact. An important step in preparedness is to use community hazard vulnerability analysis to identify the geographic areas and population segments at risk. In addition, Associated Programme on Flood Management (2013) submitted that communities should develop emergency operations plans, conduct emergency response training, acquire facilities and equipment, and perform emergency drills, exercises and critiques.

According to Pennsylvania Emergency Management Agency (2014), flood mitigation involves the management such as redirecting flood run-off through the use of flood walls and flood gates, rather than trying to prevent. Meanwhile, Caribbean Disaster Emergency Management (2010) divided flood mitigation measures into three main areas:

Control over the river: In order to achieve control over the flow and height of the water carried by the river, the channel, flood plain or watershed must undergo some physical alterations. These include:

- Levees/floodwall can be constructed to confine flood water to floating, thereby reducing flood damage.
- Construction of dams, retention basins or reservoirs in mainstreams or tributaries to store excessive water and release it gradually after the threat has passed.

- Channel improvements, which include, straightening to remove undesirable bends, deepening and widening to increase size of waterways, clearing to remove bush, trees and other obstructions; lining with concrete to increase efficiency.
- Watershed Treatment: This is employed to help the soil on slopes to become more absorbent of rainfall until flood heights have receded watershed, treatment involves, crop rotation, construction of terrace, contour strip, cropping, selective planting and reforestation.

Control over the land: To protect against flooding, certain land use policies need to be developed. Aribigbola (2008) outlined the following measures to be undertaken within the policies:

- Designated floodways and encroachment lines: These are the lateral boundaries of the floodways where no construction or land filling should be permitted. This is done to ensure that the flow of water is not obstructed.
- Zoning: This is a legal tool used by government to control development in areas which are or are likely to become prone to flooding.
- Subdivision regulations: These specify the manner in which land may be divided. Typical provisions show the extent of the flood plain on maps. Flooding limits or encroachment lines prohibit filling in channels and floodways that restrict flow and require that each lot contain a building site with an elevation above the flood level.
- Building Codes: These are standards for construction of buildings and other structures and if enforced can reduce damages to buildings in flood-prone areas. Some requirements includes the establishment of basement elevations and first flood elevations consistent with potentials flood levels, ensuring that buildings have adequate structural strength which would likely withstand water pressure or the high velocity of flowing water, prohibiting the use of equipment that might be hazardous to life when submerged and installing proper anchorage to prevent the floatation of buildings.

Additional Mitigation Measures: These include flood proofing, flood forecasting, warning and evacuation systems:

Flood proofing: this is a combination of structural changes and adjustment to properties which can be used in new or existing construction. Action includes seepage control, protective coverings, elevation or raising anchorage and under pinning.

Flood forecasting: This is reliable, accurate and timing forecasting of floods, coupled with timely evacuation to save lives and reduce property losses. Establishing a flood forecasting programme enhances all other flood mitigation measures. Adeloye and Rustum (2011) opined that flood forecasting and warning is a prerequisite for successful mitigation of flood damage. Its effectiveness depends on the level of preparedness and correct response. Therefore the responsible authorities like Nigerian Metrological Agency (NIMET) should provide timely and reliable flood warning, flood forecasting and information. Forecasts provide the necessary lead-time for a wide variety of actions to be taken by the community. Those actions that can reduce loss of life and economic losses by evacuating families, personal effects, produce, livestock and machinery, and by taking short-term efforts to increase the capacity of structural measures such as sandbagging operations and flood control operations at dams. Even in what are considered areas with low possibilities of flooding, complacency can set in and investments in forecasting and other mitigation efforts may be curtailed.

Permanent Evacuation: This removes an affected population from areas subject to inundation. This involves the acquisition of lands, the acquired land can be used for agriculture, parks or other purposes that would not interfere with flood flows or result in material damage.

Flood insurance: This assists by compensating for flood damage. Insurance rates according to Tunstall, Tapsell, Green, Floyd and George (2006) should realistically reflect the flood risk in order to avoid encouragement of improper development of flood plains.

2.3.10.3 Responses, Relief and Reconstruction after flood disaster

Disaster response and recovery are the overall immediate actions taken by government, agencies and disaster management professionals to meet the basic needs of disaster victims until more permanent and sustainable solutions are worked out. The goals, according to Kolawole, Olayemi and Ajayi, (2011) are to guarantee the survival of significant number of victims, restore essential services as quickly as possible, repair and replace damaged

infrastructure, reactivate the economic activities so as to prevent or minimize recurrence. Recovery and response activities consist of evacuation of victims, search and rescue, impact assessment, logistics and relief distribution, securing the affected area and people, rehabilitation and reconstruction (Tunstall, Tapsell, Green, Floyd and George (2006); NEMA 2012).

In most Nigerian cities however, responses to flooding according to Action Aid (2006) include among others: bailing water out of houses, digging trenches around buildings, placing children on higher objects in the house, construction of dykes or trenches, use of waterproof recycled materials, relocation to a more secured higher part, use of sandbags and distribution of relief materials. Kolawole, Olayemi and Ajayi (2011) remarked that the devastation caused by the floods in Nigeria is a reflection of lack of disaster preparedness nationwide. Most of the risk to urban populations is associated with the incapacity of local governments to ensure provision for infrastructure and for disaster risk reduction and disaster preparedness and general lack of proper planning in the urban areas. Fagbemi (2011) stated that the consequences of inaccurate planning in most urban centres of developing countries like Nigeria are of interest to different stakeholders including those involved in research studies and policymaking processes related to sustainable development. This makes large sections of the urban population very vulnerable to any increase in the frequency or intensity of storms, floods or heat waves, and to increased risk of disease, constraints on water supplies or rises in food prices – which in wealthier, better-governed cities are usually easily adapted to.

It is believed that rapid urbanization process shown in developing countries will continue in the years and decades to come, however its environmental and social consequences are unprepared for due to a lack of applied research on the urban system, and because of the intrinsic complexity of the system per se. Preparing for the possible occurrence of flooding and its effects is vital in capacity building to reduce the impacts of the disasters and its attendant hazards. Majority of the people including the government are not adequately prepared for the level of devastation that usually accompanies such flood events. The concept of disaster preparedness has been used by many development

professionals and practitioners from the biophysical and social sciences in diverse but technically precise ways, it is an important component of preventive development; however its usefulness is determined by the level of awareness of the affected people about the potential danger. Peduzzi, Dao, Herold and Mouton (2009) submitted that the people must also be empowered to respond effectively to contribute to the development of their own communities on a sustained basis. The level of disaster preparedness depends on the existing capabilities at individual or institutional levels. At the institutional level, the establishment or improvement of monitoring and early warning systems that can ensure prompt and adequate preparation and response to disasters is seen as part of a preventive development strategy. Preventive strategies can be made more effective if the capacity and the will are there, the priorities are right, legal and institutional frameworks are developed, policies are implemented and the planned activities are well coordinated.

Creation of awareness among people living in disaster-prone areas of the imminent risk they face and how best to respond when it occurs can be done through a broad range of avenues which may be combined with indigenous technical knowledge to enhance local people's confidence and empower them to act when faced with adversity. This will also enable and foster increased participation among the local community to tackle the effects of the disaster. Emeribeole, (2015) submitted that having an evacuation plan in place before flood occur can help to avoid confusion and prevent injuries and property damage. According to United States Department of Labour (2010), a thorough evacuation plan that promotes flood preparedness and responses includes the following:

- Conditions that will activate the plan.
- Chain of command.
- Emergency functions and who will perform them.
- Specific evacuation procedures, including routes and exits.
- Procedures for accounting for personnel, customers and visitors.
- Equipment for personnel.
- Review the plan with workers.

2.3.11 Concept of Flood Disaster Risk Reduction

The International Strategy for Disaster Risk Reduction (2004) defines flood disaster risk reduction as the “systematic development and application of policies, strategies and practices to minimize vulnerabilities and flood disaster risk throughout a society, to avoid or limit adverse impacts of flood hazards, within a broader context to sustainable development”. Meanwhile, Kawuwa, Adamu and Umar (2015) reported that the World Conference on Natural Disaster Reduction held in the city of Yokohama, Japan in 1994 adopted the following principles, strategies and plan for actions for a safer world:

- Risk assessment is a required step for the adoption of adequate and successful flood disaster reduction policies and measures.
- Flood disaster prevention and preparedness are of primary importance in reducing the need for disaster management.
- Flood disaster prevention and preparedness should be considered integral aspects of development policy and planning at national, regional, multilateral and international levels.
- The development and strengthening of capacities to prevent, reduce and mitigate flood disasters is a top priority area to be addressed so as to provide a strong basis for follow-up activities to the International Decade for Natural Disaster Reduction (IDNDR).
- Early warnings of impending flood disasters and their effective dissemination are key factors to successful flood disaster prevention and preparedness.
- Prevention measures are more effective when they involve participation at all levels from the local community through the national government to the regional and international level.
- Vulnerability can be reduced by the application of proper designs and patterns of development focused on target groups by appropriate education and training of the whole community.
- The international community accepts the need to share the necessary technology to prevent, reduce and mitigate flood disasters.

- Environmental protection as a component of sustainable development consistent with poverty alleviation is imperative in the prevention and mitigation of flood disasters.
- Each country bears the primary responsibility for protecting its people, infrastructure and other national assets from impact of flood disasters.

In Nigeria, disaster risk reduction strategies, plans, policies and legislation exists in varied degrees, however, what has been lacking according to Nkwunonwo, Malcolm and Brian (2015), is common goal towards management of disaster that entails effective performance of six inter-related groups of activities namely: development planning, disaster prevention, mitigation, preparedness, response and recovery.

However, Adejuwon and Aina (2014) remarked that the traditional focus of disaster management strategies in Nigeria has been the delivery of relief materials after a disaster. Even though disaster relief is an important issue, this approach alone does not effectively address the need to reduce the human and environmental impacts of future disasters. There is growing realization that countries and communities used to place more emphasis on a holistic approach to disaster risk reduction and disaster preparedness if the social, economic and environmental costs of disasters are to be effectively reduced (UNISDR, 2004). UNISDR (2004) submitted that contemporary thinking and practice of emergency management has been mainly guided by the two strategic goals outlined in the Hyogo Framework of Action (HFA), namely:

1. Integrating disaster considerations more effectively with sustainable development, politics, planning and programming at all levels, emphasizing disaster prevention, mitigation, preparedness, and vulnerability reduction.
2. Developing and strengthening institutions, mechanisms and capacities, particularly in communities, that can contribute systematically to improving resilience to hazards.

This new thinking according to Annegret, Heidi, and Bruno (2007) apparently explains why some analysts insist that effective disaster management must be factored into the national development agenda to make for sustainability. Hence, it is now widely recognized that the most likely solution to disaster problems is the implementation of

successful developmental projects towards vulnerability and risk reduction, environmental management and sustainable livelihoods” (UNISDR, 2009). To this end, Fagbemi (2011) submitted that United Nation Conference of Risk is currently carrying out various community-based programmes in some countries “to establish disaster prevention as an essential component of sustainable development” this drive has given rise to the idea of sustainable disaster management.

A critical element of sustainable disaster management is the question of community involvement in the process. The notion of community involvement presupposes community’s partnership, participation, empowerment and ownership. Nwilo, Olayinka and Adzandeh (2012), remarked that community involvement in flood disaster management demands their participation in risk assessment, mitigation planning, capacity building, participation in implementation and development of system for monitoring which ensures their stake. It is this thinking that has given birth to what is known in the literature as ‘Community-Based Disaster Management (CBDM)’. This approach differs from the conventional paradigm of disaster response characterized by command-and control structure and/or top-down (up-bottom) approach. In fact, Bunn and Arthington (2002) stated that the CBDM approach promotes a bottom-up approach while reinforcing the top-down (up-bottom) approach in dealing with disaster situations with the goal of leveraging optimal performance.

The prospect of effective emergency management in Nigeria lies in a paradigm shift from the traditional relief intervention to a pro-active order that emphasizes the imperative of disaster risk reduction and control. As Adeoye, Oyelade and Babatimehin (2008) has rightly cautioned: ”While relief intervention is needful especially at the critical phase of disaster impact and thereafter; it is, however, criminal for policy decision maker to wait for disasters to occur before allocating resources to address the catastrophes”.

2.3.12: Effects of Green space on Flood Disaster Prevention

Nkwunonwo, Whitworth and Baily (2015) in their perspectives identified the causes of flooding in Nigerian cities, Lagos and Ibadan Metropolis in particular as: (1) ineffective

waste management that blocks drains; (2) erection of structures on waterways; (3) overstretched, or non-existent sanitation drainage, etc; (4) degreening activities that remove green cover; (5) paving of open spaces with asphalt and concrete that accentuate storm water volume as percolation is reduced; and (6) unpaved surfaces that generate debris and silts that cause siltation and sedimentation of Atlantic ocean and lagoon with the consequence of rising sea level and coastal flooding. They remarked that while numbers 1-3 have attracted the attention of scholars and policy makers, numbers 4-6 are neglected or unrecognized as important agents of flooding. Lagos and Ibadan according to Akinola (2000) are experiencing degreening activities as indicated by very low proportions (27% and 24% respectively) of open spaces around buildings that are greened, while 73% and 76% of the available open spaces are either paved or unpaved with the problem of heat radiation, flood accentuation and generation of erosion that induced flooding. This confirms that the value of environmental health and beauty is being traded with economic considerations regardless of the fact that the loss in environmental value, health and beauty can offset the economic gains derived from degreening. Unless open green spaces are provided and maintained, urban areas are vulnerable to the destructive impact of flood.

Adelekan (2010) described a balanced urban scape as the total urban pieces - buildings, communication network and open spaces. If open spaces are not greened in urban areas, they will either be paved or left opened, a situation which has great consequences. For instance, paved spaces reflect heat which consequently, increase environmental temperature. Unpaved surfaces are opened to erosional effect during the rainy season and agent of air pollution (dust) during the dry season. This brings to mind, the effect of sand digging around Ibadan by some construction industries. Sand digging causes deforestation that takes a very longer period for natural re-forestation. Considering the benefits of green cover, urban greenery is a short-cut to reduction of environmental degradation; increase in productivity and welfare of citizens and aesthetic value; and a short-cut to sustainable development. This is realisable when we operate within a balanced ecological system. The relationship between the physical structures and green cover should be balanced considering the tremendous role of green cover (forests). The analysis of result of the study of Akinola (2000) shows that 62.4% of plot area is devoted to open space, out

of which only 27.0% is greened, meaning that 73.0% of the available open spaces are either paved or unpaved with the problem of heat radiation. The 27.0% green is too small, especially when one considers the benefit of green cover. The implication of this is that the benefits of green cover are lost. Green space serves several purposes especially in urban areas. Such purposes include: local climatic regulation; cycling of water; cycling of oxygen, carbon dioxide and nitrogen; biological filtering of pollutants and screening from noise; regulating hydrology and run-off; and recreation, amenity and public health.

Residential environment requires natural cooling system derivable from green cover. Where there is no green cover, artificial cooling system (air conditioning) which increases expenditure and energy consumption is used instead. This invariably increases the budget of individuals and governments while other social functions - health and education - are likely to be jeopardized. Thus poverty sets in, though may be unnoticed initially, the cumulative effect will be glaring in future. The role of green cover in controlling and regulating flow of water in rainy season is similar to the role of traffic light in controlling and regulating vehicular movements on roads. Without green cover, storm water gathers and rushes down the street which makes drainage to overflow and thus leading to flooding.

2.3.13: Flood Risk Practices of Ibadan Residents

IUFMP (2012), Agbonkhese, Agbonkhese, Aka, Joe-Abaya, Oncholi and Adekunle (2014); Adebayo (2014); Adio-Moses, Adigun, Onifade, Oguntunji and Ogungboye (2014) identified the following as flood risk practices of Ibadan residents:

- **Building Process:** The materials extensively used to cover the ground when cities are built, such as asphalt and concrete is relatively impermeable and greatly reduced groundwater replenishment. Therefore, when considerable area is covered by these materials, surface runoff tends to be much more concentrated and rapid than before, increasing the risk of flooding. It was observed that the laws and regulations governing development in Ibadan Metropolis, as far as the recognition of flood hazards are concerned, are generally inadequate to protect the populace

from floods. The existing statutory set-backs to the major streams and rivers are inadequate in the face of increased urbanization in the city. Even then, the existing laws and regulations are neither observed by developers nor enforced by government agencies, leading to unavoidable loss of lives and properties whenever the rivers overflow their banks, especially after any heavy rainfall. IUFMP (2014) reported general lack of awareness about physical planning and building regulations, environmental laws, environmental safety, as well as the risks associated with building on floodplains, among the population at large. It added that, there are instances whereby the general population erects, with impunity, buildings on the river courses and on flood plains in disregard for the rules and regulations. There may be instances of building approvals granted in conflict with the provisions of the law. Odunola and Balogun (2015) reported that cause of flood in Ibadan is further compounded by the fact that most buildings were built right within the immediate flood plain of the river. From the report of their findings, a larger proportion (62.8%) of the households' respondents agreed that most buildings did not observed appropriate setback thereby shifting such blame on the planning authority for approving such buildings. They also observed that buildings along the flood plain observed less than 30 meters setback to the river.

- Poor waste management: IUFMP (2012) reported that the indiscriminate dumping of solid waste in streams and rivers is a common practice in Ibadan metropolis. These wastes hinder the free flow of water downstream. Ajibade, Ifabiyi, Ironje and Ogunteru (2010) observed that the resultant blockage of the river beds and drainage channels with refuse and solid wastes is the most important cause of aggravated flooding along the channels of River Ogunpa and River Kudeti, and indeed most areas in Ibadan metropolis. Oluwatayo and Olatunji (2015) also submitted that main causes of flooding in Ibadan is poor waste management, that people dump refuse in nearby gutters, drainages, streets, road medians, stream and rivers or directly from the houses into gushing drain water in street gutters when it is raining. Another cause identified by them is lack of toilets in many old houses, particularly the indigenous parts of the city, which make people to include 'packaged' human faeces with other forms of waste and dumped at nearby bushes,

streams and rivers. To corroborate this, from the result of findings of IUFMP (2012) during Focus Group discussion, one of the participant remarked that “our forefathers used to dispose refuse in the river ways, so it is an inherited culture”.

- **Poor farming:** Flooding also result from poor farming. Some farming practices in Ibadan metropolis damage the vegetation cover. Vegetation can decrease flood hazards somewhat by providing a physical barrier to surface run off, by soaking up some of the water and through plants root action which keeps the soil looser and more permeable. Vegetation can also be critical in preventing soil erosion, when vegetation is removed and erosion increased, much more soil can be washed into streams. There it can fill in or “silt up” the channel, decreasing the channel’s volume and thus reducing the streams capacity to carry water away quickly.
- **Overgrazing of the land:** Overgrazing of the land also leads to flooding. Grazing with too many animals will cause the pasture to be eaten away quickly. The soil is thus left without any cover and it is easily washed into the river. Over cultivation of the land will also make the land to be infertile. When the land is cultivated over a long period of time, it will become infertile to the extent that no vegetation can grow on it.
- **PoorlyConstructed or Managed Dam:** Flooding can also be caused by poorly constructed or mismanaged dam. The size of a dam is a function of the quantity of the water to be retained and the usage. There is, however, a maximum height that the water in a dam should safely reach and dams are built with adjusted gate valves, which allow for the safe, gradual release of water. Flooding will occur whenever a dam is no longer safe and when the maximum water level has been reached and the opening of the gate valves becomes necessary. Where the opening of the gate is not done in a controlled and gradual manner, it can lead to even more devastating consequence. This was what happened many years ago in the case of Ogunpa River, several properties were completely flooded when a strike embarked upon by the workers at Eleyele dam made it difficult to release water gradually from the dam. The properties downstream of the dam were affected by the overflowing of the river.

- **Deforestation:** Deforestation of the forest belt near the rivers can cause flooding. People who live in the riverine areas and the banks of rivers cut many trees in order to build houses and to make farm. As a result of deforestation, there will be no tree to soak up water, this will cause more water to flow into the river. There will also be no tree to hold the soil together and when this happens, there will be soil erosion. Because of silting, the river bed becomes shallow while the water volume increases to the extent that the river cannot hold all the water and it will eventually overflow the bank. Deforestation has been identified as contributing factor to the flooding problem in Ibadan. According to Akintola, (1994), some areas such as the Agala and Igbo Agala forests were deliberately preserved in Ibadan under teak and cassia forests during the colonial period. These were mainly the hills in and around Ibadan. The preserved areas, referred to as catchment areas, were supposed to catch and store some water temporarily during rainfall. The destruction of these forests especially following the 1993 national election crisis, has aided flooding in Ibadan metropolis due to the reduction in the infiltration and retention capacity of these areas. This was confirmed by Akintola (1994) in a study on infiltration process in Ibadan city which indicated varying rates or capacities for different types of urban land-use surfaces.

2.3.14: Impacts of Environmental Regulatory Agencies, Ministries and Departments on Flood Disaster

Disaster management according to Obeta (2009) is still at infancy stage in Nigeria despite the fact that the year 1906 marks the earliest efforts of disaster management in Nigeria with the establishment of the Police Fire Brigade (now Federal Fire Services) with functions beyond fire fighting role to saving of lives, properties and provision of humanitarian services in emergencies. By 1999, the National Emergency Management Agency (NEMA) was established via Act 12 as amended by Act 50 of 1999, to manage disasters in Nigeria. NEMA was set up to tackle disaster related issues through the establishment of concrete structures and measures. According to Obeta, (2009) before Nigeria got her independence in 1960, response to flood disaster condition was an exclusive preserve of private, individuals and groups in affected areas. There was no specific, well-formulated institutional response procedure for tackling flood episodes. The

federal government's pioneer intervention agency came into being during the First, Second and Third National Development Plans of 1962-68, 1970-74 and 1975-80 respectively, through the establishment of the federal, state ministries and local government department of environment and work to among other assignments, address flood management issues (Environment Agency 2010). The disaster management department /units of these ministries/ departments were mandated to create awareness among the citizenry on flood and associated hazards and to develop sound response strategies to combat flood events through properly cost programme of adjustment, abatements and protection (Kolawole, Olayemi and Ajayi, 2011).

In addition, National Emergency Management Agency (2012) reported that the agencies were mandated to identify, seek and acquire the necessary data needed to combat flood and associated natural disasters. These agencies assisted greatly in identifying and characterizing flood-prone areas in Nigeria. They designed and developed drainage channels (especially in urban areas), diversion channels and dams to store surface runoff. These structures helped to reduce flood damage potentials in various parts of Nigeria (Hualou 2011). In 1988, the Federal Environmental Protection Agency (FEPA) was established as a unit in the Federal Ministry of Works and Housing. FEPA was mandated to develop policies and programmes which can secure Nigeria from the negative impacts of ecological disasters (Obeta, 2009). In 1999, the Federal Ministry of Environment was established the ministry was, among other things, mandated to assess the flooding potentials of watersheds as well as to determine, design, develop and/or authorize the development of appropriate flood mitigation measures, in these watersheds. Disaster management department of the ministry categorized flood-prone areas in Nigeria into three, namely

1. The low lying coastal areas: This area is with generally low drainage. The south ocean through this area thereby increasing the areas vulnerability
2. The Niger Benue trough: This trough consists of extensive flood plains of the Niger River and Benue-its largest tributary. This region is relatively densely populated and frequently flooded (Etuonovbe, 2011).

3. Urban and built-up areas: (especially Warri, Port-Harcourt, Uyo and Calabar). Wahab, (2011) stressed that these areas are growing rapidly due to a combination of factors such as rapid population increases, agglomeration of industries, social amenities etc. other anthropogenic and physical factors that lead to frequent flooding in Nigerian urban areas.

According to Adelekan (2010), In September 2002, a technical report of Federal ministry of environment titled “Ecological Disasters in Nigeria” described flooding as an age-old problem in many parts of Nigeria. The document noted that flood disaster is becoming more frequent, intense and unpredictable for many communities. Ndukwe and Chiemelu, (2010) reported that the continued propensity of flood incidents in Nigeria necessitated the establishment of additional institutions from the late 1990s to assists in flood disaster management in Nigeria. The new institutions are:

- i. National and State Emergency Management Agency (NEMA, FEMA, SEMA)
- ii. National Commission for Refugees (NCFR)
- iii. Federal Environment Protection Agency (FEPA) (established earlier in 1988) and
- iv. Nigerian Metrological Agency (NIMET)

NEMA procures and distributes relief materials in the form of food items, non-food items and bedding materials to the affected victims while a technical mitigation committee of FEPA undertakes flood impact assessment responsibilities and develop structural and nonstructural measures. NCFR prepare emergency shelters or find suitable accommodations for internally displaced people. NIMET study the pattern of precipitation nationwide and acquires, classifies and preserves metrological data needed for flood prediction and forecasting. Non-governmental organizations, particularly the Red-Cross society respond by providing cash and relief materials to affected people or by ensuring that those who lost their lives are properly buried.

The seemingly elusive solutions to Ibadan flood disaster led Oyo state government to establish its state and local government’s chapter of emergency management agencies (YOYSEMA, LEMA) offices. In addition, the seven and a half hours of rainfall witnessed in Ibadan from the evening of Friday, 26th August 2011 to the early hours of Saturday, 27th August, 2011, that caused serious flooding that devastated most of the city and its environs. The incident looked like reminiscent of the Ogunpa flood disaster that occurred

in the city in 1980, but on a larger scale and with more devastation this time around. According to Adegbola and Jolayemi (2012), over one hundred lives were reportedly lost with property damage estimated in billions of naira. This incident prompted the Executive Governor of Oyo State, His Excellency, Senator Isiaka Abiola Ajimobi, to constitute a Task Force on Friday, 9th September 2011, to investigate the immediate and remote causes of the flood disaster, and recommend appropriate remedial and preventive measures accordingly.

According to IUFMP (2012), the following are the Terms of Reference (TOR) given to the Task Force by Oyo State Government:

- (i) Take inventory of water courses in Ibadan metropolis;
- (ii) Identify all structures along identified water courses in Ibadan for demolition;
- (iii) Clear path of water courses up to a pre-determined set back starting with the most affected communities;
- (iv) Evolve strategies for inclusive environmental waste management;
- (v) Suggest emergency response mechanisms for unexpected floods;
- (vi) Evolve effective sensitization strategies for environmental management in the state; and
- (vii) Any all other measures necessary for effective flood management in the state.

This eventually gave birth to a World Bank assisted project named Ibadan Urban Flood Management Project in 2011. It is however imperative to state that these agencies are trying their best, in the face of inadequate resources and funds, lack of sophisticated equipments, dearth of manpower personnel etc. Perhaps flood disaster can be prevented through individual's attitudinal change towards our environment.

2.3.15 Community Capacity Building to Reduce Vulnerability, Incidence and Fatality of Flood Disaster

Community participation aims to find better solutions to the problems in the community by opening up more opportunities for people to contribute, so that the implementation of the activities will run more effective, efficient, and sustainable. Community has different perceptions on disasters and develops different efforts to overcome them. The capacities to

cope with flood disaster impact is however different depending on social groups; poor and rich, men and women, young and old, indigenous or non-indigenous, etc. Many have struggled to relocate out of their flood-prone neighbourhoods to better areas without success mostly due to huge cost of rent. Being located in the flood-prone area, majority of the people are aware of the danger involved and they have tried to protect and cope with flood effects. There are many coping mechanisms employed by the local people to deal with the negative impact of flood. These can be grouped as follows: economic, technological/structural and social coping mechanisms. The definition of economic coping mechanism involves economic activities and diversification, including those strategies of the community linked to materials goods and resources, for instance, having more than one source of income. The technological/structural coping mechanism refers to the structural activities employed by households living in the flood-prone area to cope with flood losses or damages. These include the construction of houses to prevent floods or the use of materials that can minimize the flood losses and damage. For instance people in flood prone areas such as Lagos, Ibadan and Abeokuta have taken to construct their house with reinforced material and some houses with second floor to protect their lives and properties against flood. The social/organizational coping mechanisms are those activities and or social relationship and network among the community and local government that can help people to minimize the flood losses and damage (e.g. the supply of relief materials and establishment of refugee camps to house displaced people until the flood recedes). It must be noted that local people behave and develop mechanisms for coping, that if well understood can guide local authorities and communities to develop in partnership adequate measures for avoiding or decreasing people's vulnerability and expand their opportunities for managing floods (Adewale, Sangodoyin and Adamowski 2010). Throughout the world, countries have recognized the need to formulate a clear regulatory agenda aimed at the prevention, management and reduction of disasters. A number of steps taking in the right direction would boost the capacity of the community to confront most natural disasters such as flooding. Capacity building can be at the individual, institutional and systemic levels. Individual capacity depends on the availability, the knowledge and skills, as well as the performance of human resources. The capacity question focuses on all aspects of the emergency management system at national

and local levels, and also includes an assessment of the political, cultural, social, economic and environmental factors which influence vulnerability to disasters. At the institutional level, capacity focuses on overall organizational performance and management capacities. They include, for example, the existence of an organization with a specific mandate on flood management. The systemic level focuses on the creation of enabling environment, such as the overall policy, economic, regulatory, and accountability frameworks within which organizations and individuals operate.

Capacity building is a process of achieving self reliance through the strengthening of human and institutional capabilities within an economy, to serve the interest of human, economic and political development. Alese (2014) submitted that building capacities of human resources both in public and private organization is very critical to the development of a nation. She added that although, Nigerian government is building the capacities of her human resources, it is apparent however, that her efforts are inadequate in salient areas in the process of change especially, as it affect the climatic change adaptation. Based on this, Hualou (2011) asked this question; How far has Nigeria promoted the understanding of the Disaster Risk Reduction Paradigm through training, education and public enlightenment? He responded that people need understanding and implementation of disaster risk reduction strategies to protect lives and properties against flood diasater in Nigeria.

Adedeji, Odufuwa, and Adebayo, (2012) submitted that the people at the local community level have more to lose because they are the ones directly hit by flood disaster. They are the first ones to become vulnerable to the effects of such hazardous events. On the other hand, they have the most gain if they can reduce the impact of flood disaster on their own community with the support particularly from the local government. Not too long ago, disasters were viewed as isolated events and were responded to by governments and relief agencies without taking into account the social and economic causes and implications of these events (Terungwa and Torkwase 2013).Evaluating this approach, there was an exponential increase in human and material losses from disasters in the past few decades despite advanced human interventions, but there is no clear evidence that the frequency of

extreme hazard event has increased. Ezemonye, and Emeribe (2014) recommended the following in their study;

- There is a great need to create awareness among the populace that flood prevention and mitigation is not the responsibility of the government alone and also de-emphasize taking action only after the flooding has occurred,
- The erroneous idea that flood is “an act of god” and any preparedness measure to mitigate this amounts to exhibition of lack of faith needs to be addressed through creating awareness utilizing education achievable through conferences, media, religious activities etc. and
- Educating the people on preventive and preparedness measures that, they can practice before the onset of the flooding season.

Sometime ago disasters were considered as emergencies in Nigeria and were the responsibility of the fire brigade, rescue workers and hospitals. However, if we consider some issues that usually lead to occurrence of flood disasters, the priority shifts to reducing people’s vulnerability and managing the risk will be considered more important. Aderogba (2012) reported that the important role of communities in flood disaster management is strongly supported by the United Nations International Strategy for Disaster Reduction (UNISDR) whose vision is to enable all communities to become resilient to the effects of natural hazards, technological and environmental disasters. Sayers, (2006) submitted that experiences show that community based approaches seem to offer viable alternatives for managing and reducing risks and ensuring sustainable development. According to Associated Programme on Flood Management (2013), a community-based organization (CBO) is best positioned to effectively carry out activities and plans affecting the lives of the communities; socio-economic development, natural resource management, environmental conservation and disaster management. Community-based organizations are made up of community representatives and one of their aims is to ensure that decision makers take notice of community concerns. Their main tasks are to:

- Provide a platform for the community to come together and discuss development issues.

- Analyze the causes of flood disaster and solutions
- Communicate with decision makers to share planned action and obtain their endorsement.
- Mobilize internal or locally available resources and external resources (outside the community) to implement identified solutions.
- Raise community awareness and promote community action on environmental and disaster issues and livelihood options.
- Build capacity of community members.
- Carry out monitoring and evaluation.

2.3.16 Environmental Education and Environmental Hazard Prevention

Environmental hazard is a broad term used in defining such phenomenon as earthquake, flood and pollution which are brought about as a result of active forces within the earth or on the earth's surface or by man's activities (DoubleGist, 2013).

Alese (2014) emphasized that training in ecological awareness of environmental hazards is one important side, but to understand people and human behaviour is equally important. All this pointed to a need for increasing focus on raising public awareness, and providing education, to help reduce the risk of flood disaster. Meanwhile, Sayers, (2006) emphasized that jumping directly from hazard awareness to response-preparedness skills can reinforce the view that flood disasters are inevitable, and that the only thing people can do is to react to them afterwards, this can inadvertently support a fatalistic attitude. Akintola and Ikwuyatum (2012) recommended that planning strategies, programmes and activities for public awareness and public education in disaster risk reduction. They stated further that more recently, third priority of the Hyogo Framework of Action was set as: to use knowledge, innovation and education to build a culture of safety and resilience at all levels and to be widely relevant to field. Ologunorisa and Adejumo (2005) also observed that flood control needed the cooperative agreement between government and local communities, and an enlightenment program through environmental education and mass media that could be largely accomplished through radio broadcast.

Environmental education is a process that allows individuals to explore environmental issues, engage in problem solving and take action to improve the environment. As a result,

individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decision. Environmental education does not advocate a particular viewpoint or course of action. Rather, it teaches individuals how to weigh various sides of issues through critical thinking and it enhances their own problem-solving and decision-making skills (National Environmental Education, 2016).

Components of Environmental Education according to National Environmental Education, (2016) are;

- a) Awareness and sensitizing towards environmental challenges.
- b) Knowledge and understanding of the environment and causes and effects of environmental challenges and how best to reduce new occurrence.
- c) Attitudes of concern for the environment and motivation to improve or maintain environmental quality.
- d) Skills to identify and help resolve environmental challenges.
- e) Participation in activities that lead to the resolution of environmental challenges.
- f) Uphold the beliefs that those unnecessary and untimely death and loss of properties to disasters are preventable.

To stay alive is to be safe from hazards that are inundated in our environment which calls for mitigation of host factors, agent factors and environmental factors that are responsible for disaster. So, if men are to live in a desirable and healthy environment, free from horrors, hazards and harm, there is need for environmental education through peoples environmental consciousness, public enlightenment and reinforcement of safe environment living patterns in the society. Meanwhile, there is a need to distinguish between information, education, and communication. Communities should not be passive recipients of information, there is a need to encourage people to help themselves, and communities must be provided with the mechanisms and tools to do so. Communities need to be active in the information dissemination system, they require technology adapted to local needs and conditions. Local communities should also be encouraged to document disasters and events at their level in any way possible for future research on flood mitigation and to increase local empirical knowledge of flooding. Next comes is the

means to communicate to the target groups, besides using the mass media, because effective communication requires feedback.

2.4 Empirical Review

2.4.1 Environmental Education and Knowledge of Causes and Effects of Flood Disaster

Across the globe, floods keep recurring and causing more tremendous danger to people's lives and properties. Floods seem to be the cause about one-third of all deaths, one-third of all injuries and one-third of all damage from natural disasters in developing countries. Flood disasters according to Obeta (2009) accounted for about 38% of all the federally declared natural disasters between 1995 and 2005 in Nigeria. Adegbola and Jolayemi (2012) also stressed that flood is the most frequent and most widespread natural hazard accounting for about one-third of all disasters arising from geophysical hazards and adversely affecting more people than any other natural hazard.

Olawumi, Popoola, Bolukale, Eleyule and Adegoke, 2015 observed that in a more advanced country like the Netherlands, the government strives to improve flood risk awareness and also encourage a desirable shift in behavioural pattern among the Dutch based on the 1953 devastating flood disaster in the country. Fagbemi (2011) remarked that Netherlands is often seen as world leader in flood management, with hundreds of years of experience in building flood defenses. In Nigeria, the case is not different as a number of flood occurrences had been recorded in major towns and cities. The 2012 flood disaster in Nigeria adversely affected more people in one year than the combined number of all the people affected by other natural hazards, including soil erosion between 2005 and 2010 (Hassan and Tokula, 2013). The dominance is not surprising the overlapping of the natural boundaries of rivers together with the submergence of the low-lying coastal areas, especially along the Lagos-Ibadan, Benin-Port-Harcourt and Calabar axis is a more frequent occurrence when compared with the incidence of other hazards such as drought, soil erosion, earthquake and landslide (Abam, 1995).

In many parts of Nigeria, flooding continues to be an increasing problem, catching individuals and communities by surprise in a repeatedly exasperating way and causing disruption of social activities, damage of infrastructure and even death of people and livestock (Ayoade, 2006). Meanwhile, indiscriminate dumping of refuse, encroachment upon, climate change, industrialization, deforestation, urbanization and poor channelization of drainages coupled with the excessive rainfall are the causes of flood disaster (Adio-Moses, Adigun, Onifade, Oguntunji, and Ogungboye (2014); Agbonkhese, 2014). It has also been noted by Olawumi, Popoola, Bolukale, Eleyule and Adejoke, (2015) despite government efforts and spending on this phenomena, unethical human activities causing flood disaster keep increasing.

However, Emodi(2012) while establishing the extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken, individually and collectively, to reduce exposure and vulnerability to hazards, he observed that highest percentage of the population at risk lack ecological knowledge of flood disaster risk and vulnerability. In addition, Pelling (2004) and Marthen, Zaenal, Kliwon and Jailani(2012) observed that the ability the community or society that are exposed to hazards to resist, absorb, adapt to and recover from the effects of a flood hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions is very low due to lack of awareness and education.

Public awareness and public education for disaster reduction seek to turn available human knowledge into specific local action to reduce disaster risks. It mobilizes people through clear messages, supported with detailed information. Hazard awareness alone does not lead directly to people adopting risk-reduction measures. Obeta (2009); Raaijmakers, Krywkow and Van der Veen (2008) have found that people take action only when:

- they know what specific actions can be taken to reduce their risks
- they are convinced that these actions will be effective
- they believe in their own ability to carry out the tasks

In addition, Federal Ministry of Environment's Bulletin on Ecological Disasters, (2012) recommended that education and community participation will empower the community with new knowledge and skills and develop the leadership capability of community members, and so strengthen their capacity to contribute to development initiatives.

2.4.2 Environmental Education and Attitude towards flood disaster management

An attitude is a mental and neural state of readiness, organized through exposure, extending a directive or dynamic influence upon the individual's response to all object situations with which it is related. Eagly and Chariken (1993) defined attitude as an interest of specific intensive in a particular course of action by an individual towards some objects and it indicates the readiness to act in a certain direction in a given situation. They listed the primary factors which can influence a person's attitude towards an event like flood management as: dominance, impulsiveness, venturesome, tender-mindedness, suspicious, shrewdness, apprehensiveness and self-efficacy. He stated further that a social person is warm, good-natured, easy-going, ready to cooperate, attentive to people, soft-hearted, kin, trustful, adaptable and warm-hearted. Anyone who has these attributes tends to be well disposed to good changes and support effective environmental management, thus prevent flood disaster.

Ajzen (1991) asserted that attitude and values are interrelated and that values provide direction for attitude which in turn predisposes an individual to a particular activity thereby influencing his behavior which is accounted for by his feelings. He affirmed that attitude and values are formed early in life and these persists through life but value system can modify them. The implication is that the nature of a person's value and attitude towards other people, towards situation and towards environments as a whole is important to other members of the society, especially in flood disaster prevention activities.

Attitude according to Hodgson and Palm (1992) literally means a predisposition to act in a certain way towards some aspects of one's environment, including people. They added that attitude serves primary functions of bringing together the various experiences to which an individual is exposed and forming them into a cohesive, and organized whole in

flood situations. Thus an individual's value affects all though and behavior patterns in part by generating attitude in manner that moves from broad mental set to narrow one. Attitude towards flood prevention can be positive or negative and can affect the behavior of an individual.

An increasingly rapid population growth has led to the disaster-prone areas being quite densely populated and had accepted the risk of flooding due to the difficulty in finding a more secure area. Marthen, Zaenal, Kliwon, and Jailani (2012) reported bad attitude of public towards the environmental impact caused by the residential activities near the river. The study concluded that there is a negative influence between attitudes and behavior towards the social impacts caused by flooding. This means that the higher the good attitudes and behavior toward flood resulting activities, attitudes toward responsibility, and attitudes toward prevention, the lower the social impacts due to flooding received by society. Also IUFMP (2012) opined that success of waste management and flood control depends largely on the attitude of the people, they later reiterated that positive behaviour change can only be achieved if people understand flooding and solid waste management issues, concluded that it is very imperative to adopt effective strategies that will shape people's attitudes, perceptions and beliefs about environmental issues in Ibadan.

2.4.3 Effects of Flood Risk Practices on Flood Disaster

Flood could be part of the hydrological cycle, but due to disupte natural function of river flood plains in transport water and sediment as a result of human land uses, risk has increased (Schanze, Zeman and Marsalak, 2007). It was opined by Agbonkhese, Agbonkhese, Aka, Joe-Abaya, Oncholi and Adekunle (2014) that the occurrence of flood represent a major risk to riversides populations and floodplains, in addition to causing substantial impacts on the environment, including aquatic fauna and flora and bank erosion. To study flood risk practices, it is however useful to classify flood into:

- Coastal floods which can occur on the coast and along the banks of large lakes;
- River floods that occur seasonally when springs water fills river basins too quickly and the river will overflow its banks;

- Flash floods are short-term floods in small region such as part of the city which kill and damage the most (Balica, 2007).

The flood risk practices includes; deforestation, poorly constructed and mismanaged dam, indiscriminate refuse disposal, urbanization, poor channelization of drainages and encroachment. Deforestation of the forest belt near the rivers can cause flooding, people that live in the riverine areas and the banks of rivers cut many trees in order to build houses and to make farm. As a result of deforestation, there will be no tree to soak up water,, this causes more water to flow into the river. Adebayo (2014) submitted that there will be soil erosion, because of silting; the river bed becomes shallow while the water volume increases to the extent that the river cannot hold all the water and it will eventually overflow the bank. Balica (2007) observed that cumulative risk index for urban planning and drainage management is high in most of affected States while the index for response of state actors is low. The issue of poor urban planning and blockage of drainage and water ways came to the fore as proximate condition for the fatality of the flood especially in Ibadan which accounted for hundreds of deaths from flood. Adejuwon and Aina supported the notion that activities of man during the course of human interaction with his environment in form of industrialization, technology development, burning fossil and agricultural activities are undoubtedly assuming greater importance as causes of flood disasters.

As urbanization intensifies, natural surfaces are replaced, which do not allow water to percolate readily into the ground. The effect is that a large proportion of the rainfall which should normally infiltrate into the soil or be intercepted by the vegetation and thus be delayed for some time before running off, is immediately available for surface run-off into streams and rivers, making them flood. Bad planning also brings about floods and as humans try to harness available water resources which have resulted in the construction of dams and other water control structures, the failure of these structures have resulted in floods. Balica (2007) cited example of the collapse of the Bagauda Dam near Kano in 1988 which resulted in disastrous environmental consequences: the mass failures of drainage systems across Nigeria; the encroachment of buildings on the flood plains of

stream and rivers flowing through towns and the disposition of waste materials in their courses.

2.4.4 Gender and Flood Disaster Prevention

It is widely known and accepted that disasters affect women and men differently. The United Nations Handbook for Estimating the Socio-economic and Environmental Effects of Disaster (2003) emphasized that one consequence of disaster is the decapitalization of women and the reduction of their share of productive activities in the formal and informal sectors. For instance women are disadvantaged not only do they sustain direct damages or production losses (housing) and means of production, but they also lose income when they have to apply themselves temporarily to unpaid emergency tasks and an increased amount of unpaid reproductive work, such as caring for their children when schools are closed.

Neumayer and Pluemper, (2007) submitted that gender relations as well as natural disasters are socially constructed under different geographic, cultural, political-economic and social conditions and have complex social consequences for women and men. Gender determines what is expected, allowed and valued in a woman or a man in a given context. It determines opportunities, responsibilities and resources, as well as powers associated with being male and female. Gender also defines the relationships between women and men and girls and boys, as well as the relationships between women and those between men. These attributes, opportunities and relationships are socially constructed and are learnt through socialization processes. However, given that women are often in a disadvantaged position in many developing, as well as developed countries on many issues is always a subject of concern to administrators. Fothergill, (1996), remarked that most disasters place an undue burden on women and girls who are responsible for unpaid work such as providing care, water and food for households, domestic abuse is also known to increase exponentially during and after disasters. Nabegu (2014) also reported that gender played a role considering the death toll in the aftermath of flood disaster. He reported 72% female deaths as against 28% male deaths, clearly showing that females are more vulnerable to flood than men. In addition to their physical weakness, female might

also be more exposed due to their traditional role of carrying out activities around the house.

IFRC World Disasters Report (2006) recommended promotion of gender equality and empowerment of women as one of the ways to prevent disasters, he further stressed that gender influences the type of hazard which an individual is exposed to and an individual's access to recourses with which to build resilience to hazard and to recover from disaster. When structural constraints in society result in the exclusion of women from decision making or economic, risk will be unevenly spread. A look at the lives of female refugees and internally displaced persons will reveal how difficult it is for them to care for their families, especially the female headed households. Fordham, (1998) remarked that, we need more women in legislative positions to push for laws that will promote land reforms, ownership of dwellings, inheritance and employment rights, equal access to health, education, and justice.

Meanwhile disaster management according to Fordham (1999) can provide an opportunity to redress gender disparities. For example, during the recovery period following a disaster, longstanding biases against women can be challenged by programmes that are sensitive to their needs and that involve them as equal partners in recovery work. However, according to Fothergill, (1996) if women and girls are left out of planning for disaster response or risk reduction measures, this implies that knowledge of fifty percent of the population are not capitalized upon and the needs of the most affected are unlikely to be met. He added that motion of gender equality implies an explicit attention to women's empowerment because there are special talents and skills for female gender.

United Nations handbook for Estimating the Socio-economic and Environmental Effects of Disaster (2003) reported that World Health Organization research asserted that women and children are particularly affected by flood disaster accounting for more than seventy five percent of displaced persons. Moreover, gender roles dictates that women become the primary caretakers for those affected by flood disaster including children, the injured and sick and the elderly-substantially increasing their emotional and material work load.

Women's vulnerability is further increased by the loss of men and or livelihoods, especially when a male head of household has died and the women must provide for their families. Post-flood disaster stress symptoms are often but not universally reported more frequently by women than men.

Gender inequality in social, economic and political spheres results in vast differences between men and women in emergency communication; household decisions about use of relief assets; voluntary relief and recovery work; access to evacuation shelter and relief goods; and employment in disaster planning, relief and recovery programmes, among other areas of concern in disaster relief. Enarson, (2000) reported that women's work is heavily impacted by flood disaster and their economic losses can be extensive. Their domestic work increase enormously when support system such as child care, schools, clinics, public transportation and family networks are disrupted or destroyed. Damaged living spaces are damaged working spaces for all women. For those whose income is based on homework, the loss of housing often means the loss of workspace, tools, equipment, inventory, supplies and markets. Fordham (1999) submitted that post-disaster interventions like relief and subsequent recovery efforts fail to pay adequate attention to the gender-specific impacts of disaster management efforts are designed to benefit men and women, men usually tend to receive larger share of benefits while women continue to remain marginalized. Studies on disaster management suggest that the concept of empowerment of women can be integrated as a management philosophy to overcome this problem. According to WHO, women are portrayed as the victims of disaster and their central role in response to disaster is often overlooked. A woman's pre-disaster familiar responsibilities are magnified and expanded by the onset of a disaster or emergency with significantly less support and resources. Women play a central role within the family, securing relief from emergency authorities, meeting the immediate survival needs of family members and managing temporary relocation (FEMA, 2016).

The disasters analysis conducted by Neumayer and Plumper (2007) in 141 countries revealed that when it come to deaths, gender differences were directly linked to women's economic and social rights; in societies where women and men enjoyed equal rights,

disaster in both sexes. They also confirmed that discrepancies were the result of existing inequalities. For example, boys were given preferential treatment during rescue efforts, and following disasters, both women and girls suffered from inadequate rescue efforts.

Enarson (2000) studies show that women and girls are fourteen times more likely than men to die during a flood disaster and that involving female gender in flood disaster issues is more rewarding. In industrialized countries, more women than men die during heat wave that affected Europe in 2003. In France most deaths were among elderly women. In Sri Lanka, it was easier for men to survive during the tsunami because knowledge of swimming and climbing trees is mainly taught to boys. The social prejudice means that girls and women in Sri Lanka have very few possibilities of surviving in future disasters. In some cases, gender differences also increases men's mortality in disaster situations. Many men are exposed to risky situations and even die because they believe that by being the "stronger sex" they need not take precautions and because society expects them to take heroic rescue action (International Union for Conservation of Nature (IUCN), 2016).

IUFMP (2012) submitted that women and children plays key roles in household in relation to waste generation and disposal from households, and these roles are tied to their traditional cultural gender (female) and age (children) roles and status. Hence, women in particular need to be given more prominent roles in efforts to control risks and improve waste management practices in Ibadan.

2.4.5 Disaster Experience and Flood disaster Prevention

Many researchers have stressed the importance of previous disaster experiences in people's judgments about risk. Lindell and Hwang (2008) found that in a multi-hazard environment, people who have previously been exposed to a hazard were far more aware than people without hazard experience. However, distinction is often made between direct experience and indirect experience. Direct experience according to Keller, Siegrist and Gutscher (2006) is defined by the recency and frequency of casualties and damage experienced by the people, while vicarious experience refers to hearing or reading about hazard impacts affecting friends, relatives or neighbours through social communication.

Lindell and Hwang (2008) opined that because attitudes based on direct experiences are more accessible in memory, direct personal experience has a greater potential to influence perceived personal risk. Barnett and Breakwell (2001) reported from their findings that individuals whose properties were directly affected by the flood waters were much more likely to accept a risky gamble or warnings than their unaffected immediate neighbors. They added that there is possibility of adoption of risk-seeking attitudes by the people after a large wealth loss. In addition, Harrison and Rutstrom, (2008) study provides supporting empirical evidence that individuals who have incurred a negative wealth shock are much more likely to accept a risk warnings or useful information. It is a well established fact that disaster preparedness is an important preventive strategy for protecting health and mitigating adverse health effects of unforeseen disasters. Sattler, Kaiser and Hittner, (2000) reported that studies have indicated that degree of disaster preparedness is positively associated with previous disaster exposure even by institutions and the government. Sudden onset of natural and technological disasters impose a substantial health burden, either directly on the population or indirectly on the population or indirectly on capacity of the health services to address primary health care needs (Wachtendorf and Sheng (2002). Nigeria has continued to witness series of disasters and emergency situation that are largely anthropogenic, from youth militancy, communal clashes, religious conflicts, fire outbreaks, road accidents, kidnapping and flooding (Ogundele, Arohunsoro, Jegede and Oni, 2013). The economic and environmental lost to disaster and emergency necessitated the establishment of emergency management agencies such as NEMA which was established by the act of the National assembly in 1999. The repeated occurrence of catastrophic flood episodes nation-wide, particularly in Southern and urban areas in Nigeria justifies the need for the development and implementation of an efficient preparedness plan for managing flood disaster in the country. A preparedness plan that consists of phases covering pre-flood and post-flood disaster activities (Akintola and Ikwuyatum, 2012). The former includes prevention, preparedness and mitigation while the latter consists of emergency response (rescue and relief), rehabilitation and recovery (reconstructions). Prior emergency planning is an effective strategy for flood control and management (Odunola and Balogun 2015). It helps

to drastically reduce the magnitude of floods as well as the havoc done to life, crops and infrastructure (Annegret, Heidi and Bruno, 2007).

Areola (1998) opined that prior flood emergency planning consists of floodplain occupants and other stakeholders to respond more effectively to flood episodes. It eliminates the implementation of hastily prepared assessment and response procedures, poorly coordinated, unsustainable and wasteful. This fact led Lagos State Government to search for an alternative approach as discussed below:

The Lagos state flood preparedness plan is currently the first of its kind in Nigeria (Njoku and Udegbha, 2013). The response plan deals with flood prevention and mitigation, response and recovery, and it encompasses both short-term and long-term actions (Odunuga, Oyebabande and Omojola, 2012). The preparedness plan was developed in 2003 in response to the incessant and recurring flood disaster in almost every part of the state (Obeta, 2009). He stated further that according to records in the Lagos State Ministry of the Environment the specific objectives of the plan are to:

- Provide the state with effective and systematic plan or means of executing pre-flood prevention activities as well as of dealing with (emergency) flood problems which may occur over the short or long-term: This objective enables disasters managers to monitor, mitigate and even prevent flooding.
- Identify and recommend the most appropriate mechanisms for response and recovery in affected areas: This objective assists professionals to minimize/eliminate waste and manage flood disasters efficiently.
- Specify response actions to be implemented during disaster or in threatened areas: This objective is necessary for the mobilization of resources, determination of costs, coordination and implementation of emergency projects as well as for search and rescue mission
- List agencies and responsibilities in the flood response plan: This objective helps to eliminate the duplication of efforts and conflicts between government agencies, as well as in assessment of performance and planning development.
- Determine response activities to be handled by affected communities, organizations, local governments and state authorities: This objective promotes

stakeholders participation and increases the people's knowledge of their local environment which is essential for effective flood management.

- Gather and evaluate data about the nature of floods: This objective assists professionals in classifying the state into high flood risk, medium risk and low risk areas as well as in policy development and in providing necessary environmental information. It also assists disaster managers to quickly access and visually displays critical information by location.
- Identify problems that are beyond the ability and capability of the threatened or affected area (community or local government) to resolve: Information obtained under this objective enables the state government to justify requests for external assistance. This information is particularly useful for national response agencies such as the National Emergency Management Agency (NEMA).

Aderogba (2012) reported that from records available in the state ministry of environment the response plan is based primarily on resources sourced from the local and state governments; federal assistance is generally viewed as a “last resort” when local capabilities and funds are exhausted. The plan emphasizes the need for stakeholders' involvement in addressing flood issues, this includes vulnerable communities and has nine units in its organizational structure. They perform the following pre-flood prevention responsibilities:

- a) Sensitization exercises
- b) Persuade the residents not to reside in flood-prone areas
- c) Clear drains
- d) Authorize the demolition of structures constructed across natural water flow paths
- e) Assist in disseminating early flood warning information to all the nooks and crannies of flood-prone areas
- f) Dissuade residents from dumping waste in the urban drains
- g) Network with other agencies with similar goals
- h) Assist all stakeholders to carry out their responsibilities as enshrined in the preparedness plan

The approach adopted by this unit, according to NEMA's (2012) report, involves dividing Lagos into high, medium and low flood-risk areas, using previously assembled data on the location attributes and on the nature of flooding in Lagos. More efforts and resources are expended in monitoring and enforcing regulations against human activities which affect the drainage system such as dumping of refuse, erecting structures on flood plains and other indiscriminate actions that interfere with the free flow of water on the high and medium flood risk areas. More sensitization and sanitization programs are also organized in these zones for the urban residents to enable them take more proactive actions in preventing flood. Other units get involved when a catastrophic flood occurs or when emergency conditions threaten. When this happens the state government constitutes an inter-ministerial policy and coordination committee that is typically composed of high-level representatives from concerned agencies. This committee sets the general tone and direction for the plan. It establishes an impact assessment system, assembles and analyzes data, makes recommendations to the governor on appropriate mitigation measures.

Also, Business Day news (2012) reported the Oyo state actions in 2012, that the state has learnt its lesson triggered by the previous flooding experience, and is now undertaking preventive measures to anticipate potential flooding in the future, the report continues that the state ministry has initiated clearing of forty-three (43) key locations which entails dredging of considerable number of rivers and streams across the state in addition to widening of canals so as to enable free water flow. Apart from dredging, effective solid waste management to stop indiscriminate dumping of waste in waterways has also been introduced as a way of raising people awareness on the importance of doing everything possible to prevent flood disasters.

Amori, Awomeso, Idowu and Makinde(2012) reported the scheme that involved collection of measures targeted towards reducing flood incidents along Ogunpa River, which include dredging of the river channels, clearing of human wastes and debris along the banks of the river, control of physical development along the banks, beautification of some sections of the river to discourage indiscriminate sewage disposal and the construction of modern drainage channels along the river to aid smooth flow of stream water. Business Day news added how various global institutions have taken interest in the

matter, including the World Bank on whose recommendation the state government established Oyo state Environmental Protection Agency, the agency evolved from the ministry's pollution control unit and it will serve as an enforcement tool for the implementation of all environmental policies. The Business Day news (2012) portal cited the then Honorable commissioner for Environment and Habitat, Wasiu Dauda saying enough of flood losses, it is extremely important to forestall flooding and prevent potential damage creation and this was confirmed by the channelization of middle and lower courses of Ogunpa river which assisted in the reduction of negative impact of the last flood episode.

2.4.6 Effects of Green space on Flood Disaster Prevention

Nkwunonwo, Whitworth and Baily (2015) in their perspectives identified the causes of flooding in Nigerian cities, Lagos and Ibadan Metropolis in particular as: (1) ineffective waste management that blocks drains; (2) erection of structures on waterways; (3) overstretched, or non-existent sanitation drainage, etc; (4) degreening activities that remove green cover; (5) paving of open spaces with asphalt and concrete that accentuate storm water volume as percolation is reduced; and (6) unpaved surfaces that generate debris and silts that cause siltation and sedimentation of Atlantic ocean and lagoon with the consequence of rising sea level and coastal flooding. They remarked that while numbers 1-3 have attracted the attention of scholars and policy makers, numbers 4-6 are neglected or unrecognized as important agents of flooding. Lagos and Ibadan according to Akinola (2000) are experiencing degreening activities as indicated by very low proportions (27% and 24% respectively) of open spaces around buildings that are greened, while 73% and 76% of the available open spaces are either paved or unpaved with the problem of heat radiation, flood accentuation and generation of erosion that induced flooding. This confirms that the value of environmental health and beauty is being traded with economic considerations regardless of the fact that the loss in environmental value, health and beauty can offset the economic gains derived from degreening. Unless open green spaces are provided and maintained, urban areas are vulnerable to the destructive impact of flood. Adelekan (2010) described a balanced urban scape as the total urban pieces - buildings, communication network and open spaces. If open spaces are not greened in urban areas,

they will either be paved or left open, a situation which has great consequences. For instance, paved spaces reflect heat which consequently, increase environmental temperature. Unpaved surfaces are opened to erosional effect during the rainy season and agent of air pollution (dust) during the dry season. This brings to mind, the effect of sand digging around Ibadan by some construction industries. Sand digging causes deforestation that takes a very longer period for natural re-afforestation. Considering the benefits of green cover, urban greenery is a short-cut to reduction of environmental degradation; increase in productivity and welfare of citizens and aesthetic value; and a short-cut to sustainable development. This is realisable when we operate within a balanced ecological system. The relationship between the physical structures and green cover should be balanced considering the tremendous role of green cover (forests). The analysis of result of the study of Akinola (2000) shows that 62.4% of plot area is devoted to open space, out of which only 27.0% is greened, meaning that 73.0% of the available open spaces are either paved or unpaved with the problem of heat radiation. The 27.0% green is too small, especially when one considers the benefit of green cover. The implication of this is that the benefits of green cover are lost. Green space serves several purposes especially in urban areas. Such purposes include: local climatic regulation; cycling of water; cycling of oxygen, carbon dioxide and nitrogen; biological filtering of pollutants and screening from noise; regulating hydrology and run-off; and recreation, amenity and public health.

Residential environment requires natural cooling system derivable from green cover. Where there is no green cover, artificial cooling system (air conditioning) which increases expenditure and energy consumption is used instead. This invariably increases the budget of individuals and governments while other social functions - health and education - are likely to be jeopardized. Thus poverty sets in, though may be unnoticed initially, the cumulative effect will be glaring in future. The role of green cover in controlling and regulating flow of water in rainy season is similar to the role of traffic light in controlling and regulating vehicular movements on roads. Without green cover, storm water gathers and rushes down the street which makes drainage to overflow and thus leading to flooding.

2.5 Appraisal of Literature

The study established the effects of environmental education on knowledge, attitude and practices of flood disaster prevention among residents of Ibadan metropolis. A conceptual framework was developed to give direction to the study; the model explains the interaction of the independent variable (environmental education), the dependent variables (knowledge, attitude and practices of flood disaster prevention) and the moderating variables of gender and disaster experience. Theory of health belief model (HBM) was adopted for the study, HBM is a psychological model developed by social psychologist, that attempt to explain and predict human behaviors, they theorized that people's belief about whether they are or not susceptible to health problem, and their perception of the benefits of trying to avoid it, influenced their readiness to act against the problem.

Moreover, theoretical review covered areas such as concept of flood, causes of flood disaster, effects of flood disaster, and incidences of flood disaster in Nigeria and specifically, in Ibadan, flood disaster vulnerability, flood disaster management, relationship between climate change, global warming and flood disaster. Flood disaster is flooding that is of high magnitude of causing casualties and material losses in the community. Floods impact on both individuals and communities, and have social, economic, and environmental consequences; the negative effects of flooding can be multi-dimensional and inflicting long-term "injuries" on lives and properties in affected areas. Typical effects include loss of lives, property and means of livelihoods, severe social dislocations, as well as the destruction of the environment, including wild life sanctuary. Flooding also precipitates environmental health hazards, such as the outbreak of diseases, arising from drinking surface water and well water which have been polluted as a result of flooding. In the absence of timely intervention by the government and relief agencies, the effects of flooding can be very traumatic on the victims. Flooding results into a lot of damages and the extent of damage varies from place to place. Ibadan metropolis has her share of flood events which has taken a toll on lives and properties. A lot of survey research has been carried out to ascertain the causes, effects, vulnerability factors of flooding and different reasons have been identified, such reasons include: encroachment of flood plains, dumping of refuse over the years has led to the filling up of ponds and blockages of natural water ways or drainages; high intensity rainfall coupled

with a gentle slope for water accumulation; dam failure coupled with almost bare surface; rapid rate of unplanned settlement leading to poor drainage system among many others.

Climate change is identified by researchers as one of the greatest socio-economic and biophysical challenges confronting the world in the 21st century. Human activity, particularly deforestation and the burning of fossil fuels is driving this change by increasing atmospheric concentrations of carbon dioxide and other greenhouse gases (GHGs). As a result of this according to, United Nations Development Programme, (2009), the world is experiencing greater weather extremes, changes in rainfall patterns, heat and cold waves and increasing drought and floods. Climate change has been the resultant effect of prolonged heavy rain across the globe that usually results to floods. According to Action Aids (2006) flood hazards are natural phenomena, but damage and losses from floods are the consequence of human action. Fagbemi (2011) reviewed questions that people are concerned about in Nigeria, the questions are; Is government really enforcing laws guiding people from indiscriminate dumping of wastes? Is it inadequate drainage facilities that are responsible for flood? Are the public not well enlightened on the causes and effects of flood while they carry out various activities that result to flood, like building along the water channels, indiscriminate dumping inter alia? But, he later concluded that those questions demand immediate answers and follow up actions to arrest the ugly condition.

Flood disaster management according to NEMA (2012) involves preventive measures against flood, preparing for it before it occurs as well as supporting and rebuilding society after the disaster have occurred, and also extend to fine-tuning preventive measures to prevent recurrence. However, in line with the prevailing global direction NEMA launched paradigm shift from the abiding reactive tradition of flood disaster management to a proactive pattern. Meanwhile, a change to proactive management of flood disasters requires an identification of the risk, the development of strategies to reduce that risk, and the creation of policies and programmes to put these strategies into effect.

Nevertheless, empirical data revealed that effective flood disaster risk reduction that will lead to disaster prevention can be achieved through the participation of the affected and

potential victims of flood hazards in planning and operations of disaster prevention strategies. In addition, it was revealed in literature that, flood disaster events may continue to grow, if vulnerability is not reduced, and the economic impact will far exceed the cost of mitigation and preparedness by orders of magnitude. Large sums are expended on international emergency assistance after disasters that effectively transfer the risk (and responsibility) from the affected area like Ibadan metropolis to the global community. Alese (2014) emphasized training in ecological awareness of environmental hazards; meanwhile, there is a need to distinguish between information, education, and communication. Communities should not be passive recipients of information, without any feedback, there is need to encourage people to help themselves, and communities must be provided with the mechanisms and tools to do so. Therefore, public awareness and education is the key to the successful implementation of flood disaster prevention that is safer and cheaper than emergency relief and responses.

CHAPTER THREE

METHODOLOGY

This chapter discusses the method and procedures adopted for the study and these were discussed under the following subheadings:

1. Research design
2. Population of the study
3. Sample and sampling technique
4. Research instrument
5. Validity of instrument
6. Reliability of instrument
7. Field testing of instrument
8. Ethical consideration
9. Procedure for data collection
10. Procedure for data analysis

3.1 Research Design

The research design adopted for this study was pretest-posttest control group, quasi-experimental research design using 2x2x2 factorial matrix. The design was considered appropriate because participants were not randomly assigned to experimental and control groups. The design also gave room for comparison between the experimental and control group to determine the impact of the intervention on the performance of the experimental group. The design is schematically represented:

$O_1 X_1 O_3$ Experimental group (Environmental education).

$O_2 X_2 O_4$Control group (Nutrition education)

Where O_1 and O_2 are pretest observation for the experimental group and control group respectively.

O_3 and O_4 are posttest observation for the experimental group and control group respectively.

X_1 treatment programme

X_2placebo for control group

The study used $2 \times 2 \times 2$ factorial matrix for analytical part which is represented in the table below

Table 3:1 2x2x2 factorial matrix

Treatment	Gender	Flood Disaster experience
Environmental education (E)	Male	Direct
		Indirect
	Female	Direct
		Indirect
Nutrition education (C)	Male	Direct
		Indirect
	Female	Direct
		Indirect

3.2 Population of the study

The population for this study comprised all residents of flood prone areas in Ibadan metropolis, Oyo State, Nigeria.

3.3 Sample and Sampling Technique

One hundred and twenty (120), male and female residents of flood prone communities in Ibadan metropolis, who filled the informed consent forms participated in the study. Multistage sampling procedure was used to select the participants, these include; purposive sampling, cluster sampling, volunteerism, stratified proportionate sampling and simple random sampling.

The stages are explained below:

3.3.1 Stage One: Purposive sampling technique was used to select two Local Government Areas that have the highest number of flood prone communities, out of the five Local Government Areas in Ibadan metropolis; they are Ibadan South West and Ibadan South East Local Government Areas. A detail of the vulnerability of Ibadan flood prone areas is presented in the table below:

Table 3: 2 LIST OF IBADAN FLOOD PRONE AREAS

S/N	LOCAL GOVERNMENT AREAS	FLOOD PRONE COMMUNITIES	NUMBER OF FLOOD PRONE COMMUNITIES
1	IBADAN SOUTH WEST L/G	ODO ONA ELEWE IGAN LAYOUT BOLUWADURO AJERI ASIPA ORILONISE AGO TAILOR BELIEVER STREAM AREA ABA ADIO IDO ODO CHALLENGE	10
2.	IBADAN SOUTH EAST L/G	MOLETE KUDETI ELETA TEWOGBADE SODUN KOBOMOJE ORANYAN OWODEACADEMY(OJU ODO) FELELE ELERE	10
3	IBADAN NORTH WEST L/G	IDI ISI OKE ADO OGUNPA EKOTEDO IDI IKAN OKE BOLA	6
4	IBADAN NORTH L/G	OROGUN BODIJA IKOLABA KUBE AJIBODU	5
5	IBADAN NORTH EAST L/G	ONIPEPEYE AREA	1

Source: Ministry of Environment and Natural Resources, Oyo State, Nigeria

3.3.2 Stage two: Cluster sampling technique was used to select participants from all the flood prone communities in the two Local Government Areas. Table 3:3 below explained the distribution of participants from all the flood prone communities in the two Local Government Areas purposely selected for the study.

TABLE 3: 3 DISTRIBUTION OF PARTICIPANTS

S/N	LOCAL GOVERNMENT AREAS	FLOOD PRONE COMMUNITIES	NUMBER OF REGISTERED LANDLORD\LADY	NUMBER OF VOLUNTEER LANDLORD\LADY	SAMPLED PARTICIPANTS (20% OF VOLUNTEERS)
1	IBADAN SOUTH WEST L/G	ODO ONA ELEWE	106	30	6
		IGAN LAYOUT	156	35	7
		BOLUWADURO	185	31	6
		AJERI	108	35	7
		ASIPA	104	25	5
		ORILONISE	160	30	6
		AGO TAILOR	97	26	5
		BELIEVER STREAM AREA	89	30	6
		ABA ADIO	90	31	6
		CHALLENGE	98	29	6
		SUB-TOTAL		302	60
2.	IBADAN SOUTH EAST L/G	MOLETE	86	26	5
		KUDETI	196	31	6
		ELETA	152	30	6
		TEWOGBADE	105	36	7
		SODUN KOBOMOJE	123	25	5
		ORANYAN	120	30	6
		OWODE ACADEMY (OJU ODO)	90	30	6
		FELELE	113	31	6
		ELERE	180	30	6
				ELERE	140
		SUB-TOTAL		305	60
	TOTAL			607	120

3.3.3 Stage three: Six hundred and seven (607) residents volunteered to participate in the study, the number was considered too many for the experimental study, therefore, to have a manageable class size for trainings, and as well prepared the study for attrition, stratified proportionate sampling technique was adopted to select 20% of the volunteers from each community, which resulted to sixty (60) participants from each of the two Local Governments Areas, making one hundred and twenty (120) for experimental and control group participants

3.3.4 Stage four: Simple random sampling technique of fish bowl without replacement was used to choose the stated number of participants from the volunteered members of each community. This was carried out by cutting paper into number of volunteers of each community and “Yes” was written on the required numbers, while the remaining pieces of paper bears “No”. The papers were rolled up into a ball and each volunteer took a piece of paper. Those that chose “Yes” were enrolled for the study while the volunteers with” No” were appreciated for the interest shown to participate.

3.3.5 Stage five: Simple random sampling technique was used to place the participants enrolled in each of the two Local Governments Areas into experimental and control groups. This was done by choosing one participant each from the two LGAs to represent each of the groups. Two pieces of paper that bears experimental and control were rolled for the two representatives to pick each. Ibadan South West and Ibadan South East Local Government Areas fell into experimental and control groups respectively. A placement of selected Local Government Areas into groups is presented on table 3:4 below.

TABLE 3:4 Placements of Selected Local Government Areas into groups

SN	NAME OF LOCAL GOVERNMENT	GROUP
1	Ibadan South West Local Government	Experimental
2	Ibadan South East Local Government	Control

3.3.6 Inclusion and Exclusion Criteria

The study enrolled one hundred and twenty (120) male and female volunteer landlords registered with landlord associations of the selected communities, who filled informed consent forms before participating in the study. Registered landlord\lady that are not residing in those communities were excluded from the study.

3.4 Research Instrument

The following research instruments were used for the study:

1. Environmental Education Package, a direct instructional package which comprises of flood disaster concept, causes of flood disaster, social, economic and environmental cost of flood disaster, effects of flood disaster on individual, community and the nation at large. Also inclusive are; flood disaster risk reduction strategies through attitudinal change by the people, flood prevention practices.
2. Nutrition Education Package, also an instructional package for control group participants which comprises of concept of nutrition, classes of food nutrients, their functions, adequate diet for different categories of people like pregnant women, nursing mothers, children, aged and nutrition disorders.
3. Self developed questionnaire: Apart from socio-demographic information, the questionnaire has three sub-scales which are Knowledge of Flood Disaster Prevention Scale (KFDPS), Attitude towards Flood Disaster Prevention Scale (AFDPS) and Flood Disaster Prevention Practices Scale (FDPPS), to elicit information on the variables of the study.

The sections of the questionnaire are explained as follows:

Section A: This was used to elicit information on socio-demographic characteristics of the participants; five items were generated and responded to by the participants. The items include gender, marital status, religion, educational qualifications and kind of flood disaster ever experienced.

Section B: Knowledge of Flood Disaster Prevention Scale (KFDPS)

Knowledge of Flood Disaster Prevention Scale (KFDPS) was used to elicit information from participants on meaning of flood hazard, flood disaster, causes, and vulnerability factors, effects of flood disaster, flood disaster risk reduction strategies and prevention.

Twenty-two items were generated and responded to by the participants during the pre-testing of the instrument. The data generated were then subjected to factorial analysis, with 0.60 as criterion for retention of items. The result of the analysis showed that eighteen (18) items met 0.60 criterion, thus the items were retained, while the items that did not meet with the criterion were expunged. Each response was scored on Yes=2, No=1. A Cronbach alpha method was used to test the internal consistency of KFDPS and it yielded a reliability coefficient of 0.88.

Section C: Attitude towards Flood Disaster Prevention Scale (ATFDPS)

This scale was used to obtain information from respondents on their attitude towards flood disaster prevention. Twenty items were generated and responded to by the participants during the pre-testing of the instrument. The data generated were then subjected to factorial analysis, with 0.60 as criterion for retention of items. The result of the analysis showed that fourteen items met 0.60 criterion, hence the items were retained; Each response was scored on a 4-point modified Likert scale format of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly disagree(SD) with allotment of point in the following order; SA = 4, A =3, D=2, SD =1. A Cronbach alpha method was used to test the internal consistency of ATFDPS and it yield a reliability coefficient of 0.76.

Section D: Practices of Flood Disaster Prevention Scale (PFDPS)

A practice of Flood Disaster Prevention Scale was used to obtain information from participants on practice of flood disaster prevention. Eighteen items were generated and reacted to by the respondents during the pre-testing of the instrument. The data generated were then subjected to factorial analysis 0.60 as criterion for retention of items. The result of the analysis showed that twelve items met 0.60 criterion, hence the items were retained;. Each response was scored on a 4-point modified Likert scale format of Often (OF), Occasionally (OC), Rarely (RA) and Never (N) with allotment of point in the following order; OF=4, OC=3, RA=2, NR=1. A Cronbach alpha method was used to test the internal consistency of PFDPS and it yielded a reliability coefficient of 0.79.

All together, forty nine (49) items were retained in the questionnaire (KAPOFDQPQ); which included items on socio-demographic characteristics of the respondents (5 items) and the three scales (44 items) were used in study. A Cronbach alpha method was also used to test the internal consistency of the three scales (KFDPS, ATFDPS and PFDPS)

which yield a reliability of 0.81. The questionnaire met Nunnally (1998) criterion of 0.70, which is expected for psychometric measures.

3.5 Validity of Research Instrument

To ensure the instruments measures what it was designed to measure, copies of draft questionnaire was made available for criticisms and also subjected to the critique of the researcher's supervisor and other experts in the Departments of Human Kinetics and Health Education, Faculty of Public Health of University of Ibadan, Ibadan, as well as lecturers in Urban and Regional Planning Department for content and construct validity, their comments, suggestions and modifications were studied carefully and made use, to improve the quality of the instrument in relation to research questions and hypotheses.

To ascertain the validity of the instruments in this study, seventy-six items were generated based on explorative survey discussion with some environmental practitioners, educators and town planners after which the questionnaire was presented to two professional environmental educators and an expert in psychometrics. This led to subtraction, addition and modification of the items of the questionnaire, leaving the questionnaire with (65) items. This was then subjected to exploratory factor analysis. A Kaiser-Meyer-Olkin (KMO) of 0.72 was gotten which is above the bench marks of 0.6; this indicates that the sample size is adequate for the conduct of factoranalysis. In the final analysis, only (49) of the items were able to meet up with the retention criterion of 0.6; all other items that did not meet the retention criterion were expunged.

3.6 Reliability of Research Instrument

Reliability refers to the accuracy of data in relation to stability, repeatability and precision in measurement. Reliability according to Nworgu (2006), refers to the degree of consistency between two sets of scores or observations obtained with the same instrument. An instrument is reliable when it is persistent in measuring correctly, what it supposed to measure with the result remaining the same when administered in a similar situation. The instrument was administered on a sample of twenty (20) residents of flood prone areas at Owode, Oyo, Oyo state that were notpart of the sample for the study. The data was collected and analyzed using Chronbach Alpha to test the internal consistency of KFDPS, AFDPS and FDPPS. The scale yielded reliability values of $r=0.88$, $r=0.76$ and

$r=0.79$ respectively, the entire questionnaire had $r=0.81$ which is expected of any psychometric measures.

3.7 Field Testing of Instrument

Field testing of the instrument was carried out before the actual study among 20 residents of flood prone areas in Oyo, Oyo state who were not part of the sample for the study. Apart from helping to determine the reliability of the instruments, the process helped the researcher to assess the feasibility of the study. This acquainted the researcher with the procedures and problems that could be encountered during the study, and they were taken care of before the actual study.

3.8 Ethical Consideration

Ethical approval for this study was obtained from Ethical Review Committee of University of Ibadan. The researcher presented the required information to the Social Sciences and Humanities Research Ethics Committee (SSHEC), University of Ibadan, Ibadan, Nigeria. The information includes copies of research proposal, informed consent form, and researcher curriculum vitae, evidence of certified training in research ethics and information on the participants and letter of introduction from Head of Department, Human Kinetics and Health Education, University of Ibadan, Ibadan, Nigeria. The proposal was reviewed by the committee, necessary corrections were made by the researcher and the approval with reference number UI\SSHEC\2017\0008 was given.

Furthermore, all the participants signed the informed consent forms before participating in the study, which indicates their voluntary participation. In addition, the privacy of the participants was protected by ensuring that their responses were treated with utmost confidentiality. The participants were also served with light refreshments each day of the training and were made comfortably seated at the well ventilated training venues.

3.9 Procedure for Data Collection

The researcher collected letter of introduction from the Head of Department of Human Kinetics and Health Education, University of Ibadan. The letter was presented to the landlord\lady association executives of the flood prone communities in Ibadan metropolis, to enable the researcher have access to the participants. Informed consent forms were filled by both experimental and control group participants to show their interest, readiness

and willingness to participate in the study. Prior to the commencement of the study, ten professional health educators were trained as research assistants, the purpose of the study and the roles and responsibilities of each research assistant during the study were clearly defined. Adequate arrangement was made with research assistants and the participants on date, time and venue of the programme. Since there were two groups; experimental and control groups, research assistants were also grouped into two, to handle each of the groups and rules were set by the researcher, research assistants and the participants which were kept by all, throughout the period of intervention. The experimental group participants are from Ibadan South West Local Government (60 participants), while the control group participants are from Ibadan South East Local Government (60 participants). The names, addresses and phone numbers of participants were registered, all the participants answered to their names at every sitting for the period of the intervention to attest to their presence at the training venues.

The researcher and research assistants attended to participants in experimental and control groups on Saturdays and Sundays respectively; experimental group were attended to in the morning (8.30a.m to 9.30a.m) every Saturdays while control group received attention in the evening (5.00p.m to 6.00p.m) every Sunday for eight weeks, at different locations. Training venue of experimental group was Peace Multipurpose Hall, Odo ona, Ibadan, while Ibadan South East Local Government, Conference hall, Mapo was the training venue of the control group participants. The validated and reliable questionnaire (pretest), was administered to the participants in both experimental and control group, on the first day after opening ceremony and registration at the training venues; it was retrieved on completion by the researcher and research assistants. The eight weeks intervention programme commenced at the training venues, training activities lasted for one hour weekly, for eight consecutive weeks. The experimental group was exposed to eight weeks environmental education programme, while the control group was given a placebo on nutrition education. Post- test was administered at the end of eight (8) weeks intervention programme to the participants in both experimental and control groups.

Table 3: 5 Environmental Education Training Programme for Experimental Group

Training objectives	Topic(s)/Content	Audience	Wk/Day/Time
At the end of this session, participants were able to: <ul style="list-style-type: none"> Familiarize with each other Fill the questionnaire 	<ul style="list-style-type: none"> Administration of Pre-test questionnaire 	All participants in Experimental Group	Week 1, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Define flood hazard, flood disaster(FD) List the causes and vulnerable factors of FD Correct some misconceptions and myths about flood disaster. 	<ul style="list-style-type: none"> Module 1 Flood disaster (concept, causes, vulnerability factors, misconception and myths) 	All participants in Experimental Group	Week 2, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Define and explain what flood disaster (FD) prevention means List roles and responsibilities of the community in flood disaster prevention. 	<ul style="list-style-type: none"> Module 2 Flood disaster prevention, roles and responsibilities of individual and as community in flood disaster prevention. 	All participants in Experimental Group	Week 3, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Define Flood Disaster Risk Reduction (FDRR) State how FDRR can be achieved through strict compliance with physical planning regulations and environmental laws. State some related physical planning regulations and environmental laws 	<ul style="list-style-type: none"> Module 3 Flood disaster risk reduction (FDRR). Physical planning regulations and environmental laws of FDRR in Nigeria 	All participants in Experimental Group	Week 4, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Highlights some social, economic and environmental cost of FDs. State how FD prevention can avert social cost of FD on individual, community and the nation. Identify economic sufferings FDs could bring if not prevented. State the environmental cost of FDs on the community and the nation 	<ul style="list-style-type: none"> Module 4 Social, economic and environmental effects of FD on individual, community and the nation. 	All participants in Experimental Group	Week 5, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> State attitudes that could enhance FD prevention Explain how vulnerability to FD can be prevented through attitudinal change Highlights the advantages of flood disaster prevention over flood disaster relief 	<ul style="list-style-type: none"> Module 5 Promotion of positive attitude towards flood disaster prevention. 	All participants in Experimental Group	Week 6, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> State environmental practices that contribute to flood disaster, Highlights flood disaster prevention practices that need to be encouraged Explain why we need to be friendly with our environment 	<ul style="list-style-type: none"> Module 6 Promotion of environmental practices that enhance flood disaster prevention 	All participants in Experimental Group	Week 7, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Fill and submit the post- test questionnaire 	Post- test administration	All participants in Experimental Group	Week 8, Saturday, 1hr

Table 3: 6Nutrition Education Training Programme for Control Group

Training objectives	Topic(s)/Content	Audience	Wk/Day/Time
At the end of this session, participants were able to: <ul style="list-style-type: none"> Familiarize with each other Fill the questionnaire 	<ul style="list-style-type: none"> Administration of Pre-test questionnaire 	All participants in Control Group	Week 1, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Define Nutrition State the six classes and functions of food nutrients 	<ul style="list-style-type: none"> Module 1 Nutrition and classes of food nutrient 	All participants in Control Group	Week 2, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Explain adequate diet for difference categories of people Mention importance of adequate diet in the body 	<ul style="list-style-type: none"> Module 2 Adequate diet and its importance in the body 	All participants in Control Group	Week 3, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> List sources of carbohydrate State functions of carbohydrate in the body List sources of protein State functions of protein in the body 	<ul style="list-style-type: none"> Module 3 Carbohydrates and Protein 	All participants in Control Group	Week 4, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> List sources of vitamins State functions of vitamins in the body List sources of fats and oil State functions of fat and oil in the body 	<ul style="list-style-type: none"> Module 4 Vitamins, fats and oil 	All participants in Control Group	Week 5, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> List sources of water State functions of water in the body List sources of minerals State functions of minerals in the body 	<ul style="list-style-type: none"> Module 5 Water and minerals 	All participants in control Group	Week 6, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> State four health effects of inadequate diet. List five nutritional disorders. 	<ul style="list-style-type: none"> Module 6 Nutritional disorders 	All participants in Control Group	Week 7, Saturday, 1hr
At the end of this session, participants were able to: <ul style="list-style-type: none"> Fill and submit the post- test questionnaire 	Post- test administration	All participants in Control Group	

3.10 Procedure for Data Analysis

Completed copies of the questionnaire were collected, coded and analyzed using descriptive statistics of frequency counts, percentages, bar and pie chart to describe the demographic characteristics of the participants. Also, descriptive statistics of frequency counts, percentages, mean and standard deviation were used to answer research questions. The weighted mean of 1.5 was considered as the criterion for inference; this implies that the obtained mean value below 1.5 was considered low, while the obtained mean value equal to or above 1.5 was regarded high. Moreover, parametric statistics of Multivariate Analysis of Covariance (MANCOVA) was used to test all the hypotheses at 0.05 alpha level.

CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

This chapter present results of the analyses and discussions of findings. The results as well as discussion of findings are presented based on socio-demographic characteristics of the participants, research questions and hypotheses as follows:

4.1 Socio-Demographic Characteristics of the Participants

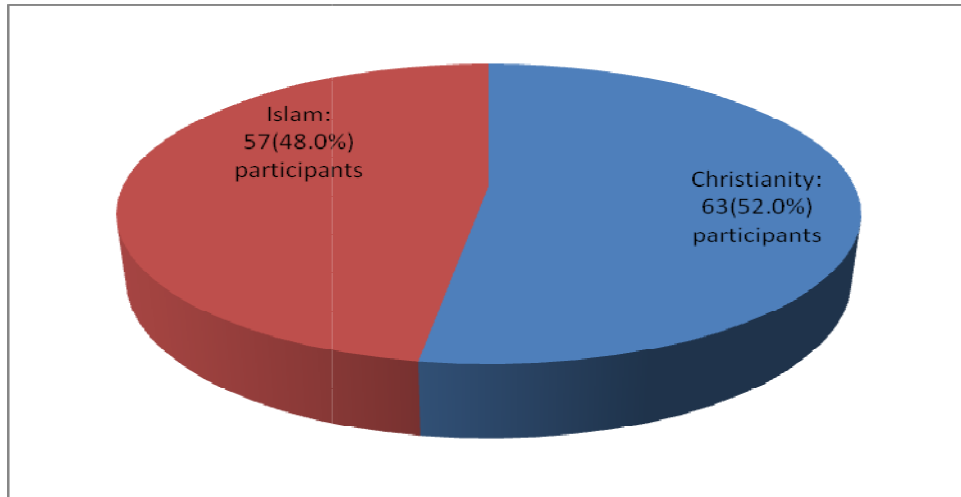


Figure 4.1: Pie chart illustrating religion of the participants

Fig. 4.1 revealed that 63 (52.0%) participants were Christians, while 57 (48.0%) were Muslim. This showed that majority of the participants were Christians.

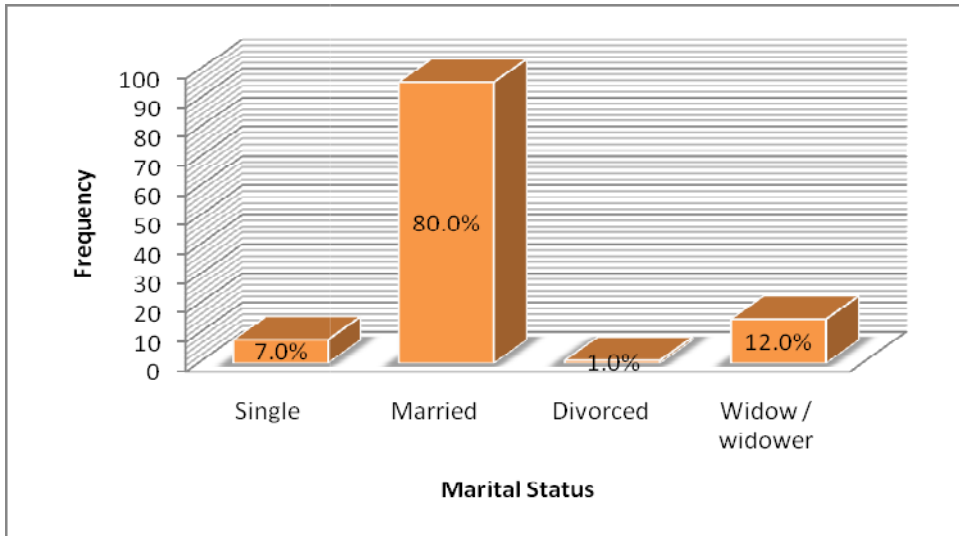


Figure 4.2: Bar chart illustrating marital status of the participants

Fig. 4.2 revealed that 8 (7.0%) participants were single, 96 (80.0%) were married, 1 (1.0%) was a divorcee, while 15 (12.0%) participants were widows / widowers. This showed that majority of the participants were married.

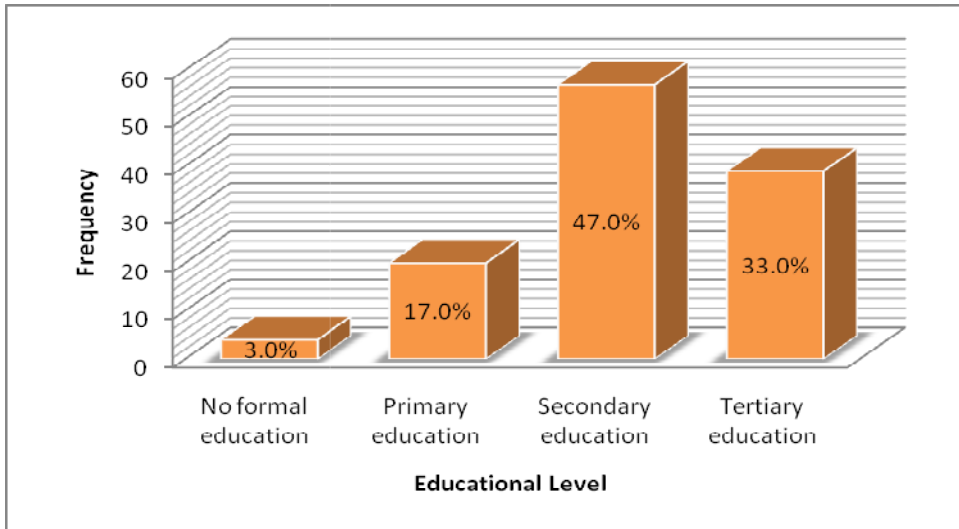


Figure 4.3: Bar chart illustrating educational level of the participants

Fig. 4.3 revealed that 4 (3.0%) participants had no formal education, 20 (17.0%) obtained Primary School Certificates, 57 (47.0%) possessed WASCE/SSSE, while 39 (33.0%) participants had tertiary education. This showed that majority of the participants possessed WASCE/SSSE.

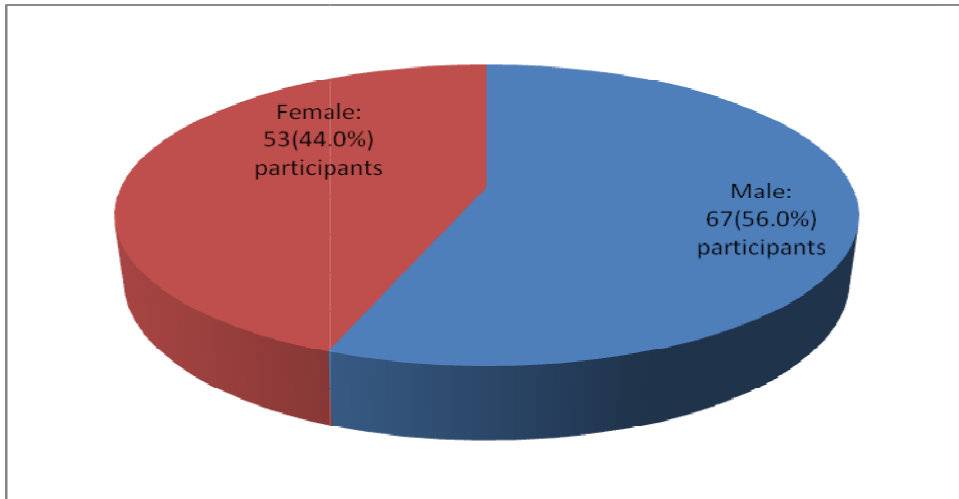


Figure 4.4: Pie chart illustrating gender of the participants

Fig. 4.4 revealed that 67 (56.0%) participants were male, while 53 (44.0%) were female. This showed that most of the participants were male.

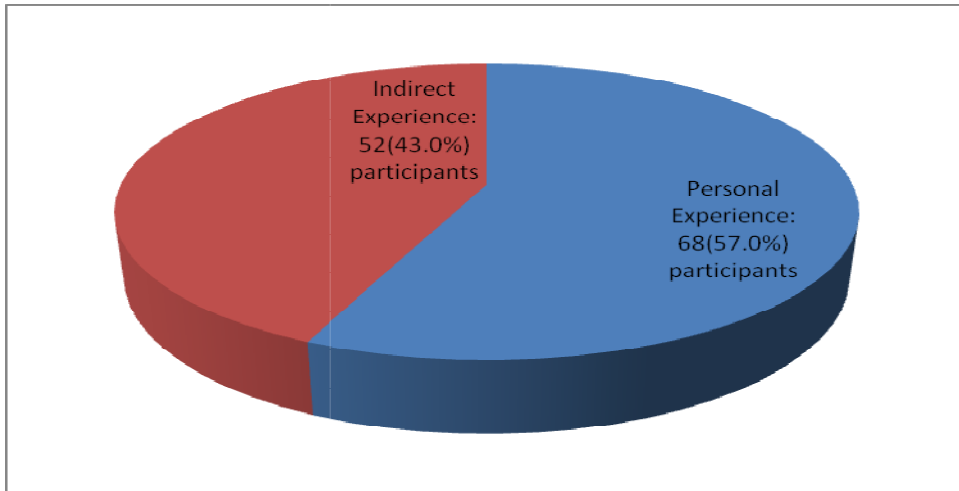


Figure 4.5: Pie chart illustrating flood disaster experience of the participants

Fig. 4.5 revealed that 68 (57.0%) participants had direct flood disaster experience, while 52 (43.0%) had indirect flood disaster experience. This showed that most of the participants had personal flood disaster experience.

4.2 Research Questions

The following research questions were answered:

4.2.1 Research Question 1: Do the residents in the Ibadan metropolis have adequate knowledge of prevention of flood disasters?

Table 4.1: Frequency table showing distribution of participants' knowledge of flood disaster prevention

S/n	Question items	True	False	Mean	Std. Dev
1	Flood disaster occurs when flooding leads to destruction of lives and properties	60 50.0%	60 50.0%	1.50	0.50
2	Flood will not lead to flood disaster if human being stay away from flood plain	55 45.8%	65 54.2%	1.46	0.50
3	Flood disaster is not preventable	62 51.7%	58 48.3%	1.52	0.50
4	Allowing rivers to flow naturally can prevent flood disasters	55 45.8%	65 54.2%	1.54	0.50
5	Clearing of gutters or drainages regularly can prevent flood disaster	50 41.7%	70 58.3%	1.42	0.49
6	Building on a flood plain (area that is close to a river) can cause flood disaster	53 44.2%	67 55.8%	1.44	0.49
7	It is necessary to consider flood plain topography before erecting structure	51 42.5%	69 57.5%	1.43	0.49
8	It is better to prevent flood disasters because no amount of sympathy and relief can make up for the pain, grief and the losses suffered	56 46.7%	64 53.3%	1.47	0.50
9	Channelization of rivers can prevent flood disaster	58 48.3%	62 51.7%	1.48	0.50
10	Maintaining stream/river set-back during building construction prevents flood disaster	44 36.7%	76 63.3%	1.37	0.48
11	Flood disasters needs to be prevented because it causes damage to public infrastructure like road, culvert and bridges	61 50.8%	59 49.2%	1.51	0.50
12	Water borne diseases outbreak can occur in a community that fails to prevent flood disaster	49 40.8%	71 59.2%	1.41	0.49
13	Flood disasters can affect economy of the country if not prevented	42 35.0%	78 65.0%	1.35	0.48
14	Flood forecasting and warning is a prerequisite for successful flood disaster prevention	57 47.5%	63 52.5%	1.48	0.50
15	Strictly obeying physical planning and building regulations goes a long way in preventing flood disaster	56 46.7%	64 53.3%	1.47	0.50
16	Strictly obeying environmental laws can prevent flood disaster	58 48.3%	62 51.7%	1.48	0.50
17	Removal or demolition of structures obstructing drainage can prevent flood disaster	60 50.0%	60 50.0%	1.50	0.50
18	One of the most potent preventive measures against flood disaster is improved vegetation	47 39.2%	73 60.8%	1.39	0.49
				Weighted Mean= 1.46	Criterion=1.50

As indicated in table 4.1, 60 (50.0%) participants affirmed that flood disaster occurs when flooding leads to destruction of lives and properties, while 60 (50.0%) did not. In addition, 55 (45.8%) participants established that flood will not lead to flood disaster if human being stay away from flood plain, while 65 (54.2%) responded contrary to that. Moreover, 62 (51.7%) participants established that flood disaster is not preventable, 58 (48.3%) did not. Furthermore, 55 (45.8%) participants stated that allowing rivers to flow naturally can prevent flood disasters, while 65 (54.2%) responded against it. Besides, 50 (41.7%) participants affirmed that clearing of gutters or drain regularly can prevent flood disaster, while 70 (58.3%) did not. Also, 53 (44.2%) participants established that building on a flood plain can cause flood disaster, while 67 (55.8%) responded contrary to that.

Furthermore, 51 (42.5%) participants affirmed that it is not necessary to consider flood plain topography before erecting structure, while 69 (57.5%) did not. In addition, 56 (46.7%) participants established that it is better to prevent flood because no amount of sympathy and relief can make up for the pain, grief and the losses suffered, while 64 (53.3%) did not. Besides, 58 (48.3%) participants expressed that channelization of rivers can prevent flood disaster, while 62 (51.7%) did not. Moreover, 44 (36.7%) participants affirmed that maintaining stream/river set-back during building construction prevents flood disaster, while 76 (63.3%) did not. Besides, 61 (50.8%) participants established that flood disasters needs to be prevented because it causes damage to public infrastructure like road, culvert and bridges, while 59 (49.2%) did not. Also, 49 (40.8%) participants affirmed that water borne diseases outbreak can occur in a community that fails to prevent flood disaster, while 71 (59.2%) did not.

In the same vein, 42 (35.0%) participants affirmed that flood disasters can affect economy of the country if not prevented, 78 (65.0%) did not. In addition, 57 (47.5%) participants established that flood forecasting and warning is a prerequisite for successful flood disaster prevention, while 63 (52.5%) disagreed. Besides, 56 (46.7%) participants expressed that strictly obeying physical planning and building regulations goes a long way in preventing flood disaster, while 64 (53.3%) did not. Furthermore, 58 (48.3%) participants agreed that strictly obeying environmental laws can prevent flood disaster, while 62 (51.7%) had contrary reaction to it. Besides, 60 (50.0%) participants affirmed

that removal or demolition of structures obstructing drainage can prevent flood disaster, while 60 (50.0%) did not. Also, 47 (39.2%) participants stated that one of the most potent preventive measures against flood disaster is improved vegetation, while 73 (60.8%) disagreed. Table 4.1 further revealed that the obtained weighted mean value of 1.46 was less than the criterion of 1.50; therefore, it could be inferred that, residents of Ibadan Metropolis had poor knowledge of flood disaster prevention.

4.2.2 Research Question 2: What are the attitudes of residents Ibadan metropolis towards prevention of flood disaster?

Table 4.2: Frequency table showing distribution of participants' attitude towards prevention of flood disaster in the Ibadan metropolis

S/n	Question items	SA	A	D	SD	Mean	Std. Dev
1	It is only God that can prevent flood disasters	27 22.5%	20 16.7%	9 7.5%	64 53.3%	2.92	1.27
2	I can dump refuse in river channels for water to carry it away	53 44.2%	14 11.7%	40 33.3%	13 10.8%	2.11	1.20
3	Flood cannot occur because of throwing refuse in drainage	48 40.0%	12 10.0%	56 46.7%	4 3.3%	2.13	1.09
4	It is normal to wrap faeces in polythene and throw into the stream	43 35.8%	18 15.0%	52 43.3%	7 5.8%	2.19	1.09
5	I cannot vacate my building because of flood rather continue to pray to God and manage	43 35.8%	22 18.3%	52 43.3%	3 2.5%	2.13	0.94
6	Maintaining river set back is a waste of land	36 30.0%	72 60.0%	7 5.8%	5 4.2%	1.84	0.71
7	I cannot be spending money for waste disposal, it is the government's responsibility	7 5.8%	46 38.3%	29 24.2%	38 31.7%	2.58	1.23
8	I support worshiping of river goddess or praying to God for flood control	43 35.8%	17 14.2%	16 13.3%	44 36.7%	2.51	1.31
9	I disregard flood forecasting since forecasters are not God	26 21.7%	17 14.2%	29 24.2%	48 40.0%	2.83	1.18
10	Flood control jingles on radio and television are of no value to me	30 25.0%	40 33.3%	48 40.0%	2 1.7%	2.18	0.83
11	Land is scarce and expensive this days so I can buy land that is close to the stream	31 25.8%	32 26.7%	52 43.3%	5 4.2%	2.26	0.89
12	I support concreting the remaining floor in house yards	20 16.7%	15 12.5%	77 64.2%	8 6.7%	2.61	0.84
13	Flood disaster is punishment from the gods	36 30.0%	23 19.2%	55 45.8%	6 5.0%	2.26	0.95
14	Adhering to set back during construction doesn't have any effect on the occurrence of flood disaster	35 29.2%	27 22.5%	53 44.2%	5 4.2%	2.23	0.92
						Weighted Mean= 2.34	Criterion=2.50

As indicated in table 4.2, 47(39.2%) respondents agreed that it is only God that can prevent flood disasters, while 73 (60.8%) disagreed. In addition, 67 (55.9%) respondents agreed that they can dump refuse in river channels for water to carry it away, while 53 (44.1%) disagreed. Furthermore, 60 (50.0%) respondents agreed that flood cannot occur because of throwing refuse in drainage, while 60 (50.0%) disagreed. Also, 61 (50.8%) respondents agreed that it is normal to wrap faeces in polythene and throw into the stream, while 59 (49.2%) disagreed. Besides, 65 (54.1%) respondents agreed that they cannot vacate their buildings because of flood rather continue to pray to God and manage, while 55 (45.9%) disagreed. Also, 108 (90%) respondents agreed that maintaining river set back is a waste of land, while 12 (10.0%) disagreed. Moreover, 53 (44.1%) respondents agreed that they cannot be spending money for waste disposal, it is the government's responsibility, while 67 (55.9%) disagreed.

In the same vein, 60 (50.0%) respondents agreed that they support worshiping of river goddess or praying to God for flood control, while 60 (50.0%) disagreed. In addition, 43 (35.9%) respondents agreed that they disregarded flood forecasting since forecasters are not God, while 77 (77.0%) disagreed. Furthermore, 70 (58.3%) respondents agreed that flood control jingles on radio and television are of no value to them, 50 (41.7%) disagreed. Moreover, 63 (52.5%) respondents agreed that land is scarce and expensive this days so, they can buy land that is close to the stream, while 57 (47.5%) disagreed. Besides, 35 (29.2%) respondents agreed on support of concreting the remaining floor in house yards, while 85 (70.8%) disagreed. In addition, 59 (49.2%) respondents agreed that flood disaster is punishment from the gods, while 61 (50.8%) disagreed. Also, 62 (51.7%) respondents agreed that adhering to set back during construction doesn't have any effect on the occurrence of flood disaster, while 58 (48.3%) disagreed. Table 4.2 further revealed that the obtained weighted mean value of 2.34 was less than the criterion of 2.50; therefore, it could be inferred that, residents in the Ibadan Metropolis had negative attitude towards prevention of flood disaster.

4.3 Hypotheses

The following hypotheses were tested in the study:

Table 4.3: Summary of MANCOVA result showing the pre-post effects of treatment, gender and disaster experience on knowledge, attitude and practices of flood disaster prevention

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Posttest Knowledge	651.897	10	65.190	8.833	.000	.450
	Posttest Attitude	5755.470	10	575.547	7.837	.000	.421
	Posttest Practice	214.491	10	21.492	2.850	.003	.209
Intercept	Posttest Knowledge	596.688	1	596.688	80.853	.000	.428
	Posttest Attitude	920.848	1	920.848	12.539	.001	.104
	Posttest Practices	311.449	1	311.449	41.293	.000	.277
Pretest Knowledge	Posttest Knowledge	15.098	1	15.098	2.046	.156	.019
	Posttest Attitude	5.587	1	5.587	.076	.783	.001
	Posttest Practices	.002	1	.002	.000	.988	.000
Pretest Attitude	Posttest Knowledge	.002	1	.002	.000	.986	.000
	Posttest Attitude	3.474	1	3.474	.047	.828	.000
	Posttest Practices	1.709	1	1.709	.227	.635	.002
Pretest Practice	Posttest Knowledge	6.258	1	6.258	.848	.359	.008
	Posttest Attitude	113.135	1	113.135	1.541	.217	.014
	Posttest Practices	.104	1	.104	.014	.907	.000
Treatment	Posttest Knowledge	188.661	1	188.661	25.564	.000	.191
	Posttest Attitude	1778.444	1	1778.444	24.216	.000	.183
	Posttest Practices	55.498	1	55.498	7.358	.008	.064
Gender	Posttest Knowledge	40.748	1	40.748	5.522	.021	.049
	Posttest Attitude	153.806	1	153.806	2.094	.151	.019
	Posttest Practices	2.232	1	2.232	.296	.588	.003
Disaster Experience	Posttest Knowledge	80.031	1	80.031	10.845	.001	.091
	Posttest Attitude	1022.935	1	1022.935	13.929	.000	.114
	Posttest Practices	19.811	1	19.811	2.627	.108	.024
Treatment*Gender	Posttest Knowledge	12.934	1	12.934	1.753	.188	.016
	Posttest Attitude	143.422	1	143.422	1.953	.165	.018
	Posttest Practices	32.052	1	32.052	4.250	.042	.038
Treatment* Disaster Experience	Posttest Knowledge	63.683	1	63.683	8.629	.004	.074
	Posttest Attitude	77.894	1	77.894	1.061	.305	.010
	Posttest Practices	4.502	1	4.502	.597	.441	.005
Gender * Disaster Experience	Posttest Knowledge	2.739	1	2.739	.371	.544	.003
	Posttest Attitude	3.603	1	3.603	.049	.825	.001
	Posttest Practices	21.610	1	21.610	2.865	.093	.026
Treatment* Gender * Disaster Experience	Posttest Knowledge	.894	1	.894	.121	.728	.001
	Posttest Attitude	.228	1	.228	.003	.956	.001
	Posttest Practices	15.870	1	15.870	2.104	.150	.019
Error	Posttest Knowledge	797.027	108	7.380			
	Posttest Attitude	7931.522	108	73.440			
	Posttest Practices	814.575	108	7.542			
Total	Posttest Knowledge	60417.000	119				
	Posttest Attitude	94079.000	119				
	Posttest Practices	25401.000	119				
Corrected Total	Posttest Knowledge	1448.924	118				
	Posttest Attitude	13686.992	118				
	Posttest Practices	1029.496	118				

4.3.1 Hypothesis 1(a): There is no significant main effect of treatment on knowledge of flood disaster prevention among residents in the Ibadan metropolis

As shown in Table 4.3, there was a significant main effect of treatment on knowledge of flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 25.564, p < 0.05$, partial $\eta^2 = 0.191$); hence, the hypothesis was rejected. This implied that the treatment contributed significantly to the variation in participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.191 showed that the treatment had a contribution of 19.1% to participants' knowledge of flood disaster prevention.

Table 4.4a: Estimated marginal mean of participants' knowledge of flood disaster prevention by treatment

Dependent Variable	Treatment Groups	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Knowledge	Experimental	23.611	.431	22.758	24.465
	Control group	20.212	.465	19.289	21.134

Table 4.4a showed that participants in the treatment group had higher posttest mean score of 23.611 on knowledge of flood disaster prevention than the participants in the control group with posttest mean score of 20.212. This means that participants that were exposed to environmental education performed better than those in the control group. It implied that environmental education was an effective programme that could increase knowledge of flood disaster prevention.

4.3..2 Hypothesis 1(b): There is no significant main effect of treatment on attitude towards flood disaster prevention among residents in the Ibadan metropolis.

Table 4.3 showed that there was a significant main effect of treatment on attitude towards flood disaster prevention among residents of Ibadan metropolis ($F_{(1,108)} = 24.216, p < 0.05$, partial $\eta^2 = 0.183$); hence, the hypothesis was rejected. The implication was that the treatment contributed significantly to the variation in participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.183 showed that the treatment had a contribution of about 18.3% to participants' attitude towards flood disaster prevention.

Table 4.4b: Estimated marginal mean of participants' attitude towards flood disaster prevention by treatment

Dependent Variable	Treatment Groups	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Attitude	Experimental	30.302	1.359	27.609	32.995
	Control group	19.864	1.468	16.954	22.773

Table 4.4b revealed that participants in the treatment group had higher posttest mean score of 30.302 on attitude towards flood disaster prevention than the participants in the control group with posttest mean score of 19.864. This means that participants that were exposed to environmental education performed better than those in the control group. It implied that environmental education was an effective programme that could bring about positive attitude towards flood disaster prevention.

Hypothesis 1(c): There is no significant main effect of treatment on practices of flood disaster prevention among residents in the Ibadan Metropolis.

As shown in table 4.3, there was a significant main effect of treatment on practices towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 7.358$, $p < 0.05$, partial $\eta^2 = 0.064$); hence, the hypothesis was rejected. This implied that the treatment contributed significantly to the variation in participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.064 showed that the treatment had a contribution of about 6.4% to practices towards flood disaster prevention among the participants.

Table 4.4c: Estimated marginal mean of participants'practices towards flood disaster prevention by treatment

Dependent Variable	Treatment Groups	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Practices	Experimental group	15.153	.435	14.290	16.061
	Control group	13.309	.470	12.376	14.241

Table 4.4c showed that participants in the treatment group had higher posttest mean score of 15.153 on practices towards flood disaster prevention than the participants in the control group with posttest mean score of 13.309. This means that participants that were exposed to environmental education performed better than those in the control group. It implied that environmental education was an effective programme that could bring about positive practices towards flood disaster prevention.

4.3.2 Hypothesis 2(a): There is no significant main effect of gender on knowledge of flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 revealed that there was significant main effect of gender on knowledge of flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 5.522, p < 0.05$, partial $\eta^2 = 0.049$); hence, the hypothesis was rejected. This implied that gender had significant effect on participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.049 showed that gender had a contribution of about 4.9% to participants' knowledge of flood disaster prevention.

Table 4.5a: Estimated marginal mean of participants' knowledge of flood disaster prevention by gender

Dependent Variable	Gender	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Knowledge	Male	22.606	.339	21.934	23.277
	Female	21.217	.485	20.255	22.180

Table 4.5a showed that male participants had higher posttest mean score of 22.606 on knowledge of flood disaster prevention than the female participants with posttest mean score of 21.217. This implied that male participants had adequate knowledge of flood disaster prevention than their female counterparts.

4.3.2.2 Hypothesis 2(b): There is no significant main effect of gender on attitude towards flood disaster prevention among residents in the Ibadan metropolis.

As shown in Table 4.3, there was no significant main effect of gender on attitude towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)}=2.094$, $p>0.05$, partial $\eta^2=0.019$); hence, the hypothesis was not rejected. This implied that gender had no significant effect on participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.019 showed that gender had a contribution of about 1.9% to participants' attitude towards flood disaster prevention.

Table 4.5b: Estimated marginal mean of participants' attitude towards flood disaster prevention by gender

Dependent Variable	Gender	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Attitude	Male	26.431	1.069	24.313	28.549
	Female	23.734	1.531	20.699	26.770

Table 4.5b showed that male participants had higher posttest mean score of 26.431 on attitude towards flood disaster prevention than the female participants with posttest mean score of 23.734. This implied that male participants had positive attitude towards flood disaster prevention than their female counterparts.

4.3.2.3 Hypothesis 2(c): There is no significant main effect of gender on practices towards flood disaster prevention among residents in the Ibadan Metropolis.

As shown in Table 4.3, there was no significant main effect of gender on practices towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = .296, p > 0.05$, partial $\eta^2 = 0.003$); hence, the hypothesis was not rejected. This implied that gender had no significant effect on participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.003 showed that the treatment had a contribution of about 0.3% to practices towards flood disaster prevention among the participants in the Ibadan metropolis.

Table 4.5c: Estimated marginal mean of participants' practices towards flood disaster prevention by gender

Dependent Variable	Gender	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Practices	Male	14.068	.342	13.389	14.747
	Female	14.393	.491	13.420	15.366

Table 4.5c revealed that female participants had higher posttest mean score of 14.393 on practices towards flood disaster prevention than the male participants with posttest mean score of 14.068. This implied that female participants had positive practices towards flood disaster prevention than their male counterparts.

4.3.3 Hypothesis 3(a): There is no significant main effect of flood disaster experience on knowledge of flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 revealed that there was a significant main effect of disaster experience on knowledge of flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)}=10.845$, $p<0.05$, partial $\eta^2=0.091$); hence, the hypothesis was rejected. This implied that disaster experience had significant effect on participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.091 showed that flood disaster experience had a contribution of about 9.1% to participants' knowledge of flood disaster prevention.

Table 4.6a: Estimated marginal mean of participants' knowledge of flood disaster prevention by flood disaster experience

Dependent Variable	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Knowledge	Direct	22.880	.432	22.024	23.736
	Indirect	20.943	.403	20.144	21.742

Table 4.6a revealed that participants with direct flood disaster experience had higher posttest mean score of 22.880 on knowledge of flood disaster prevention than those with indirect experience with posttest mean score of 20.943. This means that participants with direct flood disaster experience had adequate knowledge of flood disaster prevention than the participants with indirect flood disaster experience.

4.3.3.2 Hypothesis 3(b): There is no significant main effect of flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis.

As shown in table 4.3, there was a significant main effect of flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)}=13.929$, $p<0.05$, partial $\eta^2=0.114$); hence, the hypothesis was rejected. This implied that disaster experience had significant effect on participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.114 showed that flood disaster experience had a contribution of about 11.4% to participants' attitude towards disaster prevention.

Table 4.6b: Estimated marginal mean of participants' attitude towards flood disaster prevention by flood disaster experience

Dependent Variable	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Attitude	Direct	28.546	1.362	25.846	31.246
	Indirect	21.619	1.272	19.099	24.140

Table 4.6b showed that participants with direct disaster experience had higher posttest mean score of 28.546 on attitude towards flood disaster prevention than those with indirect experience with posttest mean score of 21.619. This means that participants with direct flood disaster experience had positive attitude towards flood disaster prevention than the participants with indirect experience.

4.3.3.3 Hypothesis 3(c): There is no significant main effect of flood disaster experience on practices towards flood disaster prevention among residents in the Ibadan metropolis.

Table 4.3, there was no significant main effect of flood disaster experience on practices towards flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)}=2.627$, $p>0.05$, partial $\eta^2=0.024$); hence, the hypothesis was not rejected. This implied that flood disaster experience had no significant effect on participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.024 showed that disaster experience had a contribution of about 2.4% to practices towards flood disaster prevention among the participants.

Table 4.6c: Estimated marginal mean of participants' practices towards flood disaster prevention by flood disaster experiences

Dependent Variable	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
				Lower Bound	Upper Bound
Practices	Direct	14.713	.437	13.847	15.578
	Indirect	13.749	.408	12.941	14.556

Table 4.6c showed that participants with direct flood disaster experience had higher posttest mean score of 14.713 on practices towards flood disaster prevention than those with indirect experience with posttest mean score of 13.749. This means that participants with direct flood disaster experience had positive practices towards flood disaster prevention than the participants with indirect experience.

4.3.4 Hypothesis 4(a): There is no significant 2-way interaction effect of treatment and gender on knowledge of flood disaster prevention among residents in the Ibadan metropolis.

Table 4.3 revealed that there was no significant interaction effect of treatment and gender on knowledge of flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)} = 1.753, p > 0.05, \text{partial } \eta^2 = 0.016$); hence, the hypothesis was not rejected. This implied that interaction effect of treatment and gender had no significant effect on participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.016 showed that interaction effect of treatment and gender had a combined contribution of about 1.6% to participants' knowledge of flood disaster prevention.

Table 4.7a: Estimated marginal mean of participants' knowledge of flood disaster prevention by treatment and gender

Dependent Variable	Treatment Group	Gender	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Knowledge	Experimental	Male	24.705	.484	23.745	25.665
		Female	22.518	.652	21.226	23.810
	Control	Male	20.506	.498	19.519	21.493
		Female	19.917	.781	18.370	21.464

Table 4.7a revealed that male participants in the experimental group had higher posttest mean score of 24.705 on knowledge of flood disaster prevention than their female counterparts in the same group with posttest mean score of 22.518. This means that male participants that were exposed to environmental education had better knowledge of flood disaster prevention than their female counterparts in the same group. In the control group, the male participants had higher posttest mean score of 20.506 on knowledge of flood disaster prevention than their female counterparts in the same group with posttest mean score of 19.917. It means that male participants in the control group had better knowledge of flood disaster prevention than their female counterparts in the same group. The overall comparison showed that male participants in the experimental group had the highest mean score, followed by female participants in the same group. This means that, male participants in the experimental group had the best performance in knowledge of flood disaster prevention over their female counterparts and the participants in control group.

4.3.4.2 Hypothesis 4(b): There is no significant 2-way interaction effect of treatment and gender on attitude towards flood disaster prevention among residents in the Ibadan Metropolis.

As shown in table 4.3, there was no significant interaction effect of treatment and gender on attitude towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 1.953, p > 0.05, \text{partial } \eta^2 = 0.018$); hence, hypothesis 4(b) was not rejected. This implied that interaction effect of treatment and gender had no significant effect on participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.018 showed that interaction effect of treatment and gender had a combined contribution of about 1.8 % to participants' attitude towards flood disaster prevention.

Table 4.7b: Estimated marginal mean of participants' attitude towards flood disaster prevention by treatment and gender

Dependent Variable	Treatment Group	Gender	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Attitude	Experimental	Male	32.980	1.528	29.951	36.008
		Female	27.624	2.057	23.547	31.700
	Control	Male	19.883	1.571	16.769	22.996
		Female	19.845	2.462	14.964	24.726

Table 4.6b showed that male participants in the experimental group had higher posttest mean score of 32.980 on attitude towards flood disaster prevention than their female counterparts in the same group with posttest mean score of 27.624. This means that male participants that were exposed to environmental education had positive attitude towards flood disaster prevention than their female counterparts in the same group. In the control group, the male participants had higher posttest mean score of 19.883 on attitude towards flood disaster prevention than their female counterparts in the same group with posttest mean score of 19.845. It means that male participants in the control group had better attitude towards flood disaster prevention than their female counterparts in the same group. The overall comparison showed that male participants in the experimental group had the highest mean score, followed by female participants in the same group. This means that, male participants in the experimental group had positive attitude towards flood disaster prevention over their female counterparts and the participants in control group.

4.3.4.3 Hypothesis 4(c): There is no significant 2-way interaction effect of treatment and gender on practices towards flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3, there was a significant interaction effect of treatment and gender on practices towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)}= 4.250$, partial $p<0.05$, partial $\eta^2=0.038$); hence, hypothesis 4(c) was rejected. This implied that interaction effect of treatment and gender had significant effect on participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.038 showed that interaction effect of treatment and gender had a combined contribution of about 3.8% to participants' practices towards flood disaster prevention.

Table 4.7c: Estimated marginal mean of participants' practices towards flood disaster prevention by treatment and gender

Dependent Variable	Treatment Group	Gender	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Practices	Experimental	Male	14.362	.490	13.391	15.332
		Female	15.944	.659	14.637	17.250
	Control	Male	13.775	.503	12.777	14.773
		Female	12.843	.789	11.278	14.407

Table 4.7c showed that female participants in the experimental group had higher posttest mean score of 15.944 on practices towards flood disaster prevention than their male counterparts in the same group with posttest mean score of 14.362. This means that female participants that were exposed to environmental education had better practices towards flood disaster prevention than their male counterparts in the same group. In the control group, the male participants had higher posttest mean score of 13.775 on practices towards flood disaster prevention than their female counterparts in the same group with posttest mean score of 12.843. It means that male participants in the control group had better practices towards flood disaster prevention than their female counterparts in the same group. The overall comparison showed that female participants in the experimental group had the highest mean score, followed by male participants in the same group. This means that, female participants in the experimental group had positive practices towards flood disaster prevention over their male counterparts and the participants in control group.

4.3.5 Hypothesis 5(a): There is no significant 2-way interaction effect of treatment and flood disaster experience on knowledge of flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 showed that there was a significant interaction effect of treatment and disaster experience on knowledge of flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 8.629$, $p < 0.05$, partial $\eta^2 = 0.074$); hence, hypothesis 5(a) was rejected. This implied that interaction effect of treatment and disaster experience had significant effect on participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.074 showed that interaction effect of treatment and disaster experience had a combined contribution of about 7.4% to participants' knowledge of flood disaster prevention.

Table 4.8a: Estimated marginal mean of participants' knowledge of flood disaster prevention by treatment and flood disaster experiences

Dependent Variable	Treatment Group	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Knowledge	Experimental	Direct	25.458	.512	24.443	26.473
		Indirect	21.764	.631	20.513	23.061
	Control	Direct	20.302	.745	18.826	21.778
		Indirect	20.121	.541	19.049	21.193

Table 4.8a revealed that participants in the experimental group with direct flood disaster experience had higher posttest mean score of 25.458 on knowledge of flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 21.764. This means that participants with direct flood disaster experience that were exposed to environmental education had better knowledge of flood disaster prevention than those with indirect experience in the same group. In the control group, the participants with direct flood disaster experience had higher posttest mean score of 20.302 on knowledge of flood disaster prevention than their counterparts with indirect disaster experience in the same group with posttest mean score of 20.121. It means that participants with direct flood disaster experience had better knowledge of flood disaster prevention than those with indirect experience in the same group.

The overall comparison showed that participants with direct flood disaster experience in the experimental group had the highest mean score, followed by participants with indirect flood disaster experience in the same group. This means that, participants with direct flood disaster experience in the experimental group had adequate knowledge of flood disaster prevention over those with indirect flood disaster experience and the participants in control group.

4.3.5.2 Hypothesis 5(b): There is no significant 2-way interaction effect of treatment and flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis.

As shown in table 4.3, there was no significant interaction effect of treatment and flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)} = 1.061, p > 0.05, \text{partial } \eta^2 = 0.010$); hence, hypothesis 5(b) was not rejected. This implied that interaction effect of treatment and flood disaster experience had no significant effect on participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.010 showed that interaction effect of treatment and flood disaster experience had a combined contribution of about 1.0% to participants' attitude towards flood disaster prevention.

Table 4.8b: Estimated marginal mean of participants' attitude towards flood disaster prevention by treatment and flood disaster experiences

Dependent Variable	Treatment Group	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Attitude	Experimental	Direct	34.736	1.615	31.535	37.938
		Indirect	25.867	1.992	21.919	29.815
	Control	Direct	22.356	2.349	17.700	27.001
		Indirect	17.372	1.706	13.990	20.753

Table 4.8b revealed that participants in the experimental group with direct flood disaster experience had higher posttest mean score of 34.736 on attitude towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 25.867. This means that participants with direct flood disaster experience that were exposed to environmental education had better attitude towards flood disaster prevention than those with indirect experience in the same group. In the control group, the participants with direct flood disaster experience had higher posttest mean score of 22.356 on attitude towards flood disaster prevention than their counterparts with indirect disaster experience in the same group with posttest mean score of 17.372. It means that participants with direct flood disaster experience had positive attitude towards flood disaster prevention than those with indirect experience in the same group. The overall comparison showed that participants with direct flood disaster experience in the experimental group had the highest mean score, followed by participants with indirect disaster experience in the same group. This means that, participants with direct flood disaster experience in the experimental group had positive attitude towards flood disaster prevention over those with indirect flood disaster experience and the participants in control group.

4.3.5.3 Hypothesis 5(c): There is no significant 2-way interaction effect of treatment and flood disaster experience on practices towards flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 revealed that there was no significant interaction effect of treatment and flood disaster experience on practices towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = .597, p > 0.05, \text{partial } \eta^2 = 0.005$); hence, the hypothesis was not rejected. This implied that interaction effect of treatment and disaster experience had no significant effect on participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.005 showed that interaction effect of treatment and disaster experience had a combined contribution of about 0.5% to participants' practices towards flood disaster prevention.

Table 4.8c: Estimated marginal mean of participants' practices towards flood disaster prevention by treatment and flood disaster experiences

Dependent Variable	Treatment Group	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Practices	Experimental	Direct	15.868	.518	14.842	16.894
		Indirect	14.437	.638	13.172	15.702
	Control	Direct	13.557	.753	12.065	15.049
		Indirect	13.060	.547	11.977	14.144

Table 4.8c revealed that participants in the experimental group with direct flood disaster experience had higher posttest mean score of 15.868 on practices towards flood disaster prevention than their counterparts with indirect disaster experience in the same group with posttest mean score of 14.437. This means that participants with direct disaster experience that were exposed to environmental education had better practices towards flood disaster prevention than their those with indirect experience in the same group. In the control group, the participants with direct disaster experience had higher posttest mean score of 13.557 on practices towards flood disaster prevention than their counterparts with indirect disaster experience in the same group with posttest mean score of 13.060. It means that participants with direct disaster experience had positive practices towards flood disaster prevention than those with indirect experience in the same group. The overall comparison showed that participants with direct flood disaster experience in the experimental group had the highest mean score, followed by participants with indirect personal disaster experience in the same group. This means that, participants with direct disaster experience in the experimental group had best practices towards flood disaster prevention over those with indirect disaster experience and the participants in control group.

4.3.6 Hypothesis 6(a): There is no significant 2-way interaction effect of gender and flood disaster experience on knowledge of flood disaster prevention among residents in the Ibadan Metropolis.

As indicated in table 4.3, there was no significant interaction effect of gender and disaster experience on knowledge of flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 0.371$, $p > 0.05$, partial $\eta^2 = 0.003$); hence, hypothesis 6(a) was not rejected. This implied that interaction effect of gender and flood disaster experience had no significant effect on participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.003 showed that interaction effect of gender and flood disaster experience had a combined contribution of about 0.3% to participants' flood disaster prevention.

Table 4.9a: Estimated marginal mean of participants' knowledge of flood disaster prevention by gender and flood disaster experiences

Dependent Variable	Gender	Disaster Experience	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Knowledge	Male	Direct	23.383	.394	22.602	24.163
		Indirect	21.828	.576	20.687	22.969
	Female	Direct	22.378	.780	20.831	23.924
		Indirect	20.057	.589	18.890	21.224

Table 4.9a revealed that male participants with direct flood disaster experience had higher posttest mean score of 23.383 on knowledge of flood disaster prevention than their counterparts with indirect disaster experience with posttest mean score of 21.828. This means that male participants with direct disaster experience had better knowledge of flood disaster prevention than those with indirect experience. In addition, the female participants with direct disaster experience had higher posttest mean score of 22.378 on knowledge of flood disaster prevention than their counterparts with indirect disaster experience with posttest mean score of 20.057. It means that female participants with direct flood disaster experience had better knowledge of flood disaster prevention than those with indirect experience. The overall comparison showed that male participants with direct flood disaster experience had the highest mean score, followed by female participants with personal disaster experience. This means that, male participants with direct flood disaster experience had the best performance in knowledge of flood disaster prevention over their male counterparts with indirect experience and female participants with both direct and indirect disaster experience.

4.3.6.2 Hypothesis 6(b): There is no significant 2-way interaction effect of gender and flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 showed that there was no significant interaction effect of gender and flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)} = 0.049, p > 0.05, \text{partial } \eta^2 = 0.001$); hence, hypothesis 6(b) was not rejected. This implied that interaction effect of gender and flood disaster experience had no significant on effect participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.001 showed that interaction effect of gender and flood disaster experience had a combined contribution of about 0.1% to participants' attitude towards flood disaster prevention.

Table 4.9b: Estimated marginal mean of participants' attitude towards flood disaster prevention by gender and flood disaster experiences

Dependent Variable	Gender	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Attitude	Male	Direct	30.114	1.242	27.652	32.576
		Indirect	22.748	1.816	19.148	26.348
	Female	Direct	26.978	2.461	22.100	31.857
		Indirect	20.491	1.857	16.809	24.172

Table 4.9b showed that male participants with direct flood disaster experience had higher posttest mean score of 30.114 on attitude towards flood disaster prevention than their counterparts with indirect disaster experience with posttest mean score of 22.748. This means that male participants with direct flood disaster experience had better attitude towards flood disaster prevention than their counterparts with indirect experience. In addition, the female participants with direct disaster experience had higher posttest mean score of 26.978 on attitude towards flood disaster prevention than their counterparts with indirect disaster experience with posttest mean score of 20.491. It means that female participants with direct disaster experience had better attitude towards flood disaster prevention than those with indirect experience. The overall comparison showed that male participants with direct flood disaster experience had the highest mean score, followed by female participants with direct disaster experience. This means that, male participants with direct disaster experience had the best performance in attitude towards flood disaster prevention over their male counterparts with indirect experience and female participants with both direct and indirect disaster experience.

Hypothesis 6(c): There is no significant 2-way interaction effect of gender and flood disaster experience on practices towards flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 showed that there was no significant interaction effect of gender and disaster experience on practices towards flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)} = 2.865$, $p > 0.05$, partial $\eta^2 = 0.026$); hence, hypothesis 6(c) was not rejected. This implied that interaction effect of years of gender and flood disaster experience had no significant effect on participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.026 showed that interaction effect of gender and flood disaster experience on practices had a combined contribution of about 2.6% to participants' practices towards flood disaster prevention.

Table 4.9c: Estimated marginal mean of participants' practices towards flood disaster prevention by gender and flood disaster experiences

Dependent Variable	Gender	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
					Lower Bound	Upper Bound
Practices	Male	Direct	15.088	.398	14.299	15.877
		Indirect	13.049	.582	11.895	14.202
	Female	Direct	14.449	.595	13.269	15.628
		Indirect	14.338	.789	12.774	15.901

Table 4.9c showed that male participants with direct flood disaster experience had higher posttest mean score of 15.088 on practices towards flood disaster prevention than their counterparts with indirect disaster experience with posttest mean score of 13.049. This means that male participants with direct flood disaster experience had better practices of flood disaster prevention than their counterparts with indirect experience.

In addition, the female participants with direct flood disaster experience had higher posttest mean score of 14.449 on practices towards flood disaster prevention than their counterparts with indirect disaster experience with posttest mean score of 14.338. It means that female participants with direct flood disaster experience had better practices towards flood disaster prevention than those with indirect experience. The overall comparison showed that male participants with direct flood disaster experience had the highest mean score, followed by female participants with direct disaster experience. This means that, male participants with direct disaster experience had the best performance in practices of flood disaster prevention over their male counterparts with indirect experience and female participants with both direct and indirect flood disaster experience.

4.3.7 Hypothesis 7(a): There are no significant 3-way interaction effect of treatment, gender and flood disaster experience on knowledge of flood disaster prevention among residents in the Ibadan Metropolis.

As indicated in Table 4.3, there were no significant 3-way interaction effect of treatment, gender and flood disaster experience on knowledge of flood disaster prevention among residents in the Ibadan Metropolis ($F_{(1,108)}=.121, p>0.05, \text{partial } \eta^2=0.001$); hence, the hypothesis was not rejected. This implied that interaction effect of treatment, gender and flood disaster experience had no significant contribution to the variation in participants' scores on knowledge of flood disaster prevention. The partial eta square value of 0.001 showed that interaction effect of treatment, gender and flood disaster experience had a combined contribution of about 0.1% to participants' knowledge of flood disaster prevention.

Table 4.10a: Estimated marginal mean of participants' knowledge of flood disaster prevention by treatment, gender and flood disaster experiences

Dependent Variable	Treatment	Gender	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
						Lower Bound	Upper Bound
Knowledge	Experimental	Male	Direct	26.254	.595	25.074	27.433
			Indirect	23.156	.731	21.707	24.604
		Female	Direct	24.663	.785	23.108	26.218
			Indirect	20.373	.986	18.420	22.327
	Control	Male	Direct	20.512	.585	19.352	21.672
			Indirect	20.501	.872	18.772	22.230
		Female	Direct	20.092	1.362	17.392	22.793
			Indirect	19.741	.738	18.278	21.205

Table 4.10a revealed that male participants in the experimental group with flood direct disaster experience had higher posttest mean score of 26.254 on knowledge of flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 23.156. This means that male participants with directflood disaster experience that were exposed to environmental education had better knowledge of flood disaster prevention than those with indirect flood disaster experience in the same group. In addition, it was shown that female participants in the experimental group with direct flood disaster experience had higher posttest mean score of 24.663 on knowledge of flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 20.373. This means that female participants with directflood disaster experience that were exposed to environmental education had better knowledge of flood disaster prevention than those with indirect flood disaster experience in the same group.

In the control group, the male participants with directflood disaster experience had higher posttest mean score of 20.512 on knowledge of flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 20.501. This means that male participants with direct flood disaster experience in the control group had better knowledge of flood disaster prevention than those with indirect flood disaster experience in the same group. Moreover, it was revealed that female participants in the control group with direct flood disaster experience had higher posttest mean score of 20.092 on knowledge of flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 19.741. This means that female participants with direct flood disaster experience had better knowledge of flood disaster prevention than those with indirect flood disaster experience in the same group.

The overall comparison showed that male participants with directflood disaster experience in the experimental group had the highest mean score, followed by female participants with directflood disaster experience in the same group. This means that, male participants with directflood disaster experience in the experimental group had the best performance in knowledge of flood disaster prevention over their counterparts with indirect flood disaster

experience as well as other gender groups with both direct and indirect flood disaster experience.

4.3.7.2 Hypothesis 7(b): There are no significant 3-way interaction effects of treatment, gender and flood disaster experience on attitude towards flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 showed that there were no significant interaction effects of treatment, gender and flood disaster experience on attitude towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = .003$, $p > 0.05$, partial $\eta^2 = 0.000$); hence, the hypothesis was not rejected. This implied that interaction effect of treatment, gender and flood disaster experience had no significant effect on participants' scores on attitude towards flood disaster prevention. The partial eta square value of 0.001 showed that interaction effect of treatment, gender and flood disaster experience had a combined contribution of about 0.1% to participants' attitude towards flood disaster prevention.

Table 4.10b: Estimated marginal mean of participants' attitude towards flood disaster prevention by treatment, gender and flood disaster experiences

Dependent Variable	Treatment	Gender	Flood Disaster Experience	Mean	Std. Error	95% confidence level interval	
						Lower Bound	Upper Bound
Attitude	Experimental	Male	Direct	37.688	1.878	33.966	41.409
			Indirect	28.272	2.306	23.701	32.842
		Female	Direct	31.785	2.475	26.879	36.691
			Indirect	23.463	3.109	17.300	29.625
	Control	Male	Direct	22.540	1.846	18.882	26.199
			Indirect	17.225	2.752	11.770	22.680
		Female	Direct	22.171	4.297	13.653	30.690
			Indirect	17.519	2.329	12.903	22.134

Table 4.10b showed that male participants in the experimental group with direct flood disaster experience had higher posttest mean score of 37.688 on attitude towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 28.272. This means that male participants with direct flood disaster experience that were exposed to environmental education had better attitude towards flood disaster prevention than those with indirect flood disaster experience in the same group. In addition, it was revealed that female participants in the experimental group with direct flood disaster experience had higher posttest mean score of 31.785 on attitude towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 23.463. This means that female participants with direct flood disaster experience that were exposed to environmental education had better attitude towards flood disaster prevention than those with indirect flood disaster experience in the same group.

In the control group, the male participants with direct flood disaster experience had higher posttest mean score of 22.540 on attitude towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 17.225. This means that male participants with direct flood disaster experience in the control group had better attitude towards flood disaster prevention than those with indirect flood disaster experience in the same group. Also, it was revealed that female participants in the control group with direct flood disaster experience had higher posttest mean score of 22.171 on attitude towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 17.519. This means that female participants with direct flood disaster experience had better attitude towards flood disaster prevention than those with indirect flood disaster experience in the same group.

The overall comparison showed that male participants with direct flood disaster experience in the experimental group had the highest mean score, followed by female participants with direct flood disaster experience in the same group. This means that, male participants with direct flood disaster experience in the experimental group had the best performance in

attitude towards flood disaster prevention over their counterparts with indirect flood disaster experience as well as other gender groups with both direct and indirect flood disaster experience.

4.3.7.3 Hypothesis 7(c): There are no significant 3-way interaction effects of treatment, gender and flood disaster experience on practices towards flood disaster prevention among residents in the Ibadan Metropolis.

Table 4.3 showed that there were significant interaction effects of treatment, gender and flood disaster experience on practices towards flood disaster prevention among residents of Ibadan Metropolis ($F_{(1,108)} = 2.104, p > 0.05, \text{partial } \eta^2 = 0.019$); hence, the hypothesis was rejected. This implied that interaction effect of treatment, gender and flood disaster experience had significant contribution to the variation in participants' scores on practices towards flood disaster prevention. The partial eta square value of 0.019 showed that interaction effect of treatment, gender and flood disaster experience had a combined contribution of about 1.9% to participants' practices towards flood disaster prevention.

Table 4.10c: Estimated marginal mean of participants' practices towards flood disaster prevention by treatment, gender and flood disaster experiences

Dependent Variable	Treatment	Gender	Flood Disaster Experience	Mean	Std. Error	95% confidence interval	
						Lower Bound	Upper Bound
Practices	Experimental	Male	Direct	16.063	.602	14.871	17.256
			Indirect	12.660	.739	11.195	14.125
		Female	Direct	16.214	.996	14.239	18.189
			Indirect	15.673	.793	14.101	17.245
	Control	Male	Direct	14.112	.591	12.940	15.285
			Indirect	13.437	.882	11.689	15.186
		Female	Direct	13.002	1.377	10.272	15.732
			Indirect	12.683	.746	11.204	14.162

Table 4.10c revealed that male participants in the experimental group with direct flood disaster experience had higher posttest mean score of 16.063 on practices towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 12.660. This means that male participants with direct flood disaster experience that were exposed to environmental education had better practices towards flood disaster prevention than those with indirect experience in the same group. In addition, it was revealed that female participants in the experimental group with direct flood disaster experience had higher posttest mean score of 16.214 on practices towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 15.673. This means that female participants with direct flood disaster experience that were exposed to environmental education had better practices towards flood disaster prevention than those with indirect flood disaster experience in the same group.

In the control group, the male participants with direct flood disaster experience had higher posttest mean score of 14.112 on practices towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 13.437. This means that male participants with direct flood disaster experience in the control group had better practices towards flood disaster prevention than those with indirect flood disaster experience in the same group. Also, it was revealed that female participants in the control group with direct flood disaster experience had higher posttest mean score of 13.002 on practices towards flood disaster prevention than their counterparts with indirect flood disaster experience in the same group with posttest mean score of 12.683. This means that female participants with direct flood disaster experience had better practices towards flood disaster prevention than those with indirect flood disaster experience in the same group.

The overall comparison revealed that female participants with direct flood disaster experience in the experimental group had the highest mean score, followed by male participants with direct flood disaster experience in the same group. This means that, female participants with direct flood disaster experience in the experimental group had the

best performance in practices towards flood disaster prevention over their counterparts with indirect flood disaster experience as well as other gender groups with both direct and indirect flood disaster experience.

4.4 Discussion of findings

This study provided characteristics of residents of flood prone areas in Ibadan, Nigeria that participated in the study and some key attributes in relation to knowledge, attitude and practices towards flood disaster prevention. At the baseline survey before intervention, the study found that residents of flood prone areas in Ibadan metropolis had poor knowledge of flood disaster prevention; they had negative attitude towards flood disaster prevention. This could be as a result of ignorance, non-challant attitude, lack of participatory awareness on flood disaster prevention, this result agrees with findings of Famuyiwa and Kadiri (2017), they reported that 256(85.3%) which represent the majority of the study population lack knowledge of flood disaster risk reduction. Also, the findings is in consonance with the result of study of Babalola (2000) who reported that 66 (66%) of sampled respondents are of the opinion that flood disaster cannot be prevented, because it is a natural phenomenon, this was so because they lack knowledge of flood disaster vulnerability, that flood disaster is not natural in the real sense of it, it is the hazard that is natural. Since flood disasters are the outcome of flood hazard on vulnerable population, there must be a trigger before flood hazard can lead to a disaster. The findings also agrees with Owolabi and Ekechi (2014) result, they noted that people are not well informed about disaster risk reduction strategies; they added that disaster is always seen as emergency response by the people that does not really worth or need any prevention or preparedness. In agreement with this finding, Oriola (2000) also, opined that, when people lack ecological knowledge, environmental management system become less effective due to unintentional harmful environmental practices of the uninformed public.

The result of this findings established that Environmental Education (EE) had significant effect on knowledge, attitude and practices towards flood disaster prevention among Ibadan residents in Nigeria.. This implies that the treatment contribute significantly to the variations in participants scores in knowledge, attitude and practices towards flood

disaster prevention. The participants that were exposed to environmental education programme performed better in knowledge, attitude and practices towards flood disaster prevention than their counterparts that were not exposed to environmental education. This can be further explained that flood disaster preventive measures will be more successful when the affected communities are empowered with necessary skills and knowledge to tackle the problems. This result is in line with Odelola and Akinola (2015) recommendation that residents of Ibadan metropolis need intensive environmental health education so as to encourage proper disposal of waste in Ibadan. Similarly, Olorunfemi and Raheem (2017) submitted that, the primary level of prevention of disaster lies at the communities level, they suggested that leaders drawn from the various political, social and economic sectors of society have to assume primary responsibility for the protection of their own community. Onuma, Shin and Managi (2013) opinion also corroborated the result of this finding, that promoting education and capacity building on how to manage and reduce risk from disaster is very crucial to achieve sustainable development. The findings is a proof that enabling communities by investing in human resources and building individual capabilities across the generations will have longer lasting value than any other specific investment in emergency response to disaster.

The findings of the study are in consonance with the opinion of Federal Ministry of Environment Bulletin on Ecological Disasters (2012), that EE and community participation will empower the community with new knowledge and skills to tackle Environmental problems like flooding. The findings of this study also corroborated Akintaro and Moronkola (2017) opinion in their identified goals of EE, as a way of helping individuals develop skills for identifying and solving the problem of environment. The result of this study also confirms Babalola (2000), assertion that, to achieve flood disaster prevention, there is the need to put in place environmental education programmes that will create awareness on the negative impact of day- to-day activities of the populace. The result is in agreement with Onyezere (2017) views, in his own opinion; people are motivated by approaches in which they participate in the solution and not just radio jingles and campaign that is not didactic way of informing people about disaster prevention.

Therefore, impacting knowledge through education is necessary to influence positive change in knowledge, attitude and practices towards flood disaster prevention.

The result of this findings is also in line with Alese (2014) opinion, that training to create ecological awareness is very important to reduce the risk of disaster and he revealed that more than three quarter of the vulnerable communities lack ecological knowledge of disaster prevention, but they only belief in emergency aid from government and nongovernmental organizations. This study further corroborated the report of Rajabfard and Bishop (2018) who reported that attitude changes reported in the posttest are evidence of modifications of attitudes during education training programme. Robinson (2013) reported that effective EE is capable of creating a future society where people are aware of their civic responsibilities and are ready to play useful roles as producers, and conscious of the environmental impact and this will eventually lead to participation in activities leading to resolution of environmental problems like flood disaster.

Similar results were recorded by Lam, Hisenh and Zhan (2013), they submitted that EE not only increases peoples environmental awareness and knowledge of the importance of natural resources, and habitat but shed lights on the way human being have been abusing the environment, as well as of how we should protect it. Amoran (2013) also had similar result; he reported that the self expressed practice of maintaining clean environment of experimental participants increased from 40.4% to 54.5% after the intervention programme, while there were no significant changes in practice of control group participant.

On this note, residents of prone areas in Ibadan metropolis that have acquired adequate knowledge of flood disaster prevention, through the EE training will not only develop positive attitude and good practices towards prevention of flood disaster in their environment, but enlighten other neighbours, family and friends in other places about flood disaster prevention, thus, safety of lives and property that is part of developmental vision of Nigeria will be achieved in due course.

The results of findings revealed significant effect of gender on knowledge of flood disaster prevention, and also established that there was no significant effect of gender on attitude

and practices of flood disaster prevention among residents of flood prone areas in Ibadan metropolis. The finding is in contrast to Sangodare and Aina (2013) findings who found significant gender difference in knowledge and practices of disaster risk reduction in Amuwo Odofin, Lagos state. Meanwhile, further processing of the result revealed that male participants had better knowledge and attitude of flood disaster prevention than their female counterparts, while female had better practices of flood disaster prevention than their male counterparts. The low level of knowledge of female participants can be explained in terms of cultural factors that place men above women and as well as universal devaluation of women in disaster related issues leading to low participation level of women in planning, implementation, monitoring and rehabilitation during flood disasters. However, women's better performance in practices of flood disaster prevention may be due to the important cultural roles of maintaining cleanliness around the house.

Nevertheless, Ojo and Bello (2014) expressed opposite opinion to the result of this findings that women are very knowledgeable about disaster and that they tend to bring unique experiences and valuable skills that will benefit disaster prevention, they emphasized that women are known to be very proactive in flood disaster prevention issues because they understand that the consequences of flood disaster on them, so they really want to make a difference for the future of their children. De Silva and Jayathilaka (2014) submitted that because of norms social control and male dominated family structure in African society, men tend to be more involved in disaster related issues than women, they added that women have limited opportunity to decision making power structures due to patriarchy they are prevented from participating in flood disaster management planning and action. Vladimir, Giulia, Adem, Paolo and Slavoljub (2018) also justified poor disaster knowledge of women, that they are weakly represented in the flood-planning response and overall decision-making processes. Greenberg and Schneider (2005) also reported that men's higher confidence in their proactive behaviors during an emergency, rating their level of self-preparedness as significantly high. They further submitted that the behavior may at least in part be driven by the social role that men usually play within the family context. The findings similarly corroborated Richard and Peterson (2008) submission that women complaint that information did not reach them adequately, thus exposing gaps in

risk communication. They however remarked that, to achieve sustainable development, every individual regardless of gender has the right to be adequately informed of the potential risks and preparedness measures.

Despite the fact that flood disasters, according to Ihaji and Ucho (2014) usually have impact on lives of women all around the world, they are only viewed as victim and helpless group of people in disaster issues. They reported 7154 female as against 2949 male flood victims that registered at Makurdi flood camps in 2012. Nabegu (2014) also, reported 72% female deaths as against 28% male death, he explained further that in addition to female physical weakness, that they might be more exposed to disaster due to their traditional role of carrying out activities around the house. Meanwhile, women are regarded as important agent of change by Ojo and Bello (2014) that needs to be further strengthened as such, they further stressed that recognizing and mobilizing women skills and capacities as social force and channeling it to enhance efforts for their safety and that of their communities is a major task in any disaster prevention strategy.

Furthermore, the outcome of this study established significant moderating effect of flood disaster experience on knowledge and attitude towards flood disaster prevention among the participants, but established no significant effects on flood disaster prevention practices of the participants. Moreover, after further processing of MANCOVA result, it was discovered that participants with personal disaster experience had higher post-test mean score in knowledge, attitude and practices of flood disaster prevention than those with indirect flood disaster experience. The result is in consonance with Yu and Yiwei (2016) result, they reported that direct experience may raise public awareness and prevention; the predictive power of direct experience on disaster consciousness, the result supported the predictive power of direct experience, highlighting the significance of recalling past experience as well as creating indirect experience to raise personal consciousness and motivate appropriate actions and participation. The findings is also in line with Hoffman and Muttarak, (2010) that reported that prior disaster experience is one key driver of disaster preparedness, people take precautionary actions when they have prior disaster experience.

Moreover, experience can motivate preparedness and prevention strategies, experience of personal loss by family member being physically, financially or emotionally injured scared an individual. Some researchers have noted that disaster can influence risk perception (Lindel and Perry (2011): Wachinger (2013). This implies that an increase in perceived vulnerability may motivate people to become more prepared, this may be influenced by people`s affective reactions to future disaster. The outcome of the findings was also supported by Ogundele and Adisa (2015) views, they reported that the experience -preparedness link could be mediated by how disaster experience influences levels of fear or anxiety, thus opined that fear actually shapes cognitions and motivates adaptive responses. They later confirmed that link between fear and preparedness is found in flood experience context, their findings indicated that 67% of people with direct flood disaster experience scored high in preparedness test administered, as against 33% of people with indirect flood experience, this is suggesting that emotional response has a stronger effect on preparedness for flood than cognitive response.

Conversely, Ogunwole and Olayiwola (2015) found that while experience of oil spillage disaster in Niger Delta increased it did not translate into high rates of adjustment and adoption of most mitigation measures . This according to them may be due to level of concern, experience with lower levels or higher levels of concern being less likely to motivate preparedness. An important issue here is whether elevated anxiety is accompanied by information about how to mitigate source of the anxiety and whether people can act on this information, this will be the degree to which they can exercise control or prevention of the disaster. The outcome of the findings is in line with Lindell and Perry (2011) who reported that those who experience disaster damage from the Great East Japan Earthquake in 2011 are relatively more prepared than other people in other areas.

The finding on interaction effect of treatment and gender revealed no significant interaction effect on knowledge and attitude but a significant interaction effect on practices towards flood disaster prevention among residents in the Ibadan metropolis. This implied that interaction effect of environmental education and gender had no significant

contribution to the variation in participant's scores on knowledge and attitude of flood disaster prevention, except on practices. However, female participants that were exposed to environmental education training package are best in flood disaster prevention practices over their male counterparts in the same group, and male and female participants that were not exposed to environmental education package. This finding is in line with Oguniola (2013) who submitted that women's group that participate in disaster management activities and reconstruction efforts after flood disaster acquire significant knowledge and expertise that can greatly benefit communities.

In addition, the result of this study also established significant interaction effect of environmental education and flood disaster experience on knowledge of flood disaster prevention, and also revealed no significant interaction effect of treatment and flood disaster experience on attitude and practices towards flood disaster prevention among residents of Ibadan metropolis. This implied that the interaction effect of treatment and flood disaster experience contributed to the variation in participant's scores on knowledge of flood disaster prevention, while the relationship between environmental education and flood disaster experience had no significant effect on difference in the scores on attitude and practices of the participants towards flood disaster prevention.

Meanwhile, participants with direct flood disaster experience that were exposed to environmental education training package are best in flood disaster prevention knowledge, attitude and practices of flood disaster prevention over other participants in the same group, that had indirect flood disaster experience and participants were not exposed to environmental education package. This is in line with the work of Lindell and Hwang (2008), they reported that people who have been previously exposed to disaster are far more aware than people without flood disaster experience. They further explained that because direct experience is more accessible in memory, direct experience has a greater potential to influence perceived personal risk. Barnett and Breakwell (2001) also corroborated this finding with their reports that individuals whose properties are directly affected by flood are much more likely to accept risky gamble or warnings than their unaffected neighbours.

The findings also revealed that interaction effect of gender and flood disaster experience had no significant interaction effect on knowledge, attitude and practices of flood disaster prevention among residents in the Ibadan metropolis. This showed that interaction effect of gender and flood disaster experience had no significant contribution to the variation in participants' scores in knowledge, attitude and practices of flood disaster prevention. However, male participants with direct flood disaster experience are best in knowledge, attitude and practices of flood disaster prevention over their female counterparts with direct experience, and other male and female participants that had indirect flood disaster experience. It was also deduced from the findings that female participants with direct flood disaster experience had higher mean score in knowledge, attitude and practices of flood disaster prevention than male and female participants with indirect flood disaster experience. This implied that flood disaster experience had higher influence over gender on the participants' knowledge, attitude and practices towards flood disaster prevention in Ibadan metropolis. This finding is in consonance with submission of Akinwale and Oguntunji (2008), they reported that of all the five variables examined as predictors of disaster preparedness, prior disaster experience had the highest score of 40 (49%) as predictor of disaster preparedness..

The findings revealed that interaction effect of environmental education, gender and flood disaster experience had no significant effect on participants' knowledge and attitude and but was significant on practices towards flood disaster prevention. This implies that the interaction effects of treatment, gender and flood disaster experience did not contribute to variation in participant's scores on knowledge and attitude towards flood disaster prevention. Nevertheless, male participants with direct flood disaster experience who were exposed to environmental education had the best performance in knowledge and attitude towards flood disaster prevention, while female participants with direct flood disaster experience who were exposed to environmental education had the best performance in practices towards flood disaster prevention. On the other end, female participants with indirect disaster experience that were not exposed to environmental education had least performance in knowledge, while male participants with indirect flood disaster experience

performed least in attitude. In addition, male participants with indirect flood disaster experience in experimental group had least scores in practices of flood disaster prevention.

This implied that EE was very effective on both male and female participants with personal flood disaster experience. The above finding is in consonance with Federal Democratic Republic of Ethiopia, Ministry of Health (2004), who reported that 80% of environmental disasters are preventable through environmental interventions.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study examined the effects of environmental education on knowledge, attitude and practices of flood disaster prevention among residents in the Ibadan metropolis, Nigeria. The independent variable of environmental education and moderating variables of gender and flood disaster experience were tested in relation to dependent variables of knowledge, attitude and practices towards flood disaster prevention. The study was carried out using quasi experimental research design of pretest posttest control group research design using 2x2x2 factorial matrix. One hundred and twenty (120) participants were selected as sample for the study using multi -stage sampling procedures that involve purposive, simple random, cluster and volunteerism.

The participants were placed into two groups; experimental and control group. Participants in experimental group were exposed to eight weeks, environmental education training programme using the training manual developed by the researcher while the control group was exposed to placebo treatment of nutrition education. Data were collected before (pre-test) and after (post-test) the intervention programmes using self developed questionnaire. Data were analysed using descriptive statistics of frequency counts, simple percentages, bar and pie charts and inferential statistics of Multivariate Analysis of Covariance (MANCOVA) to determine the main and interaction effects of independent variable of EE, dependent variables of knowledge, attitude and practices of flood disaster prevention and moderating variables of gender and flood disaster experience.

The study answered two research questions and tested seven hypotheses at three levels each, making twenty one sub variables. Eight of the sub variables were rejected while the remaining thirteen were not rejected. The result of the study showed that Environmental

education was effective on knowledge, attitude and practices towards flood prevention practices.

5.2 Conclusion

Based on the findings of this study, it was concluded that environmental education was effective in improving the knowledge, attitude and practices of flood disaster prevention among residents in the Ibadan Metropolis, Nigeria. However, it was revealed in the study that there were significant main effects of gender and flood disaster experience on knowledge and attitude of flood disaster prevention. The two way interaction effects of the two moderating variable were not significant on knowledge, attitude and practices of flood disaster prevention. The study also concluded that EE, gender and flood disaster experience had significant three-way interaction effects on practices but none on knowledge and attitude of flood disaster prevention among residents in the Ibadan metropolis, Nigeria. The study however, concluded through the estimated marginal means analysis that, male participants with direct flood disaster experience that were exposed to treatment performed best in knowledge and attitude while female participants with direct flood disaster experience who were exposed to environmental education had positive performance in practices towards flood disaster prevention. On the other end, female participants with indirect flood disaster experience that were not exposed to environmental education had inadequate knowledge, while male participants with indirect flood disaster experience performed least in attitude. In addition, male participants with indirect flood disaster experience in experimental group had least scores in practices of flood disaster prevention.

5.3 Recommendations

Based on the findings of this study and the conclusion drawn thereof, the following recommendations were made:

1. The findings of this study confirms empirical significant effect of EE on knowledge, attitude and practices of flood disaster prevention thus Federal, State ministries and Local government department of environment, health and safety education units, NEMA, SEMA, and other non-governmental organizations are encouraged to utilize EE to educate members of the public, most particularly the vulnerable population to

improve their knowledge, better their attitude and practices towards prevention of flood disaster in Nigeria.

2. Practices examined in this study are self expressed practices, Environmentalists and flood managers, should ensure that the participants put the knowledge acquired during this intervention programme into real practice.
3. Health and safety educators should consider educational activities that are participatory in flood disaster issues in order to present information in a manner that maximizes and encourages feedback from the participants.
4. Genderdynamics in flood disaster context should be of interest to government, non-governmental, and international organizations and researchers, not only at policy levels, so that both genders will be adequately equipped with needed knowledge and skills, thus perform effectively their role in disaster prevention, since both sexes are vulnerable to flood disaster.
5. Prior experience aspect of the learners' life should always be considered as it may positively affect the learning outcomes.

5.4 Contributions to Knowledge

The study confirmed the effectiveness of environmental education in bringing about improvement on knowledge, attitude and practices of flood disaster prevention in the Ibadan metropolis, Nigeria.

1. The study established that environmental education was effective in bringing about improvement in knowledge, attitude and practices of residents in the Ibadan metropolis towards flood disaster prevention in Ibadan.
2. It was established that residents of Ibadan metropolis had poor knowledge and bad practices of flood disaster prevention.
3. The study identified gender imbalance in flood disaster prevention knowledge, attitude and practices.
4. The study established that learning of flood disaster prevention is associated with understanding gained through prior experience of flood disaster.

5.5 Suggestion for Further studies

This study was carried out on flood disaster prevention among residents of flood prone areas in Ibadan metropolis

1. Further studies could be conducted in other flood prone cities of the country.
2. This study could be replicated among secondary school students, so as to catch them young and instill principle of flood disaster prevention on them.
3. The study could also be replicated using another environmental disaster like inferno.

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APPENDIX 1

DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION

FACULTY OF EDUCATION

UNIVERSITY OF IBADAN, IBADAN

QUESTIONNAIRE ON EFFECTS OF ENVIRONMENTAL EDUCATION ON KNOWLEDGE,
ATTITUDE AND PRACTICES OF FLOOD DISASTER PREVENTION AMONG RESIDENTS IN
THE IBADAN METROPOLIS, NIGERIA

Dear Participants,

This questionnaire is designed to collect data on knowledge, attitude and practices towards flood disaster prevention in the Ibadan Metropolis, Nigeria. Kindly answer all items sincerely, as they are entirely for research purposes. You will benefit greatly from the exercise and be assured that your responses will be treated with utmost confidentiality. Thank you, for participating.

Yours sincerely,

Hamzat, Kafilat Adefunke

SECTION A

Socio-Demographic Characteristics

Instruction: Please answer the questions below honestly, put a tick inside the box in front of any of the options or fill as it applies to you

1. Religion: (a) Christianity (b) Islam (c) Traditional
2. Educational level (highest): (a) No formal education (b) Primary school (c) Secondary school (d) Tertiary education
3. Marital status: (a) Single (b) Married (c) Divorced (d) Widow/Widower
4. Gender: (a) Male (b) Female
5. Flood disaster you ever experienced is: (a) Personal (b) Indirect

SECTION B: KNOWLEDGE OF FLOOD DISASTER PREVENTION SCALE (KFDPS)

Instruction: Please tick column of the option that best suits your opinion. Only one response is valid.

SN	ITEM	True	False	I don't know
6	Flood disaster occurs when flooding leads to destruction of lives and properties			
7	Flood will not lead to flood disaster if human being stay away from flood plain			
8	Flood disaster is not preventable			
9	Allowing rivers to flow naturally can prevent flood disasters			
10	Clearing of gutters or drainages regularly can prevent flood disaster			
11	Building on a flood plain (area that is close to a river) can cause flood disaster			
12	It is necessary to consider flood plain topography before erecting structure			
13	It is better to prevent flood because no amount of sympathy and relief can make up for the pain, grief and the losses suffered			
14	Channelization of rivers can prevent flood disaster			
15	Maintaining stream/river set-back during building construction prevents flood disaster			
16	Flood disasters needs to be prevented because it causes damage to public infrastructure like road, culvert and bridges.			
17	Water borne diseases outbreak can occur in a community that fails to prevent flood disaster			
18	Flood disasters can affect economy of the country if not prevented			
19	Flood forecasting and warning is a prerequisite for successful flood disaster prevention			
20	Strictly obeying physical planning and building regulations goes a long way in preventing flood disaster			
21	Strictly obeying environmental laws can prevent flood disaster			
22	Removal or demolition of structures obstructing drainage can prevent flood disaster			
23	Improved vegetation can prevent flood disaster			

SECTION C: ATTITUDE TOWARDS FLOOD DISASTER PREVENTION

SCALE (ATFDPS)

Instruction: Please tick () the exact column which corresponds with your attitude. Only one response is required for each statement.

Keys: SA= Strongly Agree, A= Agree, D= Disagree, and SD= Strongly Disagree

SN	ITEM	SA	A	D	SD
24	It is only God that can prevent flood disasters				
25	I can dump refuse in river channels for water to carry it away				
26	Flood cannot occur because of throwing refuse in drainage				
27	It is okay to wrap faeces in polythene and throw into the stream				
28	I cannot vacate my building because of flood rather continue to pray to God and manage				
29	Maintaining river set back is a waste of land				
30	I cannot be spending money for waste disposal, it is the government's responsibility				
31	I support worshiping of river goddess or praying to God for flood control				
32	I disregard flood forecasting since forecasters are not God				
33	Flood control jingles on radio and TV are of no value to me				
34	Land is scarce and expensive this days so I can buy land that is close to the stream				
35	I support concreting the remaining floor in house yards				
36	Flood disaster is punishment from the gods				
37	Adhering to set back during construction doesn't have any effect on the occurrence of flood disaster				

SECTION D: PRACTICES OF FLOOD DISASTER PREVENTION SCALE

Instruction: Please tick () the exact column which corresponds with your practices. Only one response is required for each statement.

Keys: OF= Often (Always do it whenever the need arises)

OC=Occasionally (Common, but not all the time the need arises)

RA=Rarely (Only once in a while)

NR= Never (Not at all)

SN	ITEM	OF	OC	RA	NR
38	I clear the gutter or drain of debris				
39	I allow run off to move freely in the drain when it is raining by not throwing refuse into it				
40	I encourage planting of trees and shrubs in my surrounding				
41	I throw satchet or bottle of water in the waste bin				
42	I pay for the service of refuse contractor for the refuse generated in my house or industry				
43	I encourage free flow of water in natural and artificial water ways by not blocking it				
44	I encourage soil percolation of run-off water in my compound				
45	I discourage wrapping of feaces in polythene and dropping it in a nearby stream				
46	I stay away from river flood plains for any construction				
47	I do participate in weekly and monthly environmental sanitation				
48	I provide toilet facilities for use in my house				
49	I provide refuse drum for storing of refuse in my house				

APPENDIX 11

EKA IMO EKO KAINETIHIKI ATI EKO AJEMOLERA, YUNIFASITI IBADAN, IBADAN,
NAIJIRIA

Ìwádíí Ìjìnlẹ̀ Lóri Ipa Tí Èkó ọ̀rọ̀ Ìmójútó Àyíká Nkó Lara Ìmọ̀, Ihùwàsí Àti Ìse Àwọ̀n Olùgbé Ilú
Ìbàdàn, Nípa ọ̀rọ̀ Tó Dá Lóri Idena (Ìkápá) Omíyalé.

Arákùnrin/Arábirin,

Àwọ̀n àkójopò ibèèrè wọ̀nyí wà fún láti mọ̀ ise., isesí pelu imò àti ọ̀ye tí ẹ̀ ní lóri ikápá/àmójútó
isẹ̀lẹ̀ omíyalé nílúú Ìbàdàn,ni orile ede Naijiria.

Àwọ̀n ibèèrè ọ̀un wá fún isẹ̀ iwádíí, yó dára púpọ̀ tí ẹ̀ bá lé dáhùn wọ̀n bó se ye àti pelú otítító inú
nítòrí ànfàní ni yó padà jẹ̀ fún yín.

Àfín dá yin lójú pé ààbò tó ye wà fún àwọ̀n èsì tí ẹ̀ bá fún wa.Èsẹ̀ púpọ̀.

Tiyin tooto,

Hamzat, Kafilat Adefunke.

A. Ẹ JẸ KÁ MỌYÍN.

Àkíyèsí:- Ẹ jọwọ̀ ẹ̀ dáhùn àwọ̀n ibèèrè wọ̀nyí nípa fifa igi oníkòkòrò sínú àpótí tó bá èsì yín mu nínú àwọ̀n tí
a ti pèsè.

1. Èsìn: Kristiẹ̀ni Mùsùlùmí Ìbílẹ̀
2. Ìwé èrì tí ẹ̀ ní: Nkó lo rárá Alákòbèrè Girama ilé èkó Òmíràn(dárúko
rẹ̀).....
3. Ipò ìgbéyàwó: Àpón Lábé Ìgbéyàwó kíkọ ara tọkọtaya lábé ikòsílẹ̀
4. Èyà ọ̀kùnrin tàbí obìrin: Ọ̀kùnrin Obìrin
5. Ìrírí nípa isẹ̀lẹ̀ èkún omi: Fúnra mi Aladugbo/Òrẹ̀/Ará

B. ÌMỌ WA LÓRÍ DIDENA ÌSÈLÈ OMÍYALÉ.

Àkíyèsí: Jọwọ fa ilà sáábẹ̀ Bẹ̀ni, Bẹ̀kọ̀ tabi Emi ko moo, gégẹ̀bí ó bá se ba Idáhùn re mu. Ìdáhùn kan fún ibéèrè kan ló wúlò.

ÒÒKÀ	GBÓLÓHÙN	Beeni	Beeko	Emi ko mo
6	Èkún omi má n selẹ̀ tí omi bá pọ̀jù tí ó sì sà̀n kojá ojú odò lati gba emi ati ba dukia je			
7	Èkún omi kò ní fa isẹ̀lẹ̀ omíyalé tí a kòbá kọ̀ ilé sí ojúsàn			
8	Ìsẹ̀lẹ̀ omíyalé jẹ̀ nkan tí a lè dè̀nà			
9	Fífí àyẹ̀ gba odò láti sà̀n lójúsàn rẹ̀ káwọ̀ isẹ̀lẹ̀ omíyalé			
10	A lè dè̀nà isẹ̀lẹ̀ omíyalé nípa yíyọ̀ gbogbo nkan tódí gótà kúrò lóòrèkòòrè			
11	Kíkọ̀ ilé sójúsàn odò lè fa isẹ̀lẹ̀ omíyalé			
12	Nígbà tí a bá n wá ilẹ̀ fún ilé kíkọ̀, óse pà̀táki láti se àgbéyẹ̀wò èkún omi kí á tó bẹ̀rẹ̀ isẹ̀			
13	Ó sà̀n láti dè̀nà isẹ̀lẹ̀ omíyalé nítorí pé kòsì iye irànlọ̀wọ̀ tabi ibáníkẹ̀dùn tó lè dípò irora àti òfò tó rọ̀mọ̀			
14	Fífẹ̀ ojú odò lójú kí ó lè fà̀ayẹ̀ gba ọ̀pọ̀ omi láti sà̀n lọ, lè dè̀nà isẹ̀lẹ̀ omíyalé.			
15	Fífí àyẹ̀ tófin sà̀n sílẹ̀ láti bẹ̀bẹ̀ odò sára ilé tí à nkọ̀ ndè̀nà isẹ̀lẹ̀ omíyalé			
16	Ó yẹ̀ kí á dè̀nà isẹ̀lẹ̀ omíyalé torí ó má n ba nkan amáyé̀dẹ̀rùn jẹ̀			
17	Ajakale arun ti a nko latara mimu omi onikokoro aisan le waye ni adugbo ti omiyale ba ti sele			
18	Omíyalé lè dí ọ̀rọ̀ ajé lówọ̀ tí a kòbá dè̀nà rẹ̀			
19	Àsotẹ̀lẹ̀ àti ikilọ̀ lóri èkún omi jẹ̀ ohun àmúyẹ̀ kan tó lè dè̀nà isẹ̀lẹ̀ omíyalé			
20	Bíbọ̀wọ̀ fún ọ̀fin ààtò ilú àti ti ilé kíkọ̀ náà jẹ̀ ọ̀nà pà̀táki tí a le fi dè̀nà isẹ̀lẹ̀ omíyalé			
21	Bíbọ̀wọ̀ fún ọ̀fin ilú , èyítí ó rọ̀mọ̀ ìmọ̀tótó àyíká jẹ̀ ọ̀nà kan gbòògì tí a le fi dè̀nà isẹ̀lẹ̀ omíyalé			
22	Wíwọ̀ ilé tí ó dè̀nà ojúsàn odò yó dẹ̀kùn isẹ̀lẹ̀ omíyalé			
23	Ọ̀kan lára ọ̀nà tó lágbara láti dè̀nà isẹ̀lẹ̀ omíyalé dá lóri kí ewéko ìgbé gberu si			

D IHUWASI WA SI DIDENA ÌSÈLÈ OMÍYALÉ

Itona: Jowo fa ila sabe eyi to wa ni ibamu pelu ihuwasi ati oju ti o fi wo awon nkan wonyii. Idahun kan fun ibeere kan la fe.

OÒKÀ	GBÓLÓHÙN	MO FARAMO EYI PUPO	MO FARAMOO	MO LODI SII	MO LODI SI EYI PUPO
24	Olórun nikan ló lè dèná ìsèlè omíyalé				
25	Mole dale sinu odo to nsan ki omi gbelo				
26	Nko gbagbo pe ile dida sojuna omi ti a la le fa omiyale				
27	Kò sí n tó burú nínú pípón ìgbònsẹ̀ lóràá, kín sì jùú sínú odò, kómi gbelo				
28	Nko le fi ile mi sile nitori omiyale, kaka bee, maa kun fun adura pelu ifarada				
29	Fifi ile sofo ni ki eeyan fi aaye ti o to sile sara odo nigbati a ba nkole je				
30	Ojuse ijoba ni lati gba agbasise ti yo ma bami pale idoti ati egbin mo, kiise temi				
31	Mo fowo si ki a be orisa odo tabi ki agbadura si olorun lati dena isele omiyale				
32	Nko kobi ara si asotele lori omiyale niwonba igba to je pe awon to nso kii se olorun				
33	Emi kii teti si ipolongo omiyale lori ero mohun-maworan tabi ti rediyo nitori pe won oni itumo si mi				
34	Mo le ra ile to sunmo odo nitori pe lode toni, ile sowon, o si won lowo				
35	Mo faramo ki a kan-n-kere ile to seku lagbala wa				
36	Ìsèlè láabi omíyalé jẹ̀ ìjìyà láti ọwọ̀ àwọn òsà odò				
37	Fífi àyè sílẹ̀ bẹ̀bẹ̀ odò sára ilé kò dí ìsèlẹ̀ omíyalé lówó láti mọ̀ selẹ̀				

D: ÀWỌN ISÉ ENIYAN TI Ó RỌ MỌ DIDENA ISELE OMÍYALÉ

Itona: Jowo fa ila si eyiti o jo mo ise re ninu awon nkan wonyi. Idahun kan pere la fe lori ibeere kookan.

ÒÒKÀ	GBÓLÓHÙN	MO MA NSE NI GBOG BO IGBA	MO MA NSE LEEK OOK AN	KO WOPO KI NSE	MI O SEE RI RARA
38	Èmí kí kó innkàn kan sí ojúsàn odò Mo mán yọ idòtí àti oun tó lè dèná omi ní ojú gótà àti ojúsàn odò				
39	Èmi kí da ilẹ sójú gótà tàbí sí ojúsàn odò tí òjò bá nrọ				
40	Mo fara mọ gbígbìn igi sí àyíká mi				
41	Mo mán sọ ike tàbí ọrà omi tí mo mu sínú gótà				
42	Mo mán gba àwọn onísé kólèkódòtí láti bámi kó idòtí àti ègbìn mọ nílẹ àti níbi isé				
43	Èmi kí dèná ojúsàn omi				
44	Mo gba omi òjò láàyè láti máa wọ ilẹ nínú àyíká mi				
45	Mo mán gba awon eniyan niyanju lati ma pọn igbònsẹ lóràá, lo jùú sínú odò kómi gbéelọ				
46	Èmí kí kó innkàn kan sí ojúsàn odò				
47	Emi kii ko pa ninu eeto kolekodoti olosose ati olosoosu				
48	Mo se ètò ilé igbònsẹ igbàlódé sínú ilé mi				
49	Mo ní goro idalẹnú nínú ilẹ mi tí à nkó ilẹ sí				

APPENDIX III

ENVIRONMENTAL EDUCATION TRAINING MANUAL

INTRODUCTION: The content of the manual, designed and used for experimental groups include, what flood disaster is, causes of flood disaster, some misconceptions about flood disaster, effects of flood disaster on individuals, community and the nation at large, flood disaster prevention, flood disaster risk reduction, how to reduce vulnerability through attitudinal change and best environmental practice to prevent flood disaster. The following steps were followed for treatment procedure for participants in experimental group.

PRE_ INTERACTIVE SESSION

Objectives:

- To ensure hitch-free programme appropriate consent and supports from the participants and research assistants.
- To receive input from significant persons in selected flood prone areas such as landlord and landlady association executives.
- To provide well informed research assistants.

Activities:

Step 1: Visited the selected areas to intimate the landlord and landlady association executives of the programme (participants, Schedule, supports, benefits etc) as well as their approval and support for the programme.

Step 2: Met with the research assistants to tutor them on what was expected of them and specific roles to play.

Step 3: Got venue, equipment and facilities ready.

Step 4: Informed the landlord association executives and research assistants of venue, schedules.

INTERACTIVE SESSIONS

Session 1

Topic: General Orientation and Administration of questionnaire (Pre test)

Objectives:

- To state the purpose of the meeting
- To familiarize the researcher, research assistants with the participants, and explain procedures
- To administer pretest questionnaire so as to get the participants entry behaviour

Activities:

Step 1: The researcher made participants comfortable, welcomed them, reassured them, expressed gratitude for their presence and called for the opening prayer from one of the participants.

Step 2: The researcher introduced guests, herself and the research assistants, the participants introduce themselves.

Step 3: The researcher stated in clear terms the purpose, objectives and importance of the programme seek for the participants cooperation

Step 4: Day, duration, number of contacts, time, hour of each contact and other relevant information were discussed with the participants

Step 5: The researcher and research assistants administered the questionnaire (pretest), same were collected by the researcher with the help of research assistants after completion.

Closing Remarks:

1. The researcher expressed appreciation for the activities of the day.
2. The participants were reminded of the time and venue for the next session
3. The participants were served with refreshment at the end of the session.

Session 2

Topic: Concept of flood disaster.

Objectives:

At the end of this interactive session, participants were able to;

- Define of flood disaster.
- List the causes of flood disaster.
- State some misconceptions and myths about flood disaster.
- State some vulnerable factors of flood disaster.

Activities:

Step 1: The researcher made participants comfortably seated, warmly welcomed and appreciated them for their presence.

Step 2: The researcher introduced the topic of discussion for the day.

Step 3: The researcher painstakingly explained the content in most simple form.

Content: Concept of flood disaster

Flood means overflow of runoff water from river or other body of water or sewers, due to excessive rainfall or other inputs. Flood disaster arises when flooding is of substantial magnitude of causing significant physical damage or destruction of life and properties or sometimes permanent damage to the natural environment and infrastructures like road and culverts. So it is possible that flooding do not result to flood disaster, if people stay away from flood plain that is always flooded during rainy season. This implies that flood disaster is preventable. Attitude of preventing development from occurring in flood prone lands is essential in prevention of flood disasters. It has to be stated that many human activities are responsible for flood disaster and not nature, nature in form of heavy or torrential rains / rainstorm oceans storms and tidal waves that causes flood hazard could also be traced to climate change caused by urbanization.

Causes of flood disaster

- Building on flood plains is one of the human activities causing flood disaster, covering large parts of the ground with roofs, concrete and pavements will reduce infiltration, obstructing sections of natural channels with building, shops or any structure. So, whether during dry or rainy

season it is pertinent to find out the topography of land to be bought, before erecting structure on it

- Some people are fond of dumping waste anyhow mostly during the night or pre-dawn, usually at soft spots such as road medians, uninhabited areas, uncompleted buildings, river culverts, this insanitary attitude can hinder freeflow of water downstream and make river overflow their banks to cause flood disaster.
- Deforestation activities, if vegetation is removed and erosion increased, much more soil can be washed into streams. There it can fill in or “silt up” the channel, decreasing the channel’s volume and thus reducing the streams capacity to carry water away quickly especially after heavy rainfall. It has to be stated clearly that flood is neither caused by water spirit nor caused by the wrath of God. So the sayings that flood disaster occur when we refuse to worship Yemoja should be discouraged, whoever that disallows water to move through its normal course will always be a flood victim or expose someone or the whole community to impact of flooding.

Most flood disasters result from human-created vulnerability which is an outcome of our interaction with the environment by some human activities such as designing and location of our infrastructure, exploiting natural resources and so on. There can only be flood disaster when flood hazard and vulnerability meets at a point so flood disaster is preventable.

Step 4: The researcher made the presentations as realistic as possible by avoiding technical terms.

Step 5: The researcher allowed the participants to do some talking as briefly as possible where necessary.

Step 6: The researcher entertained questions and provided answers.

Step 7: The researcher reiterated the salient points in the topic again.

Step 8: Asked questions to evaluate the topic and make corrections where necessary

Closing Remarks

- The researcher expressed appreciation to the participants for their time

- The researcher enjoined them to attend and be punctual in the following week.
- The researcher served the participants refreshments at the end of the session.

Session 3

Topic: Flood disaster prevention

Objectives:

At the end of this session, participants were able to:

- Define flood disaster prevention
- List roles and responsibilities of the community in flood disaster prevention

Activities:

Step 1: The researcher made participants comfortably seated, warmly welcomed them.

Step 2: The facilitator briefly revised the previous topic.

Step 3: The researcher introduced the topic of discussion for the day.

Content: Explain the meaning of flood disaster prevention as all measures taken to keep or prevent flooding from becoming a disaster at all. Flood disaster is really preventable; correct the impression that flood disaster is just a natural phenomenon that is inevitable. Emphasized that it is better to prevent flood because no amount of sympathy and relief can make up for the pain, grief and the losses suffer from flood disaster Discuss some preventive measures of flood disaster such as make room for rivers to flow naturally, avoid building of houses, shop on flood plains, don't remove plants or trees unnecessarily, afforestations, stop dumping refuse on the drainages and illegal places, always clean gutters or drains and encourage others to do the same, improve infiltration in houses, participate in weekly and monthly environmental sanitation, listen to and always have trust in flood forecasting and warning to prepare yourself and prevent flood disaster. Though, weather forecasters are not God, but they have been trained to scientifically use some technologies in studying and predicting weather at various period of time. Their predictions are scientifically based and have proven to be correct often, so, they need to be trusted to prevent flood disasters. Lastly, we need to be friendly with the environment, because environment will always respond to abuses heaped on it. Some attitudinal change is required from members of the public to prevent flood disaster, such as attributing flood disaster to river goddess or punishment from God, and that it is God that has to be prayed

to, for its prevention, instead of focusing and correcting the insanitary attitude of poor waste management, encroaching flood plain and river set back. Attitude of not trusting in flood control jingles, flood warning codes also need need to be discouraged. It is highly imperative to state here that, it is better, safer and cheaper to prevent flood disaster than being a victim of flood that can cause loss of lives and properties.

Step 5: The researcher entertained questions and provided answers.

Step 6: The researcher reiterated the salient points in the topic.

Step 7:The researcher asked questions to evaluate the topic and made corrections where necessary

Closing remark

- The researcher expressed appreciation to the participants.
- The participants were reminded of the time of the next session
- The researcher served them with refreshments at the end of the session.

Session 4

Topic: Flood Disaster Risk Reduction (FDRR)

Objectives:

At the end of this session, participants were able:

- Define flood disaster risk reduction (FDRR)
- State how FDRR can be achieved through strict compliance with physical planning and environmental laws.
- State some related physical planning regulations and environmental laws.

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3:The researcher introduced the topic of discussion for the day.

Content: Flood disaster risk reduction is the systematic development and application of policies, strategies and practices to minimize vulnerabilities and flood disaster risk throughout a society, to avoid or limit adverse impacts of flood hazards,within a broader context to sustainable development Some people take unnecessary risk by building on

flood plain, this can create everlasting problem for the person and avoidable sufferings for community. Flood disaster risk reduction can be achieved through strict compliance with physical planning and Environmental Sanitation regulations

There are environment - related laws that are important in reducing flood risk; these are physical planning and environmental sanitation laws. Below are the provisions of relevant sections of the laws;

Environmental Sanitation Law / Waste Control: National Environmental Health Practices Regulations 2007, Section 12 subsection (1) stipulated that no person shall dispose of any waste whether solid or liquid in an unauthorized place including street, bush, body of water, land etc. except as approved by the Environmental Health Authority responsible for the area. Section 4 subsection (1) of Oyo state Environmental (Sanitation and Wastes Control) Regulations 2013, also stated that no person shall discard, throw or drop any litter or any similar refuse anywhere except in designated litter bins. Section 15 further stipulated that generators of waste, owners or occupiers of premises where waste are generated shall be legally and financially responsible for the safe and environmentally sound disposal of their waste. So the era of the sayings that “we can not use our money to buy cold pap wrapped with leaves and still use money to dispose its wrappers” is gone. Waste generators need to be responsible for collection, storage, transportation and final disposal of the liquid and solid waste sanitarily. Each household need to provide and use household refuse drum for collection of refuse and engage the service of private refuse contractor for disposal of refuse. There also, should be provision for sanitary latrine accommodation for the occupants, so that the attitude of wrapping human feaces in polythene bags and dump indiscriminately which often block drainage channels and cause flood disaster is discouraged

Physical planning Law: Section 4 subsection (4) of Oyo states Environmental (Sanitation and Wastes Control) Regulations 2013 state that no person shall build kiosk or shop on road median, drainages or road set backs.

Approved setbacks for major rivers in the Ibadan metropolitan area

No	River Name	Setback (m)
1	Odo-Ona Elewe	15
2	Adamo	15
3	Alalubosa	15
4	Sango	15
5	Oluyole	15.5
6	Kudeti	30.5
7	Orogun	30.5
8	Onire	30.5
9	Gbaremu	30.5
10	Alaro	30.5
11	Ogbere	30.5
12	Gege	30.5
13	Ogunpa	45
14	Odo-Ona	45
15	Ona-Ara	45.7
16	Others	15

Step 4: The researcher entertained questions and provided answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: The researcher asked questions to evaluate the topic taught and made corrections where necessary

Closing Remark

- The researcher expressed appreciation to the participants.
- The researcher enjoined them to attend and be punctual in the following week.
- The researcher closed the session with refreshments served to the participants

Session 5

Topic: Social, Economic and Environmental cost of flood disaster

Objectives:

At the end of this session, participants were able to:

- Highlights some social, economic and environmental cost of FDs.
- State how FD prevention can avert social cost of FD on individual, community and the nation.
- Identify economic sufferings FDs could bring if not prevented.
- State the environmental cost of FDs on the community and the nation.

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Content: Social, Economic and Environmental cost of flood disaster

The justification for the prevention of FD bothers on its social, economic and environmental cost of the disaster on individuals, community and the nation at large.

Cost on individuals: Flood disaster causes loss of lives when people are swept away or drowned, can inflict injuries to victim that only 15cms of fast-flowing water is needed to knock man off his feet and fall to drown. Also, houses can be swept off or badly damaged, displaces flood victim. Flood water can destroy personal properties like clothing, electronics, furniture etc.

Cost on the community: Social and Economic cost of FD can be destruction of road, bridges, destruction of business activities etc. It can severely disrupt public and personal transport when the road is cut off. Flood can also disrupt electricity supply, communication links when telephone lines are damaged. Sources of water can be flooded with feaces thus contaminate water and lead to the spread of water borne diseases in the community. Soil can be eroded by large amounts of fast flowing water, ruining crops, destroying agricultural land during flood disaster thus cause famine, and wildlife is also at risk during flood disaster. Floodwater can severely disrupt public and personal transport when the road is cut off. Vehicles can be badly damaged during flood.

Cost on the economy of the nation: Rehabilitation cost of flood victims affect the economy of a nation: the funds allocated to flood response and reconstruction, such as procurement of relief materials, evacuation of flood victims, rehabilitation of damaged bridges, road can be used for other developmental projects and create job opportunities for our youth.

Step 4: Entertained questions and provided answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: Asked questions to evaluate the topic and made corrections where necessary

Closing Remarks

- The researcher expressed appreciation to the participants.
- The researcher enjoined them to attend and be punctual in the following week.
- The researcher with the help of research assistants served refreshments to the participants to close the session.

Session 6

Topic: Promotion of positive attitude towards FD prevention

Objectives:

At the end of this session, participants were able to

- State attitudes that could enhance FD prevention
- Explain how vulnerability to FD can be prevented through attitudinal change
- Highlights the advantages of flood disaster prevention over flood disaster relief.

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Content: Most flood disasters result from human-created vulnerability which is an outcome of our interaction with the environment by some human activities such as designing and location of our infrastructure, exploiting natural resources and so on. There

can only be flood disaster when flood hazard and vulnerability meets at a point so flood disaster is preventable.

Attitude of preventing development from occurring in flood prone lands is essential in prevention of flood disasters. It has to be stated that many human activities are responsible for flood disaster and not nature, nature in form of heavy or torrential rains / rainstorm oceans storms and tidal waves that causes flood hazard could also be traced to climate change caused by urbanization.

Step 4: Entertained questions and provide answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: Asked questions to evaluate the topic and corrected where necessary

Closing Remarks

- The researcher expressed appreciation to the participants.
- The researcher enjoined them to attend and be punctual in the following week.
- The researcher served refreshments to the participants to close the session

Session 7

Topic: Flood prevention practices

Objectives:

At the end of this session, participants were able to:

- State environmental practices that contribute to flood disaster,
- Itemize flood disaster prevention practices that need to be encouraged
- Establish the need to discourage those practices to prevent flood disaster.
- Explain why we need to be friendly with our environment

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Content: Knowledge they say is necessary but not enough for behavior change, even if people are well informed, some forms of commitment is required to put the information into practice/action. The at-risk practices that causes flood includes: encroachment into the

river flood plain such as construction of structure within a flood plain, blockade of natural flood plain with container or any other structure, build with shallow foundations or weak resistance to lateral loads, throw sachet or bottle of water in the drain, dump or send someone to dump solid wastes inside the stream/ river or by road side, Discuss extensively on the contributions of all these at-risk practices to flood disaster, thus discourage all these practices to prevent flood disaster

Also, some practices that can be encouraged to prevent flood disasters are:

- Prevent new building or building extensions of either temporary or permanent nature in river set backs. Churches, mosque and other worshipping centre that usually use “we are serving Almighty” attitude to locate worship centre in river beds and setbacks need to be discouraged.
- Planting trees and ornamental plants to reduce rate of runoff.
- Encourage infiltration and increase water retention capacity in flood prone areas such as unconcreting the unbuilt area.
- Sanitary waste management by provision and make proper use of household refuse drum, also, to compliment government efforts on waste management, the service of private refuse contractors need to be sought in households, markets and companies. It has to be emphasized that waste collection charges are not exorbitant and affordable, compare to cost of damages and loss of life from flood disasters. Bearing in mind that the era of this sayings that “we can not spend our money to buy maize meal and still spend our money to dispose the leaves” is over, if we really wish to be delivered from perennial flood disasters.
- Every household must have functioning toilets, adequate and convenient for the occupants, attitude of wrapping human faeces with polythene bags and dump in drainages, stream or road sides should be discouraged.
- Clearing of drainages and culvert of debris always to allow free flow of runoff, individuals can also construct gutter in front of their houses if need arise.
- Participation in weekly and monthly environmental sanitation exercises is important and will go a long way in keeping the environment tidy and free of debris that always block waterways.

Step 4: The researcher entertained questions and provided answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: The researcher asked questions to evaluate the topic taught and made corrections where necessary

Closing Remark

- The researcher expressed appreciation to the participants.
- The researcher closed the session with refreshments served to the participants

Session 8

Topic: Administration of questionnaire (Post-test)

Objectives:

At the end of this session, participants were able:

- i. Summarize all they have learnt from the programme since inception.
- ii. Respond to the post-test materials.

Activities:

Step 1:The facilitator made the participants comfortably seated, warmly welcomed and appreciates them for their presence.

Step 2:The researcher briefly revised the previous topics so far.

Step 3:The researcher painstakingly clarified gray areas.

Step 4:Entertained questions or comments and provide answers.

Step 5:The researcher asked questions to evaluate the topics and made corrections where incorrect answers were provided.

Step 6:The researcher and research assistants administered the questionnaire (post-test).

Step 7: The researcher with the help of research assistant collected the completed questionnaire on the spot

Closing Remarks

- The researcher commended the participants and the research assistants for their time, efforts and cooperation during the programme
- The researcher enjoined the participants to make use of all they have learnt positively to improve their environment and train other neighbours so that, together we work to achieve safe environment.
- The researcher with the help of research assistants served refreshments at the end of the programme

APPENDIX IV

NUTRITION EDUCATION TRAINING MANUAL

INTRODUCTION: The content of this placebo designed and used for control group includes, what the term nutrition means, classes of food nutrients, sources of food nutrients and their importance in the body, concept of adequate diet for different categories of people such as elderly, children, pregnant women, nursing mothers, people living with some ailments such as hypertension, diabetes, also nutritional disorders are inclusive. The following steps were followed for its administration to participants in control group.

PRE_ INTERACTIVE SESSION

Objectives:

- To ensure hitch-free programme appropriate consent and supports from the participants and research assistants.
- To receive input from significant persons in selected flood prone areas such as landlord and landlady association executives.
- To provide well informed research assistants.

Activities:

Step 1: Visited the selected areas to intimate the landlord and landlady association executives of the programme. (participants, Schedule, supports, benefits etc) as well as their approval and support for the programme.

Step 2: Met with the research assistants to tutor them on what was expected of them and specific roles to play.

Step 3: Got venue, equipment and facilities ready.

Step 4: Informed the landlord association executives and research assistants of venue, schedules.

INTERACTIVE SESSIONS

Session 1

Topic:General Orientation and Administration of questionnaire (Pre test)

Objectives:

- i. To state the purpose of the meeting
- ii. To familiarize the researcher, research assistants with the participants, and explain procedures
- iii. To administer pretest questionnaire so as to get the participants entry behaviour

Activities:

Step 1: The researcher made participants comfortable, welcomed them, reassured them, expressed gratitude for their presence and called for the opening prayer from one of the participants.

Step 2: The researcher introduced guests, herself and the research assistants, the participants introduce themselves.

Step 3: The researcher stated in clear terms the purpose, objectives and importance of the programme seek for the participants cooperation

Step 4: Day, duration, number of contacts, time, hour of each contact and other relevant information were discussed with the participants

Step 5;The researcher and research assistants administered the questionnaire (pretest), same were collected by the researcher with the help of research assistants after completion.

Closing Remarks:

1. The researcher expressed appreciation for the activities of the day.
2. The participants were reminded of the time and venue for the next session
3. The participants were served with refreshment at the end of the session.

Session 2

Topic: Nutrition and classes of food nutrient.

Objectives:

At the end of this interactive session, participants were able to:

- Define Nutrition
- State the six classes and functions of food nutrients

Activities:

Step 1: The researcher made participants comfortably seated, warmly welcomed and appreciates them for their presence.

Step 2: The researcher introduced the topic of discussion for the day.

Step 3: The researcher painstakingly explained the content in most simple form.

Content: Nutrition is the process of absorbing nutrients from food and processing them for body to grow and keep healthy. It also deals with interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism. Nutrition includes food intakes, absorption, assimilation, catabolism and excretion.

Classification of nutrient: Nutrients are classified as macro and micro nutrients. Macro nutrients are needed in large amount; these include carbohydrates, fats, protein, and water. Micro nutrients are needed in small quantities, these include minerals and vitamins. This implies that nutrients are majorly classified into six classes, carbohydrates, fats, protein, water, minerals and vitamins, all these essential nutrients need to be provided by the diet for proper functioning of the body.

Step 4: The researcher made the presentations as realistic as possible by avoiding technical terms.

Step 5: The researcher allowed the participants to do some talking as briefly as possible where necessary.

Step 6: The researcher entertained question and provide answers.

Step 7: The researcher reiterated the salient points in the topic again.

Step 8: Asked questions to evaluate the topic and make corrections where necessary

Closing Remarks

- The researcher expressed appreciation to the participants for their time
- The researcher enjoined them to attend and be punctual next week.
- The researcher served the participants refreshments at the end of the session.

Session 3

Topic: Adequate diet and its importance in the body

Objectives:

At the end of this session, participants were able to:

- Explain adequate diet for different categories of people(elderly, children, expectant and nursing mothers)
- Mention importance of adequate diet in the body

Activities:

Step 1: The researcher made participants comfortably seated, warmly welcomed them.

Step 2: The facilitator briefly revised the previous topic.

Step 3: The researcher introduced the topic of discussion for the day.

Content: Adequate diet includes sufficient energy for a person's needs, through the energy in the diet, which may be in any form. For example it can be in form of carbohydrate, protein, fat and so on. Adequate diet does not only include sufficient energy for the person's needs, but the person's entire dietary requirement in the correct proportion. In other words, an adequate diet is food intakes that include all of the dietary needs of the organism in the correct proportion.

Importance of adequate diet in the body;

1. It provides the body with essential nutrients
2. It promotes growth
3. It helps the organs of the body to function well

Step 4: The researcher entertained questions and provided answers.

Step 5: The researcher reiterated the salient points in the topic.

Step 6: The researcher asked questions to evaluate the topic and made corrections where necessary

Closing remark

- The researcher expressed appreciation to the participants.
- The participants were reminded of the time of the next session
- The researcher served them with refreshments at the end of the session.

Session 4

Topic: Carbohydrates and Protein

Objectives:

At the end of this session, participants were able to:

- List sources of carbohydrate
- State functions of carbohydrate in the body
- List sources of protein
- State functions of protein in the body

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Content:

Concept of protein: Protein from food is broken into amino acids by the digestive system. It is a macro nutrient that primarily helps to build and maintain cells in the body. It could be derived from foods like beans, milk, egg, meat, fish, cheese and so on. Complete protein sources are those with all essential amino acids while an incomplete sources of protein lacks one or more of the essential amino acids. A diet rich in protein is needed by developing children, pregnant women, and lactating mothers.

Important of protein in the body;

It builds and maintains cells in the body

It's responsible for muscle contraction

Its chemical breakdown provides energy for the body

It protects the body against diseases

Concept of carbohydrate: Carbohydrate is a biological compound containing carbon, hydrogen and oxygen that is an important source of food and energy. It can be grouped into two categories; simple and complex. It is an example of macro nutrient which primarily provides energy. It could be derived from foods like cassava, bread, yam, cocoyam, garri and so on.

Importance of carbohydrate in the body:

It provides energy for the body

It helps the body organs to function well

It helps to protect the body from diseases

Step 4: The researcher entertained questions and provided answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: The researcher asked questions to evaluate the topic taught and made corrections where necessary

Closing Remark

- The researcher expressed appreciation to the participants.
- The participants were reminded of the time of the next session
- The researcher closed the session with refreshments served to the participants

Session 5

Topic: Vitamins, fats and oil

Objectives:

At the end of this session, participants were able to:

- List sources of vitamins
- State functions of vitamins in the body
- List sources of fats and oil
- State functions of fat and oil in the body

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Concept of fats and oil: Fats and oil are group of naturally occurring compounds called triglycerides. They comprised of three molecules of fatty acids and one molecule of the glycerol. They are oily, greasy or waxy substances that in their pure state are normally tasteless, colourless and odourless. Fats and oil could be derived from palm oil or vegetable oil.

Importance of fats and oil:

It helps to maintain cells in the body

It helps in the maintenance of body structure

Concept of vitamin: Vitamin includes any of the organic carbon-containing compounds that the body requires in small amounts to maintain health and function properly. Vitamins can be classified into two namely; fat soluble and water soluble vitamins. Fat soluble include vitamins A, D, E, K, while water soluble include vitamins C, B₁, B₂, B₃, B₆, B₁₂ and folic acid. The body gets most of its vitamins from the food we eat. Vitamins could be derived from fruits and vegetables.

Importance of vitamins

It helps to protect the body from diseases

It helps in the formation of blood cells

Step 4: Entertained questions and provide answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: Asked questions to evaluate the topic and correct where necessary

Closing Remarks

- The researcher expressed appreciation to the participants.
- The participants were reminded of the time of the next session
- The researcher served refreshments to the participants and closed the session

Session 6

Topic: Water and minerals

Objectives:

At the end of this session, participants were able to:

- List sources of water
- State functions of water in the body
- List sources of minerals
- State functions of minerals in the body

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Concept of minerals: Minerals are minute amount of metallic elements that are vital for healthy growth of teeth and bones. They are classified as major and trace elements. Major elements include calcium, chlorine, magnesium, potassium, phosphorus and so on. Trace elements include iron, zinc, copper and so on. Minerals could be derived from fruits and vegetables.

Importance of minerals in the body

It helps in building and maintaining strong bones

It aids muscle function and nervous system activities

It helps in prevention of onset of many disorders.

Concept of water: Water is an essential nutrient that is essential in the body. It is usually colourless, odourless and tasteless when pure. It circulates through blood and lymphatic system; transporting oxygen and nutrient to cells and removing wastes through urine and sweat. It also maintains the natural balance between dissolved salts and water inside and outside cells. The human body is 65% water, and it takes an average of 8 to 10 cups to replenish the water that the body loses each day.

Importance of water in the body

It helps to transport oxygen and nutrients to cells

It helps in digestion and absorption of foods.

Step 4: Entertained questions and provide answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: Asked questions to evaluate the topic and correct where necessary

Closing Remarks

- The researcher expressed appreciation to the participants.
- The participants were reminded of the time of the next session
- The researcher served refreshments to the participants to close the session

Session 7

Topic: Nutritional disorders

Objectives:

At the end of this session, participants were able to:

- State four health effects of inadequate diet.
- List five nutritional disorders.

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed them.

Step 2: The researcher briefly revised the previous topics.

Step 3: The researcher introduced the topic of discussion for the day.

Effect of unhealthy diet in the body

Unhealthy diet can lead to the following

- i. Malnutrition (e.g kwashiorkor)
- ii. Low immunity that will expose the body to infections
- iii. Poor maintenance of body structure
- iv. Weakness of the body
- v. Nutritional problem (e.g obesity)
- vi. Goitre
- vii. Osteoporosis
- viii. Scurvy
- ix. Cell metabolism disorder

Step 4: The researcher entertained questions and provided answers.

Step 5: The researcher reiterated the salient points in the topic for the day.

Step 6: The researcher asked questions to evaluate the topic taught and made corrections where necessary

Closing Remark

- The researcher expressed appreciation to the participants.
- The participants were reminded of the time of the next session
- The researcher closed the session with refreshments served to the participants

Session 8

Topic: Administration of questionnaire (Post-test)

Objectives:

At the end of this session, participants were able:

- Summarize all they have learnt from the programme since inception.
- Respond to the post-test materials.

Activities:

Step 1: The facilitator made the participants comfortably seated, warmly welcomed and appreciates them for their presence.

Step 2: The researcher briefly revised the previous topics so far.

Step 3: The researcher painstakingly clarified gray areas.

Step 4: Entertained questions or comments and provide answers.

Step 5: The researcher asked questions to evaluate the topics and made corrections where incorrect answers were provided.

Step 6: The researcher and research assistants administered the questionnaire (post-test).

Step 7: The researcher with the help of research assistant collected the completed questionnaire on the spot

Closing Remarks

- The researcher commended the participants and the research assistants for their time, efforts and cooperation during the programme
- The researcher enjoined the participants to make use of all they have learnt positively to improve their life, family members, friends and neighbours.
- The researcher with the help of research assistants served refreshments at the end of the programme

APPENDIX V

INFORMED CONSENT FORM FOR THE PARTICIPANTS CONFIDENTIALITY

All information obtained from the participants will be treated with utmost confidentiality

VOLUNTARIES

Only those who indicate genuine interest will be allowed to take part in the study. Also any participant is free to withdraw from participating at any point. However, the research will make every effort to ensure participants wishes are compiled with as much practicable.

STATEMENT OF PERSON OBTAINING INFORMED CONSENT

DATE..... SIGNATURE.....

I have fully explained this research to.....

NAME.....

STATEMENT OF THE PERSON GIVING CONSENT

The research study has been well explained to me and I fully understand the study process. I understand that my participation is voluntary. I understand that I may freely stop being part of the study at any time. I am willing to take part in the programme.

DATE.....SIGNATURE.....

NAME.....

APPENDIX IV

UNIVERSITY OF IBADAN, IBADAN, NIGERIA DEPARTMENT OF HUMAN KINETICS AND HEALTH EDUCATION

Head of Department
Professor Michael Adeniyi Ajayi
NCE (Ife), B.Ed. (Benin), M.Ed., Ph.D. (Ibadan)
Sports Psychology & Leisure Studies.



E-mail: michaelajayi1952@ymail.com
michaelajayi604@gmail.com
Tel.: 08023424905

Our Ref: _____

Date 29/11/17

Your Ref: _____

Dear Sir,

Permission to collect data/information/carry experiment

The bearer Kafilat Adefunke, Hamzat with Matric. No. 147852 is a
Ph. D student in the Department of Human Kinetics and Health Education,
University of Ibadan, Ibadan.

He/She needs to collect data/information/carry out experiment in your Department/Unit for
his/her/ Project/Course work.

Kindly allow him/her all necessary assistance required.

Thank you.



OTHER PROFESSORS

1. Prof. B. O. Ogendele (Health Education/Promotion)
2. Prof. O. A. Moronkola (Health Education/Promotion & Curriculum Studies)
3. Prof. B. O. Asagba (Organization & Administration of Sports)
4. Prof. E. O. Morakinyo (Organization & Administration of Sports)
5. Prof. J. F. Babalola (Exercise Physiology)
6. Prof. A. G. Abass (Exercise Physiology)
7. Prof. O. A. Adegbesan (Sports Psychology)

READERS

1. Dr. Francisca Anyanwu (Health Education)
2. Dr. K. O. Omolawon (Organisation & Administration of Sports)

APPENDIX V



SOCIAL SCIENCES AND HUMANITIES RESEARCH ETHICS COMMITTEE (SSHEC) UNIVERSITY OF IBADAN

Chairman: A. S. Prof. Jegede, B.Sc, M.Sc (Ife), MHsc (Toronto), Ph.d (Ibadan)

Tel: +234-8055282418

E-mail: sayjegede@yahoo.com

sayjegede@gmail.com

as.jegede@mail.ui.edu.ng

NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW

RE: ENVIRONMENTAL EDUCATION ON KNOWLEDGE, ATTITUDE AND PRACTICES TOWARDS FLOOD DISASTER PREVENTION AMONG RESIDENTS OF IBADAN METROPOLIS, OYO STATE, NIGERIA.

UI/Social Sciences Ethics Committee assigned number: UI/SSHEC/2017/0008

Name of Principal Investigator: Kafilat Adefunke HAMZAT
Address of Principal Investigator: Human Kinetics & Health Education,
Faculty of Education,
University of Ibadan

Date of receipt of valid application: **20/06/2017**

Date of meeting when final determination on ethical approval was made 27th November, 2017

This is to inform you that the research described in the submitted protocol, the consent forms, and other participant information materials have been reviewed and given full approval by the SSHE Committee.

This approval dates from **27/11/2017 to 26/11/2018**. If there is delay in starting the research, please inform the SSHE Committee so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the SSHE Committee assigned number and duration of SSHE Committee approval of the study. It is expected that you submit your annual report as well as an annual request for the project renewal to the SSHE Committee early in order to obtain renewal of your approval to avoid disruption of your research.

Note: the National code for health research ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the SSHEC. No changes are permitted in the research without prior approval by the SSHEC except in circumstances outlined in the Code. The SSHEC reserves the right to conduct compliance visit to your research site without previous notification.

Prof. A.S. Jegede
Chairman, SSH Ethics Committee

APPENDIX VI



Figure (1): Intervention venue at Peace Multipurpose Hall, Odo ona Elewe, Ibadan South West Local Govt. Ibadan.



Figure (2): The researcher registering participants name at intervention venue



Figure (3): Researcher facilitating during session with control group participants



Figure (4): Cross section of participants listening to a Landlord/lady Association Chairman's Speech



Figure (5): Cross section of participants listening with rapt attention during Environmental Education Training Session.



Figure (6): Another cross section of Participants during, Environmental Education Training Session.



Figure (7): A participant asking question during Environmental Education Training Session.



Figure (8): The researcher supervising the participants during post test administration at intervention venue.



Figure (9): Participant appreciating the researcher during Environmental Education Training Session.



Figure (10): Researcher and the research assistants at Experimental Group Training Venue



Figure (11): The researcher and Chairmen of Community development Association (CDA) of the Participating Communities in Ibadan South West Local Government at Intervention venue