COPING WITH VULNERABILITY TO ENVIRONMENTAL HAZARDS IN CENTRAL GONJA DISTRICT: CASE STUDY OF BUIPE AND YAPEI

By

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(B.A INTEGRATED DEVELOPMENT STUDIES)

A thesis submitted to the Department of Geography and Rural Development,

Kwame Nkrumah University of Science and Technology

in partial fulfillment of the requirement for the degree

of

MASTER OF PHILOSOPHY

Faculty of Social Sciences,

College of Art and Social Sciences

March, 2013

DECLARATION

I, Theresa Dari, hereby declare that this submission is my own work towards the award of MPhil in Geography and Rural Development and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

The study investigated how the migration and characteristics of the people of Buipe and Yapei affect their access to key assets and their ability to cope with vulnerability to flooding. The variables investigated included gender, ethnicity, age and religion. The residency period of the people were also investigated. Direct observation, focus group discussions, questionnaires and interviews were methods employed for data collection from a sample of 152 households at Buipe and 65 households at Yapei. Descriptive and inferential statistics were used in analyzing the data. The test used to determine the relationship of the variables was the chi square. The analysis showed that most of the respondents lacked access to key assets. Lack of access to these key assets affects their ability to anticipate, resist and recover from floods. At both Buipe and Yapei the most vulnerable groups were females, the aged and migrants. However, Traditionalists were the most vulnerable at Buipe whilst at Yapei the most vulnerable were Christians. The study showed that respondents at Yapei were more vulnerable to floods than those at Buipe.

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LIST OF ABBREVIATIONS

CGDA	Central Gonja District Assembly
CGHIS	Central Gonja Health Insurance Scheme
DPCU	District Planning Coordinating Unit
FGD	Focus Group Discussion
G.S.S	Ghana Statistical Service
GMA	Ghana Meteorological Station
JSS	Junior Secondary School
m	Meters
mm	Millimeters
MOFA	Ministry of Food and Agriculture
NADMO	National Disaster Management Organization
UNDP	United Nations Development Plan
NGOs	Non- Governmental Organizations
SAVACEM	Savanna Cement Company
SPSS	Statistical Package and Service Solution
Sq. km	Square Kilometer
SSS	Senior Secondary School

DEDICATION

This work is dedicated to my beloved family members for their support throughout my

academic pursuit.

May the peace and blessings of God be upon you All.

ACKNOWLEDGMENTS

CHAPTER ONE: GENERAL INTRODUCTION

1.1 Introduction

In November 2010, 55 communities in the Central Gonja district were affected by floods, about 700,000 people were displaced, 3,234 houses collapsed, 23,588 acres of farmlands were destroyed, and 1,109 ruminants were also destroyed at the cost of GH¢ 206,780.00 (NADMO, 2010). Buipe was the most affected. Here, Twelve thousand, four hundred and eighteen (12,418) people were displaced, 1,196 houses and 81 acres of farms were destroyed at an estimated cost of GH¢ 86,044. Another area that was also highly affected was Yapei, where 784 people were displaced and 298 acres of farms were destroyed at an estimated cost of GH¢ 56,720 (NADMO, 2010).

Flood occurrences in these communities have been periodic. These communities were affected by flood disasters in 2003, 2007 and 2009. However, available records indicate that 2010 was the worst disaster in recent memory. Each year of flood occurrence results in destruction of properties and mortality levels that are higher than the previous year. The residents of these two communities have remained susceptible to flood occurrences and appear to have been unable to cope with its impacts. Why the residents have been unable to anticipate, cope with, and recover from the impacts of the hazard has until now not been thoroughly researched into. More importantly, how the people absorb losses and continue functioning, and their ability to recover from the periodic flood disaster remains unanswered.

Coping is the process of continuing on after flooding and involves resistance (ability to absorb losses and continue functioning as flooding occurs) and resilience (ability to recover from flooding). There are several strategies used in order to resist and be resilient to flood impacts. These strategies involve remedial actions undertaken by people whose survival and livelihood are compromised or threatened (WHO, 1999).

Research has shown that, these strategies could be erosive, non-erosive and failed strategies (WHO, 1999). Further, it has been found that strategies vary by region, community, social group, gender, age, season and time in history and are deeply influenced by the people's previous experience (WHO, 1999).

Blaikie et al. (1994) have argued that resistance and resilience depends on demographic characteristics and access to key assets. These assets include human, physical, financial, social and natural assets (Moser, 2006). For instance lack of access to human capital, such as education, could affect people's ability to secure jobs in the formal sector which may affect their ability to resist flood impact (Blaikie et al., 1994).

Blaikie et al., (1994) proposed the access model as a framework for understanding how differences in the access profile of household differ due to different social attributes and the significance these differences have on the potential loss and rate of recovery from the impacts of a hazard and intensification of their vulnerability levels (Blaikie et al., 1994). The access model was used as a framework for analysing how the vulnerability of the people of Buipe and Yapei to floods is linked to their access to key assets.

1.2 Problem Statement

Buipe and Yapei are located in the Central Gonja District in the Northern Region of Ghana. Buipe is the capital and a principal urban centre with a population of about 8,347 people (Census, 2000). Yapei on the other hand is a rural centre with a population of about 4,044 people (Census, 2000). The two areas have a population growth rate of over 3.1% which is higher than the national growth rate of 2.8% (Census 2000). Buipe and Yapei are located along the Black and White Volta respectively. The landform is generally low-lying and undulating (DPCU, 2010). Annual rainfall is unevenly

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distributed from May to October (GMA, 2010). The mean annual rainfall ranges between 1,000 mm and 1,500 mm (GMA, 2010). Table 1.2.1 below shows the distribution of rainfall.

Table 1.2.1 Annual Rainfall in mm at Yapei and Buipe (2000-2010)

Year	Mean annual rainfall (Yapei and Buipe)	
	Yapei	Buipe
2000	1098.9	749.5
2001	764.6	833.2
2002	714.6	1241.5
2003	1017	1375.7
2004	1058.6	1126.9
2005	1150.7	855.1
2006	969.3	1046.6
2007	1045.3	879.8
2008	1195.5	1253.6
2009	1088	835.0
2010	1245.3	1274.7

Source: (GMA, 2010)

Agriculture and fishing are the main economic activities in the area. Farmers depend on the rains for farming with limited options for irrigation (DPCU, 2010). Farming and fishing activities are found along the river banks. It is important to note that majority of the people in this area fall within what the World Bank described as extremely poor. In 1993, the World Bank defined extreme poverty as the proportion of individuals in

developing countries who live on less than $1 a day (World Bank, 2008). Poverty is entrenched and most of the people live on less than one US dollar a day (DPCU, 2010).

In the last decade, some studies have recognized the biophysical and economic vulnerability of Northern Ghana to environmental hazards due to its geographical location. The results of natural disasters have been seen in the devastation of physical infrastructure and extreme social and economic dislocation. For instance, Buipe and Yapei have had a long history of the occurrence of flood (1974, 1979, 2003, 2007, 2009 and 2010). In 2003, flooding displaced 279 people and destroyed 223 acres of crops at an estimated value of GH¢1,750 at Yapei (NADMO, 2003). In Buipe, the floods displaced 444 people and 42 houses were destroyed at an estimated value of GH¢ 24,000 (NADMO, 2003). In 2010, about 12,418 people were displaced by flooding, 1,196 houses and 81 acres of farms were destroyed at an estimated cost of GH¢ 86,044 at Buipe. Similarly, in Yapei 784 people were displaced by floods, 298 acres of farms were destroyed at an estimated cost of GH¢ 56,720 (NADMO, 2010).

The data above shows that natural disasters have dramatically increased in Central Gonja despite the fact that the recurrence of natural events has remained more or less constant. If the recurrence intervals and other attributes of natural events have remained reasonably constant over time, explanation for the increase in the number and scale of disasters could be found in the fact that conditions of human vulnerability are deteriorating.

However, in Northern Ghana, increasing flooding impact is quickly attributed to excessive rainfall (NADMO, 2010). In Northern Ghana, assessments of human vulnerability that link socio-demographic characteristics to key assets are absent. The implicit identification of natural phenomenon as the only cause of disasters and the immediate need to reduce their impacts on the populations in the aftermath of the event,

have obscured the analysis and inclusion of important social dimensions. The people who have long experience with flooding should develop methods of mitigating their impacts. If flood victims continue to suffer heavy losses, then explanations must be forthcoming. Since annual rainfall patterns have oscillated around 1,000 to 1,500mm per year, and monthly averages have not changed dramatically, increased flooding must be attributed to human processes. One possibility is that contextual or external influences have affected peoples' capacities to adjust to and reduce the dangers of major natural events such as flooding.

Therefore, to advance the exploration of the issue of human vulnerability to environmental hazards and disaster this research seeks to find out how decreasing access to key assets have increased human vulnerability to flooding in the Central Gonja district.

The research seeks to answer these questions:

1. What are the effects of sex on access to secured houses, livestock, and education?
2. What are the effects of age on access to savings, loans and social network?
3. How does religious affiliation affect access to social network and education?
4. What are the effects of ethnicity on access to land and secured houses?
5. What are the differences in vulnerability between the two communities?

1.3 Objectives of the Study

The general objective of the study is to demonstrate how socio-demographic characteristics of the people of Buipe and Yapei affect access to key assets and their ability to cope with vulnerability to flooding.

1.3.1 Specific Objectives

Specific objectives of the study are to analyse:

1. The effects of sex on access to secured houses, livestock, and education.

2. The effects of age on access to savings, loans and social network.

3. The effects of religious affiliation on access to social network and education.

4. The effects of ethnicity on access to land and secured houses.

5. The differences in vulnerability between the two communities.

1.4 Null Hypotheses

1. Sex does not significantly influence access to education.

2. Age does not significantly influence access to savings.

3. Age does not significantly affect access to loans.

4. Age does not significantly influence access to social network.

5. Religious affiliation does not significantly influence access to education.

6. Religious affiliation does not significantly influence access to social network.

7. Ethnicity does not significantly affect access to land.

1.5 Alternate Hypotheses

1. Sex significantly influences access to education.

2. Age significantly influences access to savings.

3. Age significantly affect access to loans.

4. Age significantly influences access to social network.

5. Religious affiliations significantly influence access to education.

6. Religious affiliations significantly influence access to social network.

7. Ethnicity significantly affects access to land.

1.6 Significance of the Study

The study supports the use of triangulation method in research. By combining both the qualitative and quantitative research methods, advantages of each methodology complements the other making a stronger research design which resulted in more valid and reliable findings from the study. For instance, data generated from FGD and direct observations were used to supplement the data generated from interviews and Questionnaire. The inadequacies of individual methods were minimized and threats to internal validity were realized and addressed. The use of method triangulation generated data that neither the qualitative nor the quantitative method alone could yield.

Empirically, the study contributes to the use of the case study approach in Social Science research. The case study method involves procedures and techniques of investigation usually, but not exclusively or always based on intensive interviews (Kumekpor, 2002). It is a method of careful inquiry or investigation and examination seeking the facts of a case, a problem or an issue (Kumekpor, 2002). The case study approach helps in understanding of a problem within a particular context. For instance, by studying the relationship between socio-demographic characteristics and vulnerability to floods in Buipe and Yapei, the thesis contributes to our understanding of how this relationship may differ from other areas.

The research has introduced a new dimension in hazards and vulnerability analysis in the study areas. Hazards and vulnerability analysis have previously concentrated on physical processes such as excessive rainfall as the major cause of disasters. In my study, I concentrated on the social and economic processes such as lack of access to key assets which has contributed to vulnerability in the study areas.

In addition, the study will contribute to knowledge in the arena of academia. It will serve as the baseline data for further research. The outcome of this work will

contribute to finding ways of improving upon the already existing coping mechanisms among these people and theoretically serve as a source of information for further researches to be conducted in the future.

1.7 Limitations to the Study

First, as a student researcher the problem of finance was encountered. Since this was going to be a problem I searched for a part time job to help me. Secondly, the problem of non-response of some members of the sample population was encountered. There were instances where I was being asked to leave the house and not to come back. This is because they believe people come to take information from them but do not receive any assistance. Since they fell within my sampling units, I had to explain to them that I was just a student and had nothing to offer them. Also getting information from the District Assembly and NADMO Office was not easy but after continued follow-ups I had the information that I needed.

1.8 Organization of the Report

The report was organized into six chapters. The first chapter included the general introduction to the study. This includes introduction, statement of the problem, research questions, objectives of the study, the significance, limitations and organizations of reports.

In chapter two of the report, literature on coping with vulnerability to environmental hazards and definition of concepts was reviewed. The chapter three of the report presents the methodological procedures for the study. Chapter four describes the background of the study area. This includes physical background and socio-economic characteristics of the study area.

Discussions of data generated are presented in Chapter Five. Summary, conclusion and recommendations are also presented in Chapter six.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature that has already been documented from previous studies conducted on vulnerability to environmental hazards. It includes definition of key concepts, changing perspectives of hazards, disasters and vulnerability. It also includes population characteristics and vulnerability and the conceptual framework used for the study.

2.2 Definitions of Concepts

This section presents definition of key concepts and adapted definitions for the study. The key concepts include hazard, environmental hazard, risk, disaster, vulnerability, coping, and assets.

2.2.1 Hazard

Hazard has been defined differently in various researches in both physical and social sciences. The commonest characterization of hazard is some form of threat (Cutter, 1993; Blaikie et al., 1994; Smith 2001; Odeh, 2002). Hazard is best viewed as a naturally occurring or human-induced process, or event, with the potential to create loss. That is, a general source of future danger (Smith, 2004). Hazard refers to the extreme natural events which may affect different places singly or in combination at different times (Blaikie et al, 1994).

For this research, definition of hazard would embody that of Smith, (2004) and Blaikie et al., (1994). Hazard is an extreme natural or human induced event which affects different places singularly or in combination at different times and has the potential to create loss. This definition is used because hazard could occur at different places maybe

at the same time or different times and has the potential to create loss. Hazards could be human or naturally induced.

2.2.2 Environmental hazards

Kates (1978) defines environmental hazard as the threat potential posed to man or nature by events originating in, or transmitted by, the natural or built environment. Smith (2004) also described environmental hazards as "extreme geophysical events, biological processes and technological accidents, which release unusually high concentrations of energy or materials into the environment and pose largely unexpected threats to human life and economic assets". I used the definition by Kate (1978) for the research, unlike the definition by Smith, 2004, they are threat potentials posed to man and nature however Smith, (2004) sees them as unexpected threats to human life.

2.2.3 Risk

Some researchers have defined risk to incorporate information about both probabilities and consequences. To these researchers, risk is seen as a function of both a hazardous agent and some vulnerable aspect of a society (Mitchell, 1999; Smith, 2001; Dore and Etkin, 2003). Risk is the actual exposure of something of human value to a hazard and is often regarded as the product of probability and loss (Smith 2004).

Risk, in this research is being defined as the likelihood of a hazard occurring and causing some gravity of harm to society or something valued by society and to the environment. This definition is used to show the probability of occurrence of hazard and causing gravity of harm to people.

2.2.4 Disaster

Disasters happen when hazards threats materialize and overwhelmed our coping capabilities. Disaster is an event, concentrated in time and space, in which a community experiences severe danger and disruption of its essential functions, accompanied by widespread human, material or environmental losses, which often exceed the ability of the community to cope without external assistance (Smith, 2004). A disaster occurs when a significant number of vulnerable people experience a hazard and suffer severe damage or disruption of their livelihood system in such a way that recovery is unlikely without external aid (Blaikie et al, 1994). I used the definition by Blaikie et al, (1994) because disasters occur only when there is a vulnerable population.

2.2.5 Vulnerability

Vulnerability mean differently to different researchers. In the physical and environmental sciences, vulnerability is a function of the location of people and property with respect to a hazardous agent (Gabor & Griffith, 1980; Alexander, 1993). In this regard, things that are closer to a hazardous event or within its distribution area are considered more vulnerable.

In the social sciences, the term vulnerability is mostly associated with the demographic characteristics of individuals or groups in a society and their ability to anticipate, cope with, and recover from a hazardous event (Blaikie et al., 1994; Hewitt, 1997; Pelling, 1999). This definition was used for the research because vulnerability to hazards was perceived to result not from the physical events but also other social factors makes people unable to cope with disasters thereby making them vulnerable.

2.2.6 Coping

Coping capacity is the manner in which people and organizations use existing resources to achieve various beneficial ends during unusual, abnormal and adverse conditions of a disaster phenomenon or process (UNDP, 2004). Coping strategies involve remedial actions undertaken by people whose survival and livelihood are compromised or threatened (WHO, 1999). These could include erosive, non-erosive and failed strategies (WHO, 1999). These strategies vary by region, community, social group, gender, age, season and time in history and are deeply influenced by the people's previous experience (WHO, 1999). The definition by WHO, (1999) is used for this research because hazards threaten people's livelihoods and during this period strategies are adopted in order to resist and be resilient to its impact.

2.2.7 Assets

Asset has been variously defined by different people. Assets have been identified as stock of financial, human, natural or social resources that can be acquired, developed, improved and transferred across generations. It generates flows or consumption, as well as additional stock (Ford, 2004).

Assets have been defined by Bebbington, (1999) as not simply resources that people use to build livelihoods, but they give them the capability to be and act. This definition is used for this research because assets should not only be resources but rather enable people who own them have the capability to act under any given situation. Also assets are identified as the basis of agent's power to act, to reproduce, challenge or change the rules that govern the control, use and transformation of resources (Sen, 1997). In recent times, assets or capital endowment includes both tangible and intangible assets,

(Moser, 2006). These include physical, financial, human capital, social and natural capital (Moser, 2006).

Physical capital includes the stock of plant, equipment, houses, infrastructure and other productive resources owned by individuals, the business sector or a country (Bebbington, 1999; Carney, 1998; Moser, 1998; Narayan, 1997; Portes, 1998; Putnam, 1993). Financial capital includes the financial resources available to people. These include savings and supplies of credit (Bebbington, 1999; Carney 1998; Moser, 1998; Narayan 1997; Portes 1998; Putnam, 1993). It has however been concluded that, financial capital is becoming central to the other forms of capital assets in the globalized world (Mahajan, 2006).

Natural capital includes the stock of environmentally provided assets such as soil, atmosphere, forest, minerals, water and wetlands. In rural communities land is a critical productive asset for the poor, while in urban areas land for shelter is also a critical productive asset. (Bebbington, 1999; Carney, 1998; Moser, 1998; Narayan, 1997; Portes, 1998; Putnam, 1993). However in rural areas land is no longer communally owned but tradable, with forest privatized and sold (Moser, 2006).

Human capital includes investment in education, health and nutrition of individuals. Health status also determines people's capacity to work. Skill and education determine the returns from their labor. Labor is linked to investments in human capital. It is also regarded as the poor's greatest asset (Bebbington, 1999; Carney, 1998; Moser, 1998; Narayan, 1997; Portes, 1998 and Putnam, 1993).

Social capital is an intangible asset, defined as the rules, norms, obligations, reciprocity and trust embedded in social relations, social structures and society's institutional arrangement (Bebbington, 1999; Carney, 1998; Moser, 1998; Narayan, 1997; Portes, 1998; Putnam, 1993).

2.3 Changing Perspectives on Hazards, Disasters and Vulnerability

This section shows how hazards, disasters and vulnerability have been interpreted and understood over the past years and the changes that have occurred. The different views people have had on hazards, disasters and vulnerability over the past years and the current trend on people's views on hazards, disasters and vulnerability. I also looked at the weaknesses of the approaches used to study disaster and how my study is going to improve upon the weakness of the approach I have adopted.

Hazards, Disasters and Vulnerability have been interpreted and understood differently over the past years. Before the 1950's most disasters were seen as an act of God. There was a general acceptance of disasters as external, inevitable events. This led to a conclusion that calamities are divine punishment for moral misbehavior which was beyond the realm of human beings (Smith, 2004). Communities also made an effort to avoid frequently flooded places. Although humans made little attempt to reduce the impact like the construction of levees and river dams in the Middle East over 4000 years ago (Smith, 2004), there was still little understanding of the interaction between hazards and people.

However the growth of science and engineering after the 1950's resulted in adoption of structural responses to mitigate certain hazards. There was different interpretation and understanding of hazards and disasters. Whilst geologist, meteorologist, hydrologist and civil engineers were concerned with prediction and defensive controls, geographers and others focused on a wider program of loss mitigation through human adjustment such as disaster aid and better land planning (Smith, 2004).

Two quintessential models that have influenced vulnerability analysis are the risk-hazard and the pressure-and-release model (Turner et al., 2003). While one follows the tradition started by Gilbert White the other follows the concepts developed by Blaikie

et al. (1994). White (1936, 1945) introduced a human ecological perspective into hazard mitigation and questioned whether natural hazard existed at all. He posited that "natural disasters are not physical phenomenon outside of society but are linked to countless individual decisions to settle and develop hazard-prone land" (Smith, 2004:4). He argued that a comprehensive flood management program should integrate physical control of floods with non-structural methods that recognize the role of human behavior in exacerbating hazards.

White's view of blending structural and non-structural approaches to hazard mitigation became widely accepted and was strengthened by subsequent writings by White (1974), White and Haas (1975) and Burton et al., (1978). This approach had vulnerability analysis embedded in them but it generally sought to understand the impact of a hazard as a function of exposure to the hazard event and the sensitivity of the entity exposed (Burton et al, 1978; Kates, 1985). The behavior of flood control authorities and homeowners were considered important in producing hazard in developed countries while in the developing countries it was attributed to deforestation and over-grazing (Smith, 2004). This approach sought solutions to hazard in science and technology, and believed that through time the "transfer of technology from the developed to the developing world, as part of an overall modernization process, would eventually solve their problems too" (Smith, 2004:5).

Risk-hazard models were criticized for ignoring the various ways in which social units amplify or attenuate the impact of the hazard. It also failed to draw distinctions among the exposed groups and components that lead to significant variations in the consequences of the hazards. Again it ignored the role of political economy, especially social structures and institutions, in shaping differential exposure and consequences. The role of individual choice in hazard related decision was over-emphasized at the expense

of wider social and economic forces (Smith, 2004). According to Hewitt (1983) despite its acknowledgement of the role of human perception and behavior the approach sought to contain the extremes of nature through environmental engineering works, such as flood embankments or earthquake proofed buildings. It was too concerned with field monitoring and the scientific explanation of geophysical processes whilst too much priority was given to disaster plans and emergency responses. The approach which covers site-specific physical protection to improved forecasting and evacuation procedures was also criticized for being materialistic and deterministic reflecting undue faith in technology and capitalism.

The recognition of the deficiencies in the risk-hazard model led to the pressure-and-release model in which risk was explicitly defined as a function of perturbation, stressor, or stress and the vulnerability of the exposed unit (Turner et al., 2003). The pressure and release model focuses on the conditions that make exposure unsafe leading to vulnerability and the causes creating these conditions. The model addresses social groups facing disaster events and emphasizes distinctions in vulnerability by different exposure units.

Adopting a more radical interpretation that shifted the focus from hazard in developed countries to disasters in less developed countries, the pressure-and-release model was offered as an alternative to the dominant behavioral view adopting risk-hazard models. Much attention was given to the relationship between colonial legacy and economic dependence in increasing the impact of natural hazards in underdeveloped countries. Due to the weaknesses of the pressure and release model the access model was used as an alternative. The access model is a magnified analysis of how vulnerability is generated by economic and political processes (Blaikie et al., 1994). With the pressure and release model the generation of vulnerability is not adequately integrated with the

way in which hazard themselves affect people, (Blaikie et al., 1994). It however separates hazard from the social processes in order to emphasize the social causation of disasters (Blaikie et al., 1994). However nature itself constitute a part of the resources that are allocated by social processes and under these conditions people become more or less vulnerable to hazard impact (Blaikie et al., 1994). The access model shows how social systems create the conditions in which hazards have a differential impact on various societies and different groups within society (Blaikie et al., 1994). I adopted the access model for my study because it helps explain how socio-economic and political conditions create the conditions in which floods affect people in the study area. The occurrences of disasters are not only as a result of occurrence of hazards but rather the social processes create the conditions in which hazards affect people.

The concept of human vulnerability was therefore explicitly introduced in the hazard research and was based on the belief that disasters in the Third World arise more from the global economy and the marginalization of the poor than from the effects of geophysical events (Smith, 2004). The main argument is that geophysical events are mere triggers of more deeply rooted and long standing problems that arise out of underdevelopment due to dependency and unequal trading arrangement between rich and poor nations. The poor is pressured to overuse land, migrate to unplanned hazard prone cities and when disaster strikes, differential impacts reinforce growing inequalities (Smith, 2004).

The difference between the structuralist and the behavioral view is that, the structuralist view does not dwell so much on hazard but rather dwells on the common features of disaster and stresses the limits imposed on individual actions by powerful global forces (Smith, 2004). The structuralist view sees vulnerability in the Third World resulting from poverty which dispossesses rural folks from valuable land and pushes

urban residents into living in shanty towns. It also sees disaster victims as having limited choices due to limited resources (Hoffman & Oliver, 2002). This however rejects modernization theory in favor of reliance on local knowledge rather than imported technology (Blaikie et al., 1994).

The structuralist approach however has its weakness. According to Smith, (2004) the strength of the structuralist approach lies in its ability to refine the concept of poverty and vulnerability so as to help protect the most disadvantaged members of society. Also the structuralist approach lacks practical risk reduction measures (Smith, 2004). Again, the structuralist approach is based on the view that disasters spring from under development arising from dependency and unequal trading arrangements between rich and poor nations (Smith, 2004).

In conclusion, vulnerability of people to environmental hazards comes as a result of the demographic characteristics of individuals which affect their ability to access certain key resources which makes them vulnerable. Vulnerability of people to hazards is not just as the result of physical exposure of people in hazardous areas but rather societal processes creates conditions that makes people vulnerable to hazards. I provided empirical evidence to support the theory and also to strengthen its facts because I applied the theory in my study area.

2.4 Characteristics, Assets and Vulnerability

Human populations have become more vulnerable in recent years, despite the many steps being taken to reduce disasters (Changnon et al., 2000). Many have therefore, considered vulnerability to environmental hazards not as a result of the physical location of people in many precarious areas but could be as a result of lack of access to key assets such as education, health, income, secure housing and land. People's vulnerability to hazards is

generated by social, economic and political processes (Blaikie et al., 1994). These processes influence how hazards affect people in varying ways and different intensities (Blaikie et al., 1994).

Some socio-demographic characteristics have been identified by some researchers to have influenced vulnerability to hazards. These include age, gender, education, and ethnicity. These characteristics influence access to key assets and affect people's vulnerability to environmental hazards.

Population growth has been identified as making human population vulnerable to environmental hazard. This is because increasing population growth increases competition for key assets such as land, health facilities and education. The total number of people exposed to hazard is increasing, especially in third world countries which are recording about 90 per cent of world population growth. In these countries, high human vulnerability is due to high concentration of population in unsafe physical settings (Smith, 2004). Continuous population growth also outstrips the ability of government to invest in education and other social services, increasing population growth increases competition for land resources and risk to natural hazards (Smith, 2004). Whereby common resources such as land is diverted to or controlled by a minority, due to differences in income, poverty and social status within a society. This may lead to settlement of people in hazard prone areas.

Education is linked to socioeconomic status, with higher educational attainment resulting in greater lifetime earnings. Lower education constrains the ability to understand warning information and access to recovery information (HCSEE, 2000). Also the lack of proximate medical services will lengthen immediate relief and longer-term recovery from disasters (HCSEE, 2000; Morrow 1999; Hewitt 1997).

Also race and ethnicity have also been identified as having influence on vulnerability to environmental hazards. Race and ethnicity imposes language and cultural barriers that affect access to post-disaster funding and residential locations in high hazard areas (Pulido, 2000; Peacock, Morrow, and Gladwin 1997, 2000; Bolin with Stanford 1998; Bolin 1993).

Age also influences one's ability to cope with disaster. Eldar (1992) points out elderly persons may have some impairment, such as those of sight or hearing which may limit them in perceiving warnings and emergency instructions. Others will reduce their ability to carry out recommended self-protected actions or their speed and agility in leaving a room or building. Kilijaneck & Drabek, (1979), reported that only one in every five elderly persons who made claims for aid after a Tornado in Texas received it compared to three out of five for younger working persons. Studies by some researchers surmise that, the elderly tend to lack efficient income or capital reserves which restrict them from accessing certain forms of formal government aid or qualifying for low-interest building loans (Bolin, 1986, Alexander, 1997, Mileti, 1999, and Morrow, 1999). The elderly are indirectly viewed as less productive segments of society and are often neglected in favour of more productive working class population.

Again socio-demographic characteristics like sex could prevent one's ability to cope from the impacts of hazards. For instance, studies have shown that women and children are 14 times more likely to die than men during a disaster. In the 1991 cyclone disasters which killed 140,000 in Bangladesh, 90% of victims were women (Aguilar, 2004). In Sri Lanka, swimming and tree climbing are taught mainly to boys, which helped them survive and cope better than women when the waves of the tsunami hit. Social prejudice keeps girls and women from learning to swim, which severely reduces their chances of survival in flooding disasters (Oxfam, 2005). Also, it has been

concluded that, more women than men work in the informal sector and in small enterprises. These sectors are often the worst hit and least able to recover from the effects of disasters, due to lack of capital, and limited access to credit and information, among other obstacles (Nelson et al., 2002).

2.5 Conceptual Framework

The conceptual framework used for this research is adapted and modified from Blaikie et al., (1994). The conceptual framework is used to show how differences in access to resources determine people's vulnerability to hazards. Below is the original framework by Blaikie et al., 1994. In the model, households are used as the basis for analyzing vulnerability and are considered as members of economic decision unit (Blaikie et al., 1994). These units are called households (Ekejuba, 1984). These households are faced with a range of resources and assets that represent their access level in box 2a in the diagram below. These may include land of various qualities, livestock capital, reserves of food, labour and specialist skills (box 2b).

Box 4 in the diagram represents the structures of domination (income opportunities and access qualification). Box 3a in the diagram represents the income opportunities faced by the households. However each income opportunity has an access qualification which is represented in box 3b of the model. Box 5 in the diagram represents the choices of income opportunities taken by each household. Those who possess access qualification for a large number of income opportunities have a wide choice and choose those with high pay-offs or low risks (Blaikie et al., 1994). They also have flexibility in securing a livelihood under generally adverse conditions and command considerable resources (Blaikie et al., 1994). However, those whose access profiles are limited usually have little choice in income opportunities and have to seek

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the most oversubscribed and lowest paying ones and have the least flexibility in adverse conditions (Blaikie et al., 1994).

Each household makes choices, typically during key decision-making times in the agricultural calendar. The resulting bundles of income opportunities, together with satisfaction of such needs as water and shelter constitute a livelihood (box 6). The flows of income then enter the household as a range of goods and cash wages. A household budget can be constructed in which expenditures and incomes are listed (box 7). Box 8 represents decisions made by households about how to cope with deficits, save or invest any surplus. The outcome of these decisions will result in a change in the access profile of each household in the next period. These will in aggregate alter the flows of surplus between groups and households (box 1) and may alter the social relations between groups. Households then enter into box 2b with different access profiles. A disaster can cause a sudden deficit in the household budget, making that household more vulnerable to the next event (Blaikie et al., 1994).

Figure 2.1 Access Model
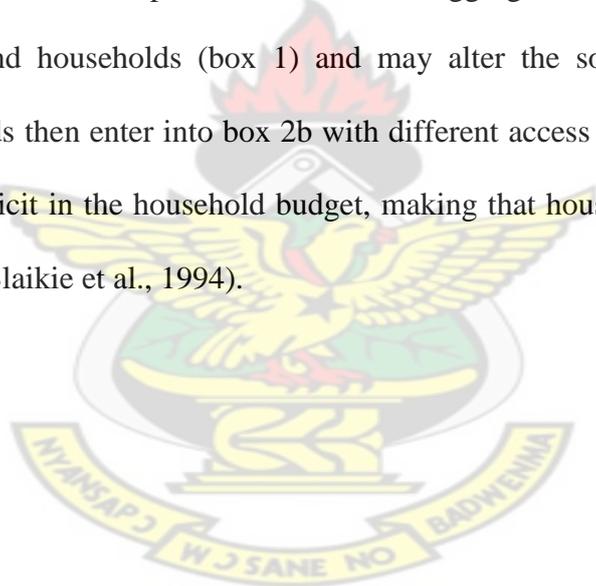
Figure 2.1 Access Model
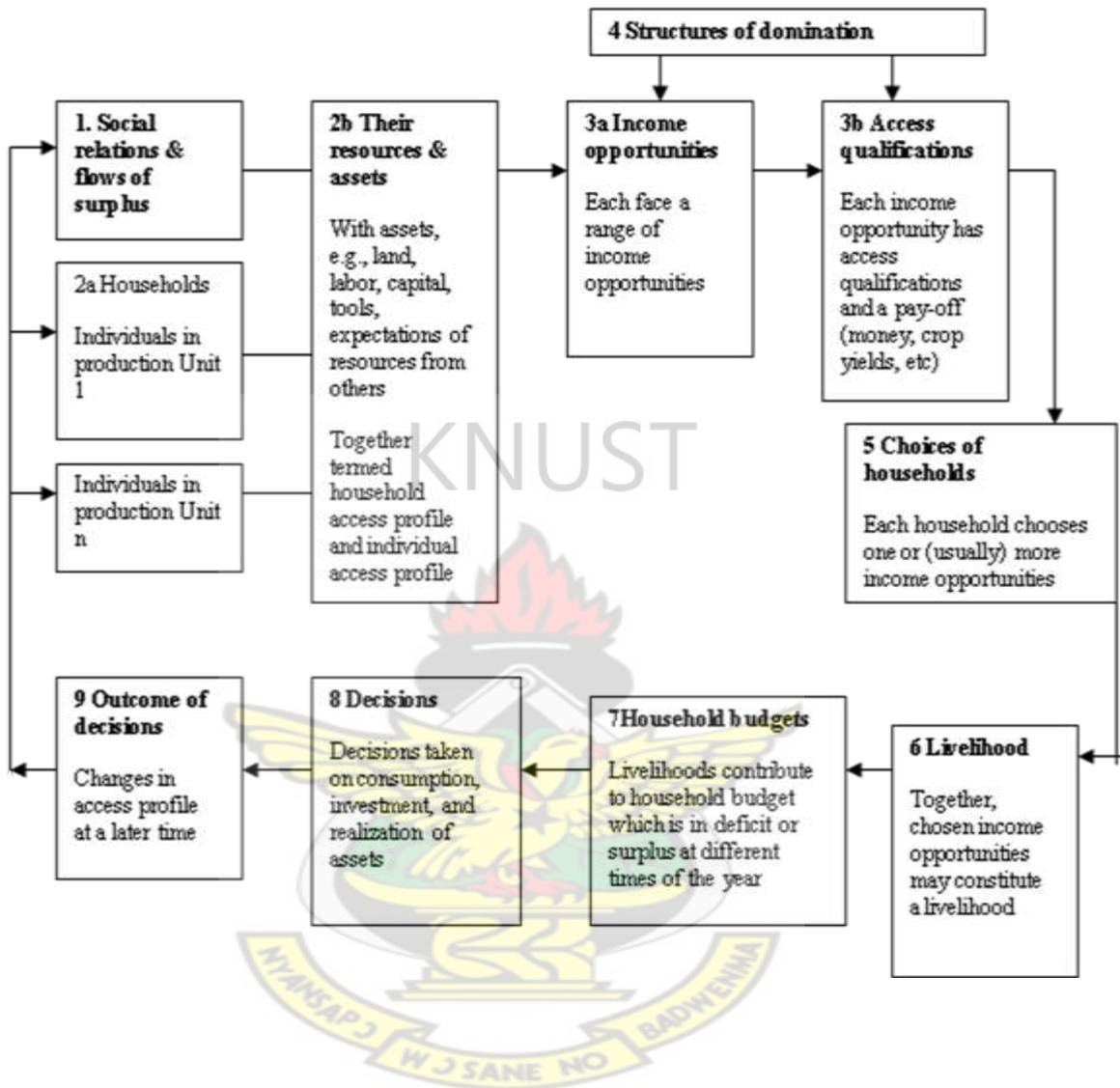
Source: Blaikie et al., (1994)

The access model shows how differences in the access profile of household differ due to different social attributes and the significance these differences have on the potential loss and rate of recovery from the impacts of a hazard and intensification of their vulnerability levels (Blaikie et al., 1994). This have been modified to suite my study.

Two households were used in the model (1 and 2). This is represented in figure 2.2 below. A household in the model represents those who share common eating arrangements which coincide with production units (Ekejuba, 1984). Box1 represents the households (1 and 2) and the range of resources available to all the households in the diagram. Box 2 in the diagram represents the structures of domination (income opportunities and access qualification). Each income opportunity has a pay-off in terms of physical product, money or other services (Blaikie et al 1994). Examples of income opportunities available to both households may include crop farming, fishing, animal rearing and casual labor. The income opportunities however have their access qualification and its pay-off. This is defined as a set of resources and social attributes which is required in taking up an income opportunity (Blaikie et al., 1994). These may include membership of a particular tribe, specialized skills, gender, age, political and social status, wealth and capital.

Some income opportunities have high access qualifications such as capital, rare skills, or costly infrastructure and therefore bar most from taking them up (Blaikie et al 1994). They however provide the highest returns. Others are much less demanding, oversubscribed and are usually poorly paid (Blaikie et al, 1994).

In the diagram, box 3 represents the income opportunities taken by both households. This represents the access profile which refers to all the resources that each individual or household possesses (Blaikie et al 1994). This is the level of access to

resources and the income opportunities with some households having a much better choice than others (Blaikie et al 1994). Household 1 due to its limited access qualification has small acres of land, not much capital goes into farming but at the subsistence level and other members of the family are hired by other people. Household 2 has a better access qualification. These include membership of a particular tribe, specialized skills and capital. Therefore household 2 goes into commercial farming, animal rearing and fishing.

The resulting bundle of income opportunities together with the satisfaction of such needs as water, food and shelter contribute a livelihood of the two households (Blaikie et al., 1994). It is the sum of the payoff of its constituent income opportunities (Blaikie et al., 1994). This is shown in box 4. Income from their business flows into these household. A household budget is then constructed in which expenditure and incomes are listed. In this case, household 1, with its limited pay-offs involving its expenditure and income would be in a deficit while household 2 would have a surplus budget that is represented in box 5.

In the diagram, box 6 represents the decisions and outcome of decisions of both households. Since household 2 has a surplus budget it can use its surplus to increase its number of assets such as land, animals, have stocks of grain and to build houses and invest into other areas, invest in the education of its children. However household 1 with its deficit would have to sell off some of its asset and also would have to borrow. This might alter the social relations of the households and also their access profile (box 7). Household 2 has a better social relation with people and would also increase its access profile. Meanwhile the social relation of household 1 will be negatively affected and its access profile will reduce. Both households enter the next season with different access profiles and with different relations to each other.

When a hazard (flood) occurs, even though both houses would be affected, household 2 would be able to recover from the impact of the hazard faster than household1. It will take time for household 1 to recover, this is because it is not just life and property that is destroyed but also sources of livelihood. Household 1 finds it difficult to reconstruct their livelihoods following a disaster. They therefore, turn to be more vulnerable to the effects of subsequent hazard events, (Blaikie et al., 1994).

Figure 2.2 Conceptual Framework
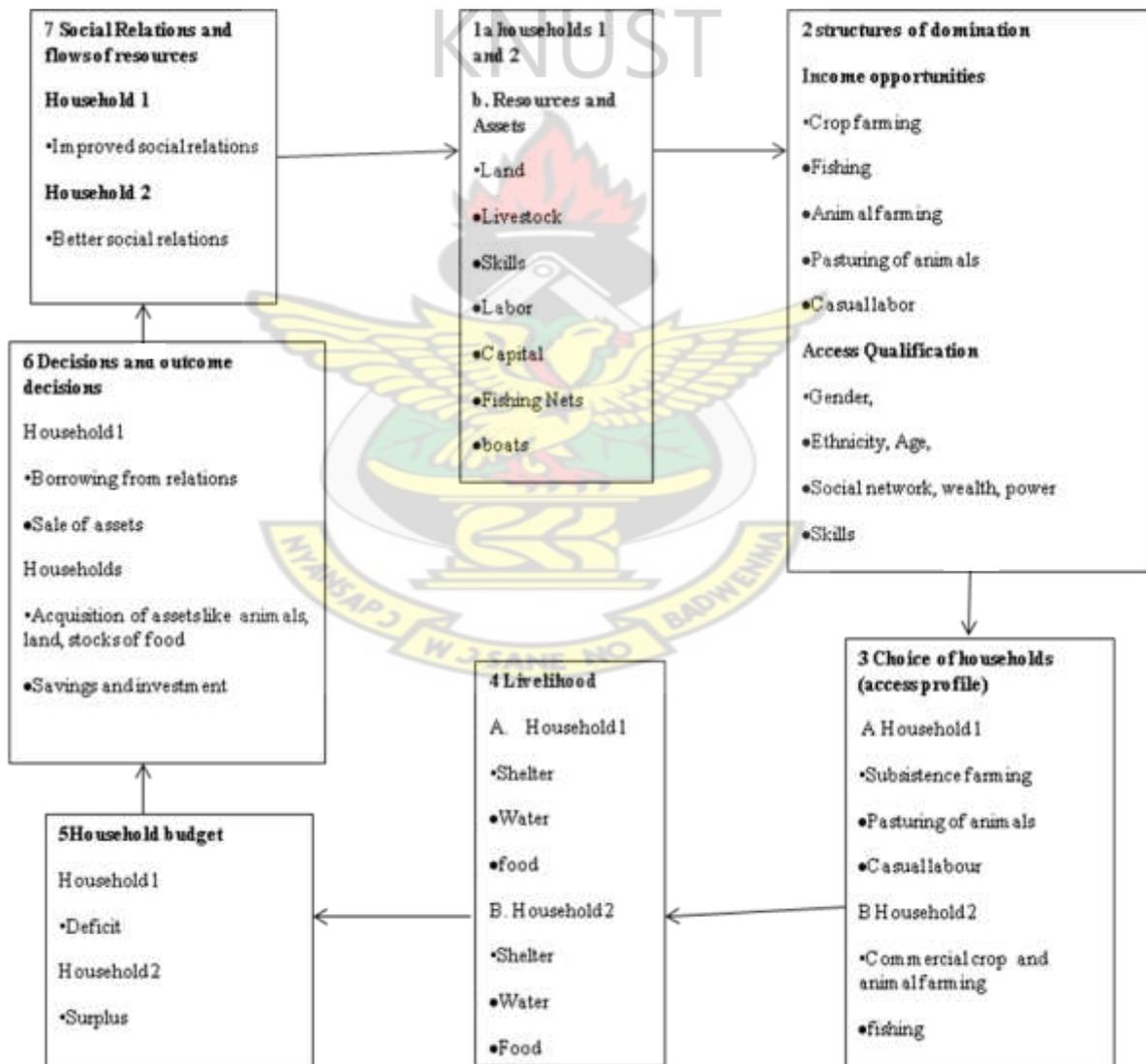
Source: Adapted from Blaikie et al., (1994)

2.6 Summary

This section summarizes the literature reviewed in chapter two. The key concepts used in the literature include Coping, Disaster, Risk, Environmental hazards, Hazard, Vulnerability and Assets. These concepts were defined to suite the study.

Before the 1950's disasters were seen as an act of God, as a result there was a general acceptance of disasters as external, inevitable events. However the growth of science and engineering after the 1950's resulted in adoption of structural responses to mitigate certain hazards. There were different interpretation and understanding of hazards and disasters by geologist, meteorologist, hydrologist, civil engineers and geographers.

Two models which influenced vulnerability analysis are the risk-hazard and the pressure-and-release model. The recognition of the deficiencies in the risk-hazard model led to the pressure-and-release model. However, due to the weakness of the pressure and release model the access model was used. The access model was also used as the conceptual framework of the study.

The chapter also describes how demographic characteristics affect access to assets and influences vulnerability to hazards. These include age, sex and ethnicity as characteristics which influence access to key assets and affect people's vulnerability to hazards.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This section presents the methodological approach and design of the research, and the different methods and procedures used to collect and analyse data. Data and information for the study were collected in a total of thirteen months of fieldwork conducted between October 2010 and October 2011. The fieldwork simultaneously combined document analysis, interviewing of respondents, focus group discussions, direct observation and questionnaire distribution.

3.2 Selection of Study Area

The study was conducted in the Central Gonja District of the Northern Region. The Central Gonja district was selected as study area on account of their suitability for studying human-environment interactions and the ways in which these affect inhabitants' vulnerabilities and responses to environmental hazards. As already documented Buipe and Yapei have a history of exposure to floods. The inhabitants of the two study communities comprise of families that have lived there for several generations and who are, as a result, expected to have developed effective strategies to cope with hazards and reduce vulnerability. However, the two communities are differentiated by socio-economic indicators, degree of social cohesion, residence time, and physical location with respect to hazards. Differences in assets and resources between the two communities and between different households in the same community should allow comparative work to be performed in an attempt to examine how assets affect vulnerability and response.

3.3 Methodological Approach

Previous studies demonstrate that political and economic processes determine levels of resilience. In this study, a micro level (community and household) analysis is done to explore human-environment interactions at the local level. The units of analysis used in this study are households and communities. A household has been defined as a person or group of persons who live together, share the same living arrangements, and consider themselves a single unit (Ghana Statistical Services 2005). In this definition, household residents need not be related by blood or marriage, but simply cohabitate. The term family is not synonymous with household in this context, even though family members who live in different households often involve one another in decisions concerning production and consumption. Community is defined as a group of households that interact frequently and have common interests, needs, and shared sense of identity (Friedman, 1996 & Morris-Oswald, 2007).

The household was chosen because this was the basic unit of production and consumption. The household, in other words, is the unit that owns valuable assets and determines coping responses and strategies. The communities were also chosen because they are usually affected by floods.

3.4 Sampling

Sampling involves the process of selecting part of the population to represent a whole. I used probability sampling technique for the study. This was used because it allows all the units in the universe an equal chance of being selected. This ensures the representativeness of the sample. It also produces the smallest possible sampling error.

The multi stage cluster sampling was used for the selection of the sample units. In the first stage communities were selected through simple random technique. At Buipe the

communities included Buipe Bridge, Yipala, Goroase and Worontu. Using the fish bowl method, numbers were written on pieces of papers, numbered one to four, each number represented a neighbourhood. Buipe Bridge was randomly chosen. At Yapei, the communities included Daresalam, Quarters, Old Yapei and Madina Line. The fish bowl method was again used in the selection of the neighbourhood. Old Yapei was randomly chosen.

The second stage of the multistage cluster sampling involved the selection of households from the selected neighbourhoods. The total number of households in Buipe was 1264 (Census, 2000). Twelve per cent of the total number of households was chosen as the sample size. The total sample size for Buipe Bridge was 152. At Yapei, the total number of households was 542 (Census, 2000). Again, twelve per cent of the total households were chosen as the sample size. The total sample size was 65.

At the second stage the procedure for selecting households was systematic. In both communities, the sampling fraction was obtained by dividing the sample size by the total number of households. The sampling fraction was one-eighth for both communities. To ensure validity of inferences as well as avoiding bias, the starting point for the selection of units was selected randomly. At Buipe the random number chosen was 5. At Yapei 3 was chosen. These numbers served as the starting point for the selection process. I started with the randomly selected numbers and at a sampling interval of eight I continued sampling until I got my total sample size. In the study area, some of the houses were compound houses that contained more than one household. Where there were more than one household in a house only one head of household was interviewed. This was based on the assumption that all members in the household shared the same socio-demographic characteristics, flood experience and coping strategies.

3.5 Methods and Procedures of Data Collection

I used both primary and secondary sources of data for the research. Primary data collections instruments used for the research are interviews, focus group discussion, questionnaires and direct observation. Secondary data collection instruments used for the research includes Government archives, journals and also documents from NADMO, MOFA and District Assemblies.

3.5.1 Document and Archival Analysis

Reports from MOFA and NADMO were used to get data on available flood statistics. This was used to show the level of vulnerability to floods in the communities. Rainfall figures were obtained from the Ghana Meteorological Agency for both communities from 2000 to 2010. This was to support the argument that physical characteristics such as rainfall are not the sole causes of vulnerability to hazards. Again, reports were taken from the CGDA on the backgrounds of the communities.

3.5.2 Interviews

Structured interviews were used for the head of institutions. Institutions which were interviewed included the CGDA, NADMO, MOFA, and CGHIS. Structured interviews were used to seek opinion of the institutions on the mitigation strategies provided by the institutions, causes of flooding and vulnerability, access to key assets and why recovery and not relocation has been the choice of the people. Interviews conducted with the institutions were used to supplement data that was gathered from the households and data gathered from direct observation.

In conducting the interview, a personal face-face interview where I sat together with the respondent was used. I traced the respondents to their offices and carried out the

interview. Using the structured interviews I was able to probe so as to get the right information I needed. I was able to see the expressions and reactions of respondents to some questions and answers. This allowed me to see if respondents were giving me the correct answers and their attitudes towards some questions.

This technique also enabled me to save time and to be able to carry out other interviews and administering my questionnaires. This was because it imposed an external indirect discipline on me to go straight to the subject matter and discuss only issues related to the subject under investigation. Also the information gathered from the different respondents was presented in the same form and order and this made analysis easy.

3.5.3 Questionnaire

Questionnaires were used for heads of households. The questionnaires were divided into sections which included socio-demographic characteristics of respondents, building structures, flood experiences, recovery and assets of respondents.

In administering the questionnaires, a personal interview questionnaire was adopted. This involved the presence of the interviewer asking questions and recording answers. From the preliminary field survey which was conducted I realised most of the respondents could not read and write so I decided to adopt this method. This was also to avoid respondents from dumping the questionnaires and also search for people who would enable them to answer the questions.

I employed two field assistants to help in administering of the questions for both communities. The field assistants were trained to be able to handle both respondents and the questionnaires. They were also asked to put the respondents at ease. The field assistants were people who had completed tertiary institutions and could speak Gonja,

Hausa and Twi so as to be able to translate the questions into the local dialects for the respondents. At Buipe, seven days was used to administer the questionnaires. This was from the 12th of October, 2011 to the 18th of October, 2011. Administering of the questionnaires were done in the morning and evening. This made it easy for us to meet most of the household heads. At Yapei, we used three days to administer the questionnaires. This was from 19th October to 21st October, 2011. Also, administering of the questionnaires were done in the morning and evening.

3.5.4 Focus Group Discussion

Focus group discussions (FGD) were used for community elders. Both women and men were of different ethnic groups and had stayed in the community for more than 30 years. Focus group discussions were used to provide more information on flooding. The discussions were used to generate data on changes in the occurrence of flooding, community assets, access and how they have changed over time. Data generated from FGD are not usually representative. This is because of the selection process. The data generated was therefore used to supplement information that was gathered from the household interviews.

I had two different discussions at Buipe. The discussions were carried on the 14th of October, 2011 but at different times for both men and women. The focus group at Buipe constituted 15 people (7 men and 8 women). The discussions lasted for about 138 minutes (65 minutes for men and 73 minutes for women). In Yapei the focus group constituted 14 people (7 men and 7 women). The discussions lasted for 135 minutes in Yapei (65 minutes for women and 70 minutes for men).

A discussion guide was used to carry out the FGD. This was used to help control and guide the discussion and also served as the focus group outline. A discussion guide

includes written introductory comments informing the group about the focus group purpose and rules, and then outlines topics or questions to be addressed in the group session (Zikmund et al., 2010). I also made it known to them that this was used for an academic purpose and anything they said was not going to be said anywhere. I led the discussion, whiles a field assistant recorded what was being discussed. However before we recorded we asked for their permission.

The participants were also asked to feel free and talk. In order to avoid one or two participants dominating the discussion, each participant was made to give an answer to any question that was asked. Also all opinions were taken into consideration. Anytime I realised what they were discussing was not generating good results I changed the topic so as to avoid much time being wasted.

3.5.5 Direct Observation

Direct observation was used to observe coping strategies. Direct observation is a technique of data collection in which the researcher takes part in the activities of the people with the knowledge of the group under study. With this technique, the group is aware of the researcher's presence and knows they are being observed. This instrument of method of data collection was used to gather data on the coping strategies of the group under study. These included before, during and after the hazards.

I was able to stay in both communities, since the floods occurred at different times. The people were made aware of my aim in the community. I observed and recorded the coping strategies before, during and after floods which occurred in 2010. This provided first-hand information which was used to supplement data that was collected from interviews and questionnaires.

3.6 Measurement of Impact, Vulnerability and Response

Structured interviews, questionnaires and focus group discussions were used to get data on the impact and sources of household and community vulnerability. I looked at physical, economic, social and political vulnerability. They were also used to get data on the level of vulnerability.

Past information about flooded areas were used to get the level of physical vulnerability. Physical vulnerability includes the characteristics of homes and their infrastructural profiles. Reports from NADMO, MOFA and FGD were used to attain the changes in the level of vulnerability. Direct observation was used to study human responses to environmental hazards. These included the adaptation strategies and factors enabling them to cope with environmental hazard.

3.7 Data Processing and Analysis

This section presents the data processing procedures and how data was analysed. Editing and coding were used to process the data for analysis. Descriptive statistics and inferential statistics were used to analyse data.

3.7.1 Data Processing

Data processing was done so as to make it easy for analysis. This however involved two stages, editing and coding. The first stage involved editing. Since fieldwork often produced data containing mistakes. Editing was done to check for completeness, consistency, and legibility of data and making the data ready for coding and transfer to storage. Editing was carried out during the process of collecting data and after the process of data collection.

Field Editing was done to check omissions such as blank pages, check legibility of handwriting for open ended responses, and clarify responses that are logically or conceptually inconsistent. Field assistant who had left some spaces blank were asked to make follow ups. This was to reduce the number of unanswered questions or incomplete responses. Field editing also enable me to spot the need for further training of field assistants to avoid mistakes that were made and to correct faulty procedures. In-house editing was also done. I went over all the questionnaires to make sure that the questionnaires were complete for coding and analysis.

After editing, the data was coded using the SPSS, quantitative data was coded. Numbers were assigned to quantitative data generated. This was to make it easy for analysis using the SPSS.

3.7.2 Data Analysis

Qualitative data was generated from the FGD and Direct observations. The data was however organized so as to search for patterns, ideas were developed from the patterns and conclusions were drawn and verified.

Quantitative data was generated from questionnaires and structured interviews. In analysing quantitative data generated, descriptive statistics were used. This was used to describe and summarize the data. Pie charts and bar graphs were used to display the single categorical variables which included gender, ethnicity, religious affiliation and age groups of both communities and was summarized by percentages.

Cross tabulations were used to show the relationship between sex and access to secured housing, livestock and education. It was also used to show the relationship between ethnicity and access to land and secured housing. Again it was used to show the relationship between religious affiliations on social network and education. It was also

used to show the relationship between age and access to social network, loans and savings.

3.7.3 Hypotheses Testing

In testing hypotheses, inferential statistics were used on making inferences about the characteristics of populations based on sample data. I used the Bivariate statistical analysis which involved testing for hypothesis involving two variables. The chi square test was used for hypothesis which involved two categorical variables.

3.8 Summary

This section summarizes the methodological approach and design of the research, and the different methods and procedures used to collect and analyse data. The study was conducted at Buipe and Yapei in the Central Gonja District of the Northern Region. The units of analysis used in the study were households and communities.

In conducting the research, I used probability sampling technique. The multi stage cluster sampling was used for the selection of the sample units. Twelve per cent of the total number of households was chosen as the sample size for both communities. Both primary and secondary sources of data were used for the research. Primary data collection instruments used for the research were interviews, focus group discussion, questionnaires and direct observation. Secondary data collection instruments used for the research includes documents, Government archives, journals and also reports from NADMO, MOFA and District Assemblies. Editing and coding were used to process the data for analysis. Descriptive statistics and inferential statistics were used to analyse data.

CHAPTER FOUR: BACKGROUND OF THE STUDY AREA

4.1 Introduction

This chapter presents the background of the study areas which includes the physical and socio-economic characteristics.

4.2 Physical Characteristics of the Area

Buipe and Yapei are located in the Central Gonja District in Northern Region with Buipe being the capital. Yapei is located in the Northern most part of the District, and is bordered on the North by the Kusawgu Area Council in the District, the West Gonja District and Tolon- Kumbungu in the West, the Mpaha Area Council to the South and Toluwe to the East. Buipe is bordered on the North by Mpaha Area Council, West Gonja District in the West, Kintampo North District in the South and also Mpaha Area Council in the East. Figure 4.1 shows district map in the national context. Figure 4.2 also shows the study areas in the district

These towns have gained much attention over the past years due to the occurrence of floods. The rainfall pattern in these towns is seasonal and is characterized by single maximum rainfall. It starts in May and ends in October. The mean annual rainfall is about 1144mm (GMA, 2010). August generally record the highest rainfall and also the greatest number of rainy days. In August rains also fall with very high intensity of up to 300mm per hour causing flash floods and erosion on the unprotected loose top soil, (GMA, 2010). During this period, people in these areas are usually affected by floods.

Figure 4.1: Location Map of the study area in national context

FIG. STUDY AREA IN NATIONAL CONTEXT

SOURCE: Survey Dept of Ghana (1994 Edition)
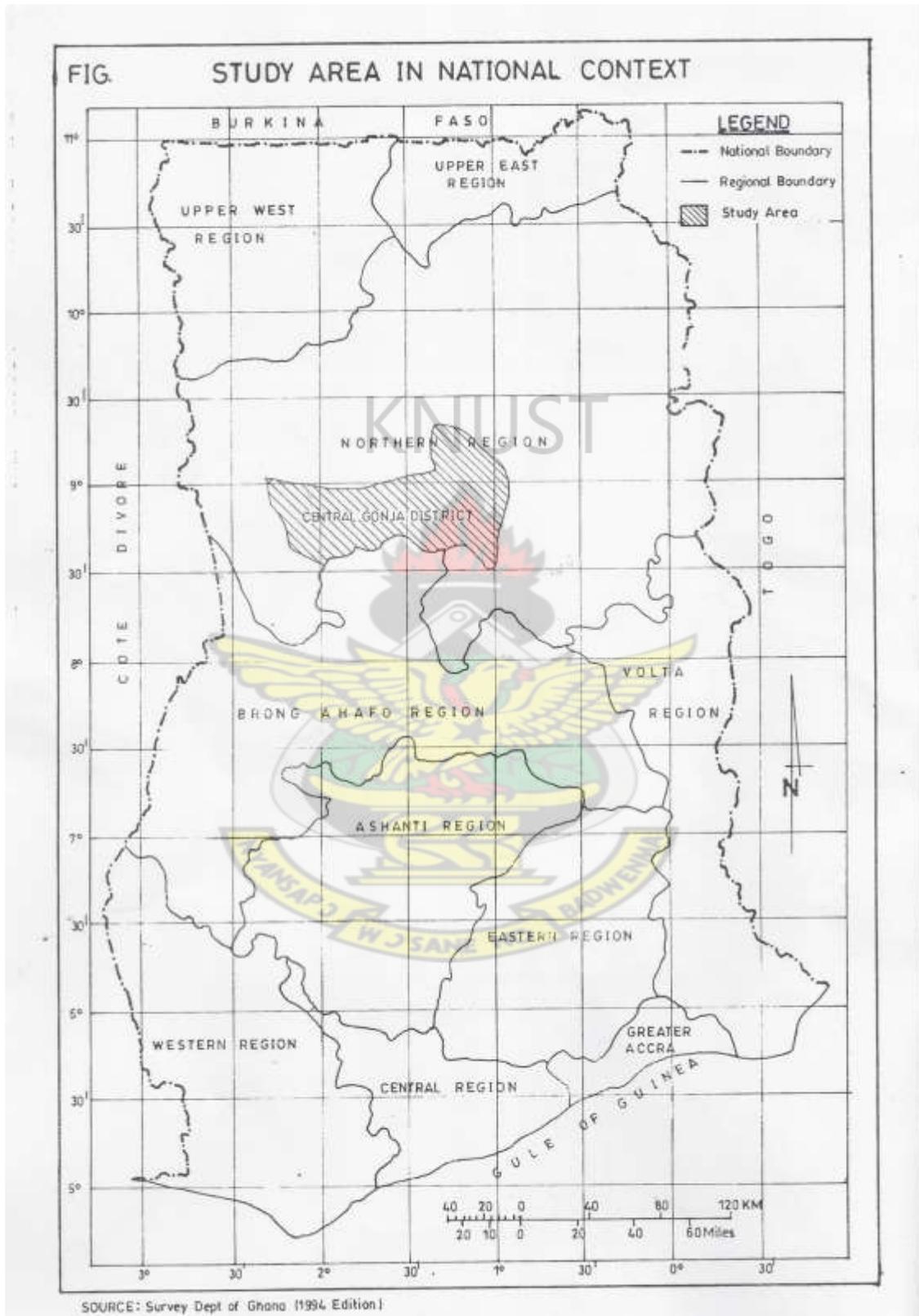
Figure 4.2 Location map of the study area
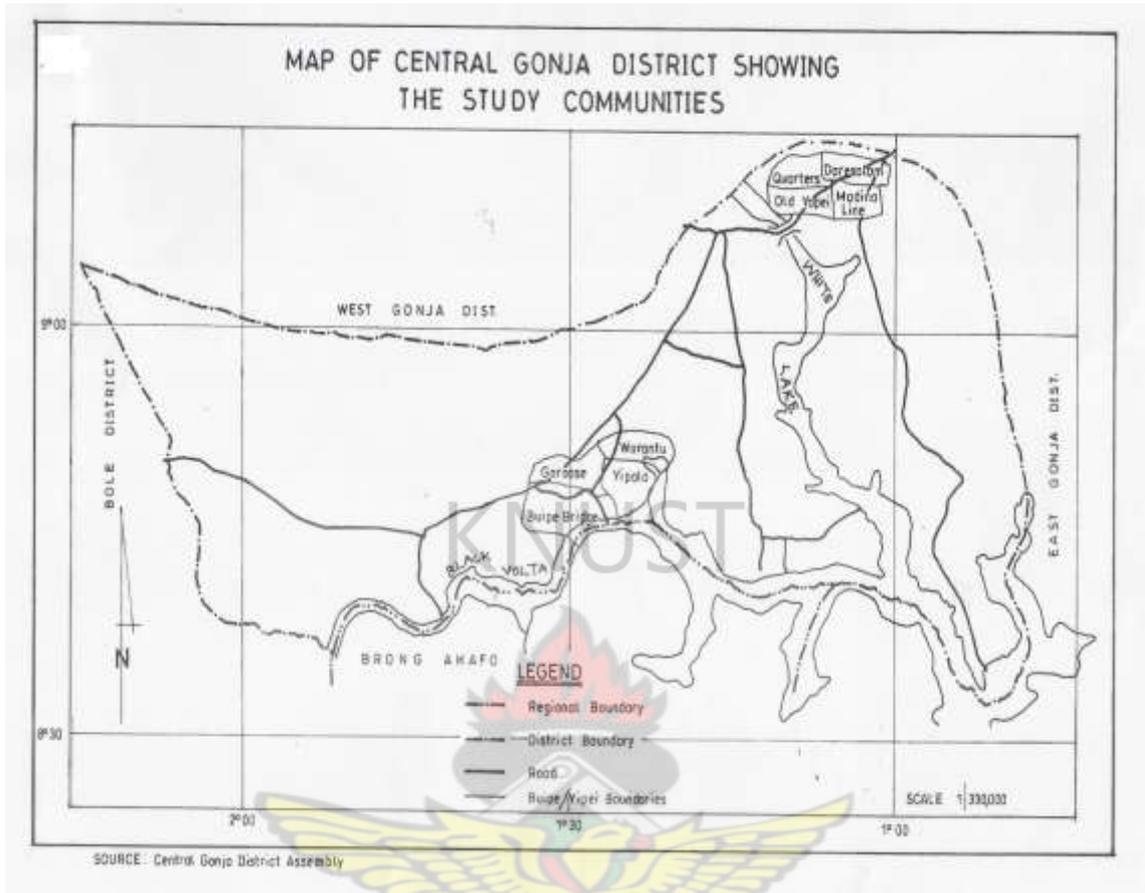
Maximum temperatures are experienced during the dry season, with March and April being the peak of very high temperatures while minimum temperatures are recorded during the Harmattan months of December to February. The area experiences the North East Trade Winds popularly known as the Harmattan Winds from the months of December-February which are characterised with cold nights and dry winds during the day time. The mean monthly temperature is 27°C, (GMA, 2010).

Again, the area is situated in an old geological area. The rocks are mainly of the Voltaian formation with isolated Cambrian rocks which contain valuable minerals such as gold and diamond. Limestone occurs between the lower and middle Voltaian formation around Buipe, the capital of the district, (DPCU, 2010).

The soils in the district are fertile for agriculture purposes and most of the inhabitants are crop farmers (DPCU, 2010). Soil types found in the district are alluvial, laterite and savanna ochrosols (DPCU, 2010). Alluvial soils are potentially fertile and are mostly found along the two Volta Rivers, their tributaries and the large plains. As a result, many people farm along the river banks which however are often destroyed anytime the rivers over flow their banks (DPCU, 2010).

The natural vegetation is guinea savannah. The major plant species which contribute to household sustenance especially because of their increasing commercial importance are Shea nuts tree and dawadawa. These serve as a source of income for the people and reduces their over reliance on agriculture (DPCU, 2010). Grass grows in tussocks and may reach 2.7_m during the rainy season. The most predominant being the elephant grass (DPCU, 2010).

The land form of the district is low 1ying but gently undulating at altitudes ranging between 150m to 300m above sea level though some parts average 600m. Settlement pattern in Buipe and Yapei is linear and scattered in nature. However settlements are concentrated along the river banks which are low-lying in nature (DPCU, 2010).

4.3 Socio-Economic Characteristics

Population growth has been seen as a source of vulnerability and also increased vulnerability (Smith, 2004; Tresman, 2004). The population growth rate in these communities is alarming and could put pressure on the available resources resulting in resource scarcity. These areas have a population growth rate of 3.1% which is higher than the national growth rate of 2.8% (Census, 2000).

The population density of the district is 8.3 persons per sq. km which is below the regional density of 25.9 persons per sq. km. With the age structure over 50% between 15-60 years of age. Buipe has population of about 8,347 people whiles Yapei has about 4,044 people.

The sex ratio of these communities is 103 males to 100 females. Research has shown that men are more able to cope better than women during disasters. For example in the 1991 cyclone disasters which killed 140,000 in Bangladesh, 90% of victims were women (Aguilar, 2004). The male dominated population could help in coping with disasters.

Gonja is the predominant tribe in the district. Gonjas' constitute over 80% of the total population. Other major tribes include Dagombas, Hausas, Mamprusis and Dagaabaa. The predominant religions practiced by the people include Christianity (18%), Islam (70%) and African Traditional Religion (12%), (DPCU, 2010).

Access to health facilities is a way of reducing vulnerability of people especially those normally affected by environmental hazards. As some writers have shown that, health care providers, including physicians, nursing homes and hospitals are important post-event sources of relief. The lack of proximate medical services will lengthen immediate relief and longer-term recovery from disasters (HCSEE, 2000; Morrow, 1999; & Hewitt 1997). Health facilities in these areas are inadequate with the few health facilities lacking qualified health personnel, drugs and vehicles (DPCU, 2010). This shows that lack of health facilities and personnel could lengthen their immediate relief and the rate of recovery and this could influence their level of vulnerability.

The main economic activity in the study area is agriculture. About 85% of the labor force is engaged in the agriculture sector, making the sector the main source of household income. Fishing is an important occupation for settlements along the White

Volta and Black Volta. A singular reliance on one economic sector for income generation creates a form of economic vulnerability. Agriculture is perhaps even more vulnerable given its dependence on climate. Any change in weather conditions or increases in hydro meteorological hazards, such as flooding, drought, or hail, can affect annual and decadal incomes and the sustainability of the resource base (Cutter et al., 2003).

Agriculture is mainly rain fed and agricultural practices are basically traditional. Farm plots are small in size and scattered and are being managed by small scale peasant farmers. More than 80% of these people use hoes and cutlasses in cultivation. A greater number of farmers have little access to tractor services while a handful use bullock ploughs in land preparation. It has however been said that, high dependence on rain fed agriculture may affect livelihood of poor communities as a result of impact of climate change (Lyimo & Kangalawe, 2010).

4.4 Summary

This section is a summary of chapter four of the study. Buipe and Yapei are part of the newly created Central Gonja District with Buipe being the capital. The mean annual rainfall in these areas is about 1144mm (GMA, 2010). The land form of the district is low lying but gently undulating at altitudes ranging between 150 m to 300 m above sea level though some parts average 600 m.

Population growth rate of the study areas is 3.1% which is higher than the national growth rate of 2.8% (Census, 2000). Buipe has population of about 8,347 people whiles Yapei has about 4,044 people. The sex ratio of these communities is 103 males to 100 females.

Gonja is the predominant tribe in the district. Other major tribes include Dagombas, Hausas, Mamprusis and Dagaabaa. The predominant religion practice by the people includes Christianity, Islam and African Traditional Religion, (DPCU, 2010). Agriculture and fishing are the main economic activities in the study areas.

CHAPTER FIVE: CHARACTERISTICS, ASSETS AND VULNERABILITY

5.1 Introduction

This chapter presents the findings from the study and shows how characteristics of individuals or groups affect their ability to access key assets and how it affects their ability to cope with hazards. The findings support the argument by Blaikie et al., (1994) that vulnerability to hazards is generated by social, economic and political processes. These processes influence how hazards affect people in varying ways and different intensities (Blaikie et al., 1994).

5.2 Sex and Access to Human and Physical Capital

In this section, education represents human capital whiles physical capital is represented by secured houses and livestock. Lack of education and poor housing quality could make people vulnerable to hazard. This is because education has been linked to socioeconomic status, with higher educational attainment resulting in greater lifetime earnings. Again, the neighbourhoods most vulnerable to flooding in Georgetown, Guyana tended to be those with low household incomes, poor housing quality and low levels of community organization (Pelling, 1997). This section shows how sex affects access to human and physical capital and how it has affected their ability to withstand and recover from the impacts of floods.

5.2.1 Percentages of Males and Females at Buipe and Yapei

At Buipe, 65.1 per cent of the sample constituted males whiles 34.9 per cent were females. This is represented in figure 5.2.1.1

Figure 5.2.1.1 Sex of Respondents at Buipe
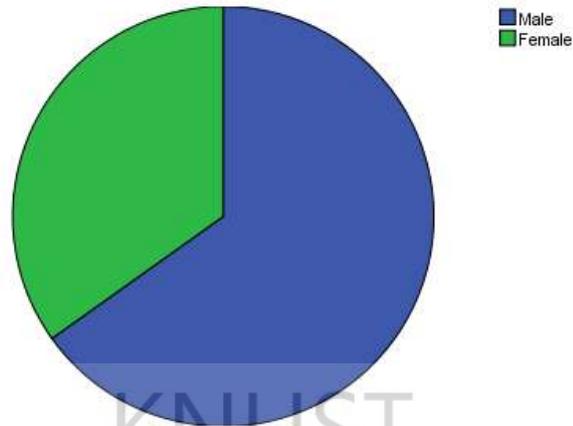
Source: Field Survey, 2011

Figure 5.2.1.2 shows the percentages of males and females at Yapei. Males constituted 83.08 per cent of the sample and females constituted 16.92 per cent.

Figure 5.2.1.2 Sex of Respondents at Yapei
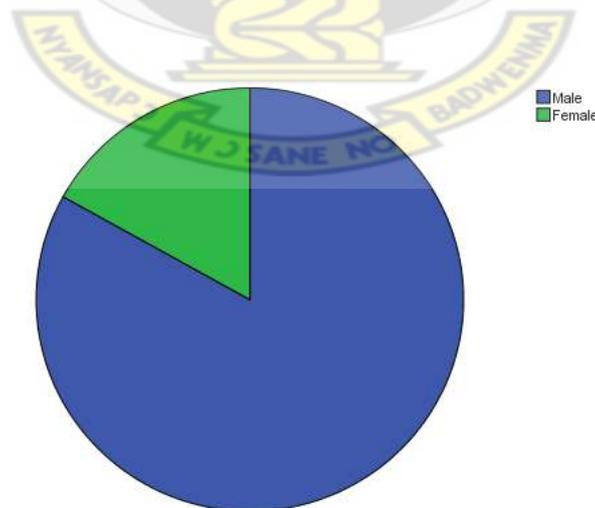
Source: field survey, 2011

In both study areas, there are more households headed by men than women. This could be as a result of the Ghanaian traditional system, where it is believed that men are the

heads of households and determine everything in the household. Again this could also be a sampling error.

Buipe has more females as household heads than Yapei. Most of the females who were household heads were widows or divorced. It's been stated that, northern region has 14.1 per cent of female headed households which is much higher than 11.0 per cent of the national average (Census, 2000). The findings from the study at Buipe compares well with census data where northern region has a greater percentage of female headed households than the national average. This is not the same at Yapei, as few of the households were headed by females. The findings from both study areas also compares well with existing data which shows that there are more males than females in the study areas. The sex ratio of these communities is 103 males to 100 females (DPCU, 2010).

5.2.2 Sex and Access to Human Capital (Education)

Lack of access to education could affect people's ability to resist the consequences of hazard. This is because lack of access to education affects people's ability to secure jobs in the formal sector which can withstand the impacts of floods. The differences in the levels of educational attainment among males and females are presented in the tables below. Table 5.2.2.1 below shows the differences in the level of education among males and females at Buipe. From the findings, more males had better access to education than females.

Table 5.2.2.1 Sex and Level of Education at Buipe

Sex	Counts and Percentages								Total	
	No Education		Basic		Secondary		Tertiary			
	Count	%	Count	%	Count	%	Count	%	Count	%
Male	58	59	30	30	6	6	5	5	99	100
Female	46	87	7	13	0	0	0	0	53	100

Source: Field Survey, 2011

Again table 5.2.2.2 shows sex and level of education at Yapei. From the findings 83 per cent of the total number of males from the sample has not been educated. None of the female respondents have been educated.

Table 5.2.2.2 Sex and Level of Education in Yapei

Sex	Counts and Percentages						Total	
	No Education		Basic		Secondary			
	Count	%	Count	%	Count	%	Count	%
Male	45	83	8	15	1	2	54	100
Female	11	100	0	0	0	0	11	100

Source: Field Survey, 2011

In both communities, more males have been educated than females. This situation has been attributed to the religion, socio-cultural practice and the value system of the people which tend to marginalize the full development of females (DPCU, 2010). Also in a FGD with the women in Buipe one woman called Hawa said "My parents did not allow me to go to school because they felt my place was in the kitchen and also said I was going to get married someday, so did not see the importance of educating me". Even though more men have been educated than women in the communities, the number is not significant especially at Yapei. This compares well with the literature which concluded that 80 per cent of the people in the area can be considered as illiterate (DPCU, 2010).

Lack of education does not only affect ability to understand warning information but also securing jobs in the formal sector which are not vulnerable to hazards. Better educational attainment could enable people to secure jobs in the formal sector than in the informal sector which are easily hit by floods. More females lost their business than the males in the study. This supports the fact that more women than men work in the informal sector and in small enterprises. These sectors are often the worst hit and least able to recover from the effects of disasters, due to lack of capital, and limited access to credit and information, among other obstacles (Nelson et al., 2002).

As initially discussed lack of access to education could affect people's ability to resist the impacts of floods. This is because lack of education affects people's ability to access jobs in the formal sector which are secured and not vulnerable to floods. Table 5.2.2.3 shows the counts and percentages of those who had their businesses closed at Buipe. From the table, 78 per cent out of the total number of males in the sample and 91 per cent of the females sampled had their businesses closed as a result of floods. Those who did not have their businesses closed could be because they are employed in the government and private sector and so their businesses are secured and resistant to floods.

Table 5.2.2.3 Sex and Businesses Destroyed at Buipe

Sex	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Male	75	78	24	22	99	100
Female	48	91	5	9	53	100

Source: Field survey. 2011

The table 5.2.2.4 below also presents the counts and percentages of the males and females who had their business closed as a result of floods at Yapei. From the table, 82 per cent of the total number of males from the sample population and 82 per cent of the 11 females from the sample had their businesses closed due to flood.

Table 5.2.2.4 Sex and Businesses Destroyed at Yapei

Sex	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Male	44	82	10	18	54	100
Female	9	82	2	18	11	100

Source: Field Survey, 2011

At Buipe, there are more men educated than women. There is a statistically significant relationship between sex and access to education in Buipe at 5 per cent confidence level with a p-value of 0.007. As initially discussed, the situation has been attributed to the religion, socio-cultural practice and the value system of the people which tend to marginalize the full development of females (DPCU, 2010). Again there are more men educated at Yapei than women. However there was no statistically significant relationship between sex and access to education at a 5 per cent confidence level with a p-value of 0.546. Table 5.2.2.5 shows the results of the chi square test.

Table 5.2.2.5 Chi Square Test on Sex and Education

Chi Square Test	Community	
	Buipe	Yapei
Value	14.126	2.128
Df	4	3
Asymp. Sig. (2-sided)	0.007	0.546

Source: Field Survey, 2011

5.2.3 Sex and Access to Physical Capital (Secured Houses and Livestock)

''Housing quality is an important indicator of flood vulnerability'' (Nethengwe, 2007:126-130). For example, in a study by Nethengwe, (2007), households in a grass-thatched house were perceived to be more vulnerable to floods than households in a stone house, whose housing structure represents high coping capacity and more resilience to flood hazards (Nethengwe, 2007). Housing quality helps to resist the consequences of flood. In both communities, houses built of cement blocks were more resistant to floods than houses built of mud (Field survey, 2011). Mud houses are not able to withstand the impacts of floods and easily collapse. This is shown in Figure 5.1.2.3 and 5.1.2.4. These pictures were taken in November, 2010.

Figure 5.2.1.3 Block house been able to resist flood   Figure 5.2.1.4: Collapsed mud houses

The table 5.2.3.1 below shows the counts and percentages of sex and ownership of houses at Buipe. Majority of both males and females own houses at Buipe. However, a greater percentage of females owned houses than males at Buipe.

Table 5.2.3.1 Sex and Ownership of Houses at Buipe

Sex	Counts and Percentages				Total	
	Own		Rent			
	Count	%	Count	%	Count	%
Male	59	60	40	40	99	100
Female	37	70	16	30	53	100

Source: Field Survey, 2011

Table 5.2.3.2 below shows the building materials of houses owned at Buipe among males and females. More males have their houses built of cement than females. This therefore means that males have houses which are more resistant to floods than females

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and therefore have secured houses. This is because of the ability of the cement houses to withstand the impacts of floods than mud houses. There are however more houses built of mud than cement in Buipe and therefore affect the ability of the houses to withstand floods.

Table 5.2.3.2 Building Materials of those who own Houses at Buipe

Sex	Counts and Percentages				Total	
	Cement		Mud		Total	
	Count	%	Count	%	Count	%
Male	20	34	39	66	59	100
Female	6	16	31	84	37	100

Source: Field survey, 2011

Building materials of females and males who rent at Buipe are presented in table 5.2.3.3. Again majority of those who rent live in mud houses than houses built of cement, with more males living in cement houses than females.

Table 5.2.3.3 Building Materials of those who Rent at Buipe

Sex	Counts and Percentages				Total	
	Cement		Mud		Total	
	Count	%	Count	%	Count	%
Male	15	38	25	62	40	100
Female	5	31	11	69	16	100

Source: Field Survey 2011

Table 5.2.3.4 shows the counts and percentages of males and females who had their houses destroyed at Buipe. More houses of females got destroyed by floods than males. This is because more males have their houses built of cement blocks than females.

Table 5.2.2.4 Houses Destroyed at Buipe

Sex	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Male	83	84	16	16	99	100
Female	47	89	6	11	53	100

Source: Field Survey, 2011

After the 2010 floods more males than females have rebuilt their houses with cement increasing the number of cement houses in Buipe. This explains why the number of houses not destroyed is lesser than the number of cement houses. Also those who rent have relocated to houses built of cement blocks.

Table 5.2.3.5 shows the counts and percentages of females and males who own and rent houses at Yapei. Unlike Buipe where a greater percentage of females own houses than males, at Yapei more males own houses than females.

Table 5.2.3.5 Sex and Ownership of Houses at Yapei

Sex	Count and Percentages				Total	
	Own		Rent			
	Count	%	Count	%	Count	%
Male	52	96	2	4	54	100
Female	10	91	1	9	11	100

Source: Field Survey, 2011

The building materials at Yapei are not different from Buipe. As initially stated, houses built of cement blocks can withstand the impacts of floods than those built of mud. The table 5.2.3.6 below shows the building materials of those who own houses. At Yapei, out of the total number of males who own houses in the sample only 8 per cent have their houses built of cement. All females have their houses built of mud.

Table 5.2.3.6 Building Materials of those who own Houses at Yapei

Sex	Counts and Percentages					
	Cement		Mud		Total	
	Count	%	Count	%	Count	%
Male	4	8	48	92	52	100
Female	0	0	10	100	10	100

Source: Field Survey, 2011

Table 5.2.3.7 below shows the building materials of houses rented by males and females. All those who rent live in houses built of mud.

Table 5.2.3.7 Building Materials of those who Rent at Yapei

Sex	Count and Percentages					
	Cement		Mud		Total	
	Count	%	Count	%	Count	%
Male	0	0	2	100	2	100
Female	0	0	1	100	1	100

Source: Field Survey, 2011

The table 5.2.2.8 below shows the counts and percentages of males and females who had their houses destroyed. Those whose houses did not collapse are at the verge of collapsing and sticks have been used to support the houses from falling. Seventy-six per

cent of the 54 males in the sample and 73 per cent of the 11 females in the sample had their houses destroyed by floods.

Table 5.2.2.8 Houses Destroyed at Yapei

Sex	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Male	41	76	13	24	54	100
Female	8	73	3	27	11	100

Source: Field survey, 2011

Houses built of cement blocks in the study areas helps to resist the impacts of floods. People who own and rent houses built of cement houses turn to be more resistant to the impacts of floods than those who live in houses built of mud. From the findings, more males live and own houses which are being able to resist the impacts of floods than females in both study areas. But Buipe has more males and females having houses being able to resist the consequences of flood than those at Yapei.

In both communities, there are more house owners than those who live in rented houses and this could be an advantage as house owners can easily make changes to their houses to withstand the impacts of floods than those who rent. For instance, Kateliwura raised the foundation of his house to 0.9 meters high above the flood level of the area. More of those who rent said their landlords did not do anything to their houses to withstand the impacts of floods. Some of them especially the males have rebuilt their houses.

Livestock are important sources of income and means of wealth accumulation (Doss et al., 2008). However, a general pattern is for men to own large livestock and particularly, work animals, while women own smaller livestock and yard animals (Doss

et al., 2008). The situation is not different from the findings in the study areas. Table 5.2.3.9 and table 5.2.3.10 show the number of males and females owning livestock in the study areas.

Livestock's in Buipe and Yapei include cattle, fowls, sheep, goat and duck. Most of the males own cattle, sheep, and goat. At Buipe, out of the 99 males in the sample 43 per cent own livestock. Forty-three per cent of all the females in the sample own livestock which include fowls, chickens, ducks and goat. The livestock's owned by men are larger and more valuable than that of women (Field Survey, 2011). This is because majority of the males who own livestock own cattle, sheep and goat which are very expensive than livestock owned by females. Most of the females own fowls, ducks and goats. For instance, cattle are more expensive than fowls and ducks.

Table 5.2 .3.9 Sex and Access to Livestock at Buipe

Sex	Count and Percentages				Total	
	Own		Do not own			
	Count	%	Count	%	count	%
Male	43	43	56	57	99	100
Female	23	43	30	57	53	100

Source: Field survey, 2011

At Yapei, livestock owned are not different from that of Buipe. This is shown in table 5.2.2.10 below. A greater percentage of males own livestock than females in the sample. Again, livestock owned by males are more expensive than those of females.

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Table 5.2 3.10 Sex and Ownership of Livestock at Yapei

Sex	Counts and Percentages				Total	
	Own		Do not own			
	Count	%	Count	%	Count	%
Male	39	72	15	28	54	100
Female	6	55	5	45	11	100

Source: Field Survey, 2011

Males own more and valuable livestock than females which include cattle, sheep and goat. This situation in both communities follows the general pattern where men own large livestock and particularly, work animals, while women own smaller livestock and yard animals (Doss et al., 2008). Both males and females sell off their livestock after floods to recover but males earn more money than females. This is because of the differences in the value of livestock. For instance at Buipe, Htu said "I used to have 30 cattle but the floods have taken all and I have only 5". Hama Bonsu owned 10 cattle but had only 5 after floods. With the females, Fatima said "I used to own 10 goats but they died, and I had only 2 after floods, 30 chickens and lost everything".

At Yapei, Adams used to own 15 sheep but have lost everything and had only 2 after floods. With the females, Fatima owned 10 fowls but had only 3 after floods left. Cattle are very expensive than goats, sheep, fowls and chickens. Again goats and sheep are more expensive than fowls and chickens. Even though both males and females in the study areas were affected by floods and lost their livestock. The livestock owned by the males in all study areas are more expensive and valuable than those of females. Livestock owned are usually sold to help in recovering from the impacts of hazard and since the males own valuable and larger livestock than females they are being able to recover fast from the impacts of floods.

Access to education and secured houses enables people to resist the impacts of floods whiles ownership of livestock helps to recover from the impacts of floods. From the study even though majority of the respondents were not educated and did not have access to secured houses most of them were females. Again males in the community owned larger and valuable livestock than the females. This therefore affected their ability to withstand and recover from the consequences of floods. The table 5.2.2.11 below shows the periods used by males and females to recover from the impacts of flood at Buipe. From the findings, a greater percentage of females take a longer time to recover from floods than males. Since floods in the community is annual more females turn to be more vulnerable to subsequent floods than males in Buipe because of the inability of females to resist and recover from the consequences of flood event which is as a result of lack of access to education, secured houses and livestock.

Table 5.2.2.11 Sex and Rate of Recovery at Buipe

Sex	Counts and Percentages				Total	
	Less than a year		More than a year			
	Counts	%	Counts	%	Counts	%
Male	66	67	33	33	99	100
Female	12	23	41	77	53	100

Source: Field survey, 2011

From the findings at Yapei, respondents take a longer time to recover from the consequences of a flood event. Only 41 per cent of the total number of males recovered in less than a year. None of the females recovered after a year from the flood impacts. Majority of the respondents have not fully recovered at Yapei because of the less access to education, quality houses, larger and valuable livestock which affects their ability to

withstand and recover from the consequences of floods. Table 5.2.2.12 below shows sex and the rate of recovery at Yapei.

Table 5.2.2.12 Sex and Rate of Recovery at Yapei

Sex	Counts and Percentages				Total	
	Less than a year		More than a year			
	Counts	%	Counts	%	Counts	%
Male	22	41	32	59	54	100
Females	0	0	11	100	11	100

Source: Field survey, 2011

As discussed earlier, education and secured houses helps to resist the impacts of floods whiles ownership of livestock helps to recover from the consequences of floods. Females in both communities take a longer time to recover from floods. This could be attributed to the better access to education, quality housing and livestock of males than females. From the access model, both households were exposed to floods and suffered damages from floods. Household 2 loses more properties than household 1 but recovers faster than household 1 because of the differences in access to resources. This therefore affects the recovery rate of household 1 and makes it more vulnerable to the next flood. This applies to households headed by males and females in the communities. Both male and female headed household were exposed to floods. However households headed by males were able to resist the impacts of floods because of their access to secured houses and education. Also, males owned more valuable livestock than females as a result were able to recover faster from the impacts of the floods. Better access to secured houses, livestock and education by the male headed households enabled them to resist and recover faster than the female headed households. Lack of better access to secured houses, livestock and education affected the ability of females to resist and recover from

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the consequences of floods. Female headed households in the communities become vulnerable to the next flood event. This becomes a cyclical process whereby assets of females continues to be destroyed and so before they recover another flood occurs making them vulnerable all the time to floods.

Also, flood victims at Buipe recover faster than those at Yapei. This is also because of the differences in access to secured houses, livestock and education. More respondents at Buipe had houses built of cement blocks than those at Yapei. This enabled them to resist the impacts of flood event. Again better access to education enabled those at Buipe to resist flood from affecting their businesses than those at Yapei. Again those at Buipe owned more valuable livestock than those at Yapei. This enabled them to recover faster from the consequences of the flood event. Respondents at Buipe have better access to secured houses and education than those at Yapei. This therefore affects their ability to resist and recover from the impact, making them vulnerable to the next flood. The people at Yapei become vulnerable to the next flood than those at Buipe.

5.3 Age and Access to Financial and Social Capital

This section shows how age affects access to financial capital which is savings, loans and social capital which is social network and household relations at Buipe and Yapei. Again savings and loans in this research refer to monies saved and borrowed from financial institutions, friends and relatives. The ages were put in two groups, the actively working population (18-60 years) and retired population (60 years and above). In Ghana the retirement age is sixty and those who are sixty years and above are considered as inactive. I wanted to find out how this affects their access to assets and vulnerability to floods.

5.3.1 Percentages of Age Groups

Figure 5.3.1.1 shows the age groups in Buipe. Those who were between eighteen and sixty years represented 75 per cent whiles sixty years and above constituted 25 per cent of the population.

Figure 5.3.1.1 Age groups of respondents at Buipe
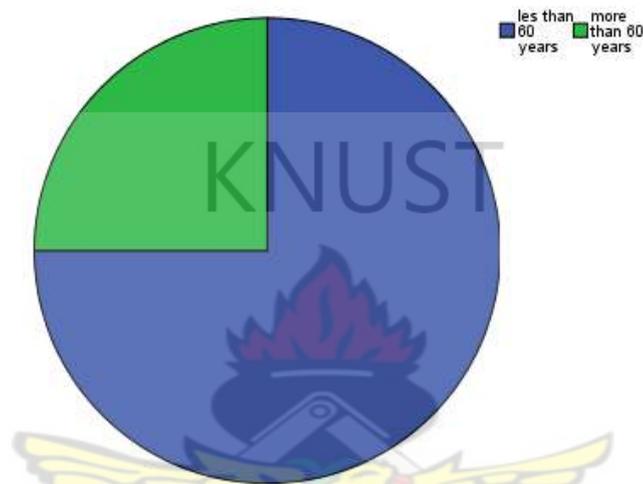
Source: Field survey, 2011

Figure 5.3.1.2 also shows the age groups in Yapei. From the sample surveyed, 58.5 per cent of the population were between eighteen to sixty years and 41.5 per cent were sixty years and above.

Figure 5.3.1.2 Age groups of respondents at Yapei
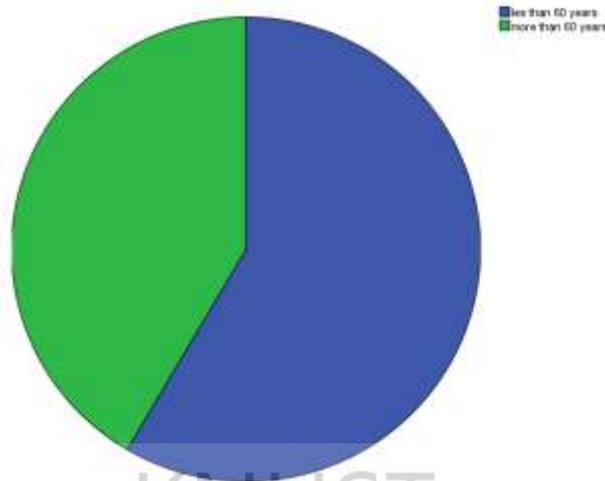
Source: Field Survey, 2011

The finding from the research compares with the age structure of the district which has over 50 per cent of the population being between the ages of 15-60 years (DPCU, 2010). The percentage of those above sixty years in Yapei is higher than that of Buipe.

5.3.2 Age and Access to Financial Capital (Savings and Loans)

Studies have shown that age affects access to financial capital. The elderly are indirectly viewed as less productive segments of the society and are often neglected in favour of more productive working class population. Access to financial capital enables people to recover from the consequences of flood event. This is because financial capital is used to restart businesses and lives. Table 5.3.2.1 shows the relationship between age and access to loans and savings at Buipe. From the findings, a greater percentage of the actively working population had better access to savings than the retired population in the sample. However, a greater percentage of the retired population had better access to

loans from financial institutions than the actively population in the sample. This contradicts the studies by some researchers which surmise that, the elderly tend to lack efficient income or capital reserves which restrict them from accessing certain forms of formal government aid or qualifying for low-interest building loans (Bolin, 1986; Alexander, 1997; Mileti, 1999; Morrow, 1999).

Table 5.3.2.1 Age and Access to Financial Capital (Savings and Loans) at Buipe

Age groups	Counts and Percentages				Total		Counts and Percentages				Total	
	Saves		Do not save				Accessed loans		Did not access loans			
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Actively Working (18-60 years)	62	54	52	46	114	100	51	45	63	55	114	100
Retired (60 years above)	10	26	28	74	38	100	20	53	18	47	38	100

Source: Field Survey, 2011

The relationship between age and access to financial capital at Yapei is presented in table 5.3.2.2 below. Most of them do not save neither did they access loans like those at Buipe. This may be because there are no financial institutions at Yapei. The findings at Yapei showed that 11 per cent each out of the total number of each age group save. More of those in active working population borrowed from friends and relatives than the retired population in the sample.

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Table 5.3.2.2 Age and Access to Financial Capital (Savings and Loans) at Yapei

Age groups	Counts and Percentage				Total		Counts and percentage				Total	
	Save		Do not save				Access loans		Did not access loans			
	Counts	%	Counts	%	Counts	%	Counts	%	Counts	%	Counts	%
Actively Working (18-60 years)	4	11	34	89	38	100	3	8	35	92	38	100
Retired (60 years and above)	3	11	24	89	27	100	1	4	26	96	27	100

Source: Field survey, 2011

Many of the respondents at Buipe had better access to financial capital than those at Yapei. The situation is different in Yapei. As seen from table 5.3.2.2 most of them do not save and did not access loans. In a FGD, one woman said "there are no banks in this community so we don't save and are not even able to secure loans like those at Buipe. We used to save with some men who come around but they have run away with our monies. They took my GH¢ 300 away". Access to financial capital helps to recover from the impacts of floods. This is because financial capital helps to restart businesses, lives and also to get all properties that were lost.

The results of the analysis at Buipe show that more of those in the actively working population save than the retired. From table 5.3.2.3, there is a statistically significant relationship between age and access to savings at Buipe at 5 per cent confidence level with a p-value of 0.003. Again more of those in the active working population save than those who are retired at Yapei. However the relationship between

age and savings at Yapei was not statistically significant at a 5 per cent confidence level with a p-value of 0.940.

Table 5.3.2.3 Chi Square test on Age and Savings

Pearson Chi-Square	Community	
	Buipe	Yapei
Value	9.007	0.006
Df	1	1
Asymp. Sig. (2-sided)	0.003	0.940

Source: Field Survey, 2011

The findings of the research showed that, majority of the retired received loans than those in the active working population. From table 5.3.2.4, there was no statistically significant relationship between age and access to loans at a 5 per cent confidence level. The p-value was 0.398. Again, the findings at Yapei showed that, more of the active working population borrowed than those who are retired in the sample. The result was not statistically significant at a 5 per cent confidence level, with a p-value of 0.488.

Table 5.3.2.4 Chi Square test on Age and Loans

Pearson Chi-Square	Community	
	Buipe	Yapei
Value	0.714[a]	0.480[a]
Df	1	1
Asymp. Sig. (2-sided)	0.398	0.488

Source: Field survey, 2011

5.3.3 Age and Access to Social Capital (Social network and household relations)

Households are important adaptive institutions and act as safety nets in times of economic difficulty (Moser, 1997). At Buipe and Yapei, households acted as safety nets for those whose houses were flooded as some of them packed their belongings and stayed with friends and families. Also access to social network enabled some respondents to anticipate and recover from flood consequences. Those who did not receive help had to stay in schools, verandas, tents and abandoned structures. This affected the health of some respondents. For instance, a 61 year old woman called Bintu at Buipe said "I had to sleep in the school and on the floor for three months". This she said has affected her and she can hardly walk, as a result she is not being able to work again and is now at home. Figures 5.3.1.3 and 5.3.1.4 below show tents and schools occupied by flood victims. These pictures were taken November, 2010.

Figure 5.3.1.3: Temporal occupied tent by victims. Figure 5.3.1.4: A school building occupied by victims

Access to social capital helps in the ability to anticipate and recover from the consequences of floods. For instance, A 65 year old man called Albasir at Buipe said "I

heard about the floods from a friend at MOFA". Also a 35 year old man called Issahaku at Buipe said he heard about the floods from a relative at the NADMO office. Social network helps flood victims to recover from floods. For instance a 45 year old man called Enoch at Buipe said, "I received bags of rice, cooking oil and bags of cement from my friends". This he said enabled him to feed his family throughout the flood season. Also he used the bags of cement to rebuild his houses which was initially built of mud. Again, a 65 year old man Alhaji at Yapei said he received bags of cement from his party members. This he used to rebuild his house.

Table 5.3.3.1 below shows those who received help from friends, relatives and those who did not and had to rent, sleep in schools, verandas and abandoned structures. From the table, those in the active working population had better access to social capital than the retired. This enabled those in the active working population to anticipate and recover from flood impacts.

Table 5.3.3.1 Age and Access to Social Capital at Buipe

Age groups	Count and percentages				Total	
	Received help		Did not receive help			
	Count	%	Count	%	Count	%
Actively Working (18-60 years)	29	25	85	75	114	100
Retired (60 years and above)	9	24	29	76	38	100

Source: Field Survey, 2011

Table 5.3.3.2 below shows the counts and percentages of those who had their properties destroyed between the age groups. More of those in the retired age group had their properties destroyed than those in the active working population age group.

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Table 5.3.3.2 Damages to Properties at Buipe

Age groups	Counts and percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Actively Working Population (18-60 years)	106	93	8	7	114	100
Retired (60 years and above)	35	92	3	8	38	100

Source: Field survey, 2011

Although both age groups suffered severe damages from floods, those in the active working age group take a shorter time to recover than those in the retired age group. This is because of the better access to financial and social capital. Access to financial capital helps to recover from the consequences of flood event. Most of those in the retired age group only depended on loans taken to restart their lives. However, those in the active working population depended on savings and loans as a result help them to recover faster. Also access to social capital (household relation and social network) from friends and relatives of those in the active working population helped them to restart their lives. Table 5.3.3.3 below shows the counts and percentages of those who recovered in less than a year and those who took over a year to recover from floods. The findings at Buipe showed that, a greater percentage of the active working population recovered faster than the retired in the sample. Therefore, the retired are the vulnerable group. This is because of the lack of access to financial and social capital which affects their ability to anticipate and recover from flood consequences. They find it very difficult to reconstruct their lives after floods and so become vulnerable to subsequent floods.

Table 5.3.3.3 Recovery Rate among the Age Groups at Buipe

Age groups	Counts and Percentages				Total	
	Less than a year		More than a year			
	Counts	%	Counts	%	Counts	%
Actively Working Population (18- 60 years)	64	56	50	44	114	100
Retired (60 years and above)	14	37	24	63	38	100

Source: Field Survey, 2011

Table 5.3.3.4 shows those who received help from people and those who did not between the age groups at Yapei. More of those in the retired age group received help from friends and relatives than those in the active age group.

Table 5.3.3.4 Age and Access to Social Capital at Yapei

Age Groups	Count and Percentages					
	Received help		Did not receive help		Total	
	Count	%	Count	%	Count	%
Actively working Population (18-60 years)	5	13	33	87	38	100
Retired (60 years and above)	7	26	20	74	27	100

Source: Field Survey, 2011

The counts and percentages of those who lost their properties at Yapei are presented in table 5.3.3.5 below. Even though more of those in the retired age group received help

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than those in the active working population, they could not pack their things but were only given places to sleep. However, those in the active age group received help from friends and relatives and were also provided with places to pack their things. This accounts for the reason why more of those who are in the retired age group lost their properties than those in the active age group.

Table 5 3.3.5 Damages to Properties at Yapei

Age	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Actively working Population (18- 60 years)	30	79	8	21	38	100
Retired (60 years and above)	24	89	3	11	27	100

Source: Field survey, 2011

Majority of the sample at Yapei have not recovered from the consequences of the flood event. This can be attributed to the lack of access to savings, loans, social network and household relations. Majority of those who take a longer time to recover are the retired. These people turn to be vulnerable to subsequent floods. Table 5.3.3.6 shows the periods used by the different age categories to recover from the impacts of floods at Yapei.

Table 5.3.3.6 Recovery Rate among the Age groups at Yapei

Age	Counts and Percentages				Total	
	Less than Year		More than a Year			
	Count	%	Count	%	Count	%
Actively Working Population (18- 60 years)	15	40	23	60	38	100
Retired (60 years and above)	7	26	20	74	27	100

Source: Field Survey, 2011

Lack of access to financial capital affects people's ability to recover from the impacts of flood events whiles lack of access to social capital affects people's ability to anticipate and recover from the consequences of flood event. This is evident in both study areas as lack of access to financial and social capital affected the ability of those who are retired to recover. This then makes them vulnerable to subsequent floods.

From the access model, two households were exposed to floods. But household 2 due to its better access to social capital and financial capital was able to anticipate and recover from the consequences of floods. This is because access to social capital enabled household 2 to anticipate flood occurrence in the community. This helped them to pack some properties. Also, even though they still lost some properties they were able to recover as a result of access to financial capital and because of its social status had people to help them to recover. This is evident in the study areas, both age groups stay in flood prone areas but because those in the active age group at Buipe had a better access to social capital they were able to anticipate flood occurrence, also had places to pack their belongings and were helped to restart lives. Also those who are actively working had better access to financial capital than the retired so were able to recover faster. The

retired turn to be vulnerable to subsequent flood, because of the longer time it takes for them to recover from floods due to lack of access to financial and social capital.

Location of people could also contribute to their inability to anticipate, withstand and recover fast from the impacts of floods. This is evident in the study areas, Buipe is considered to be an urban area whiles Yapei is a rural area. As a result the respondents at Buipe had a better access to financial and social capital than those at Yapei. Lack of access to financial capital by the respondents at Yapei affected their ability to recover quickly from the consequences of the flood event. Also lack of access to social capital affected their ability to anticipate and recover from the consequences of the flood event. The respondents at Yapei also turn to be more vulnerable to subsequent floods than those at Buipe. The respondents at Yapei find it very difficult to reconstruct their lives after floods and so take a longer time to recover before the next floods. This makes them very vulnerable to subsequent flood.

Table 5.3.3.7 shows the results of hypothesis 4. The findings at Buipe showed that, majority of those in the actively working group had access to social capital than the retired. However, the result was not statistically significant at 5 per cent confidence level. The p-value was 0.829. Again, results at Yapei showed that more of those who are retired had access to social capital than those in the actively working group. However, the result was not statistically significant at a 5 per cent confidence level with a p-value of 0.314.

Table 5.3.3.7 Chi Square test on Age and Social Network

Pearson Chi-Square	Community	
	Buipe	Yapei
Value	.047[a]	1.014[a]
Df	1	1
Asymp. Sig. (2-sided)	0.829	0.314

Source: Field survey, 2011

KNUST

5.4 Religion and Access to Social and Human Capital

This section presents the percentages of the religious groups and how it affects access to social and human capital in the study areas. Education represents human capital whiles social network and household relations represents social capital. Christianity, Islamic and Traditional religions are the main religious groups in the study areas.

5.4.1 Percentages of Religious Groups

The religious groups at Buipe are being represented in the pie chart below. Christians represented 18.4 per cent; Muslims represented 80.3 per cent while the traditionalist constituted 1.3 per cent of the population.

Figure 5.4.1.1 Religious Groups at Buipe

Christianity
Islamic
Traditional
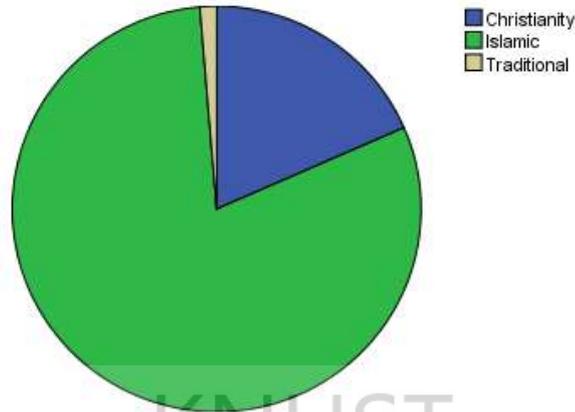
Figure source: Field Survey, 2011

Again the pie chart below represents the percentages of the religious groups at Yapei. Islamic religion constituted the largest, 95.4 per cent while Christianity represented 4.6 per cent. None of the respondents indicated a traditional religion.

Figure 5.4.1.2 Religious Groups at Yapei

Christianity
Islamic
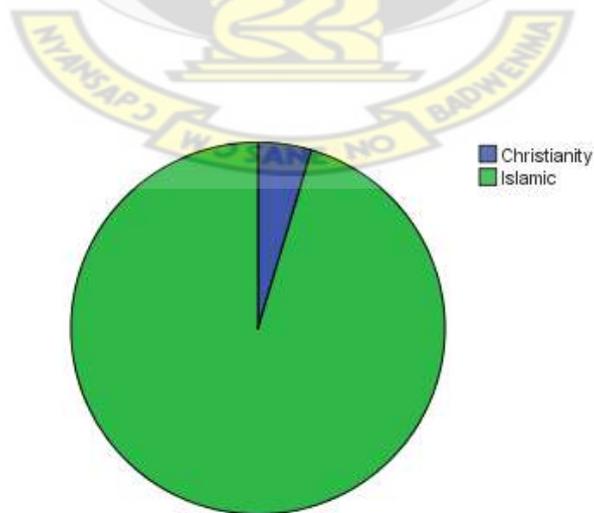
Source: Field Survey, 2011

Islamic religion is predominant in both study areas and more than 70 per cent of the people are Muslims (DPCU, 2010). Traditional religious groups were absent at Yapei.

5.4.2 Religion and Access to Human Capital (Education)

Table 5.4.2.1 below shows the counts and percentages of the educated and none educated at Buipe. More Christians have been educated than Muslims and traditionalist. It has however been stated that, academic expectations, level of educational attainment, school attendance, and academic performance are all positively affected by religious practice, (Fagan, 2006). The low level of educational attainment by the Muslims and traditionalists in the sample could be attributed to the religious practices of Muslims and traditionalist which prevents them from having access to education.

Table 5.4.2.1 Religion and Access to Education at Buipe

Sex	Counts and Percentages								Total	
	No Education		Basic		Secondary		Tertiary			
	Count	%	Count	%	Count	%	Count	%	Count	%
Christianity	13	46	11	39	3	11	1	4	28	100
Islamic	90	74	25	21	3	2	4	3	122	100
Traditional	1	50	1	50	0	0	0	0	2	100

Source: Field survey, 2011

The findings from the study showed that majority of the respondents had not been educated. This could be the reason why majority of the respondents rely on rain- fed agriculture and usually suffer severe damages from floods. Lack of education affects people's ability to resist the consequences of floods. This is because lack of education makes people secure jobs in the informal sector which are most vulnerable to floods.

Jobs in the informal sector are unable to resist the impacts of floods. For instance, Gariba at Buipe said "I lost ten acres of maize during the previous year's flood". As a result he has not been able to recover again.

Table 5.4.2.2 shows the counts and percentages of those who lost their businesses among the religious groups at Buipe. More Muslims and Traditionalist lost their business than Christians. This could be because more Christians are educated than the other religious groups and so are more likely to be employed in the formal sector.

Table 5.4.2.2 Religion and Businesses Destroyed at Buipe

Religion	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Christianity	22	79	6	21	28	100
Islamic	99	81	23	19	122	100
Traditional	2	100	0	0	2	100

Source: Field Survey, 2011

Again the table below shows the various religious groups and the educational level at Yapei. None of the Christian respondents had been educated.

Table 5.4.2.3 Religion and Access to Education at Yapei

Sex	Counts and Percentages						Total	
	No Education		Basic		Secondary			
	Count	%	Count	%	Count	%	Count	%
Christianity	3	100	0	0	0	0		100
Islamic	53	85	8	13	1	2		100

Source: Field survey, 2011

Majority of the respondents at Yapei lost their business. Only 19 percent of the 62 Muslims did not have their businesses destroyed. This is presented in table 5.4.2.4.

Table 5.4.2.4 Religion and Businesses Destroyed at Yapei

Religion	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Christianity	3	100	0	0	3	100
Islamic	50	81	12	19	62	100

Source: Field survey, 2011

KNUST

The relationship between religion and access to education was not statistically significant at a 5 per cent confidence level since the p-value was 0.125. However there were more Christians educated at Buipe than Muslims and Traditionalist. Also there was no statistically significant relationship ($p<0.05$) between religion and access to education at Yapei with a p-value of 0.918. However there were more educated Muslims than Christians. The results of the hypothesis test is shown in table 5.4.2.5

Table 5.4.2.5 Chi Square on Religion and Education

Pearson Chi-Square	Buipe	Yapei
Value	12.639[a]	0.505[a]
Df	8	3
Asymp. Sig. (2-sided)	0.125	0.918

Source: Field survey, 2011

5.4.3 Religion and Access to Social Capital (Social Network and Household Relation)

Access to social capital helps to anticipate and recover fast from the impacts of floods. Some respondents who did not have radios nor televisions heard about the occurrence of

floods in the community through their churches and mosques. Maria from Buipe said "I heard about the floods from the mosque" Others also heard it from their friends and relatives. Also during floods some of the respondents did not lose all their properties because their relatives and friends helped them to pack some of their properties. Again, some had support from friends, relatives, religious institution which helped them to recover from the flood consequences. Jacob at Buipe said "I received five bags of cement and roofing sheets from my church. This helped me to rebuild my house which was initially built of mud."

The table 5.4.3.1 below shows religion and access to social capital at Buipe. From the table, more Muslims had better access to social capital than Christians and Muslims. None of the traditionalists received help. Those who did not receive help had to sleep in abandoned structures, verandahs and rented houses.

Table 5.4.3.1 Religion and Access to Social Capital at Buipe

Religion	Count and Percentages				Total	
	Received help		Did not receive help			
	Count	%	Count	%	Count	%
Christianity	5	18	23	82	28	100
Islamic	33	27	89	73	122	100
Traditional	0	0	2	100	2	100

Source: Field Survey, 2011

Table 5.4.3.2 shows the counts and percentages of those who lost their properties during floods among the religious groups. The findings showed that, 93 per cent each out of 28 Christians and 122 Muslims and all the respondents who indicated as traditionalist lost their properties during the previous year's flood.

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Table 5.4.3.2 Damages to Properties at Buipe

Religion	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Christianity	26	93	2	7	28	100
Islamic	113	93	9	7	122	100
Traditional	2	100	0	100	2	100

Source: Field Survey, 2011

The table 5.4.3.3 below shows the recovery rate among the religious groups in Buipe. The traditionalists take a longer time to recover making them vulnerable to subsequent flood. None of the traditionalist recovered in less than a year.

Table 5.4.3.3 Recovery among the Religious groups at Buipe

Religion	Counts and Percentages				Total	
	Less than a Year		More than a Year			
	Counts	%	Counts	%	Counts	%
Christianity	16	57	12	43	28	100
Islamic	62	51	60	49	122	100
Traditional	0	0	2	100	2	100

Source: Field survey, 2011

More Christians were able to recover faster than the other religious groups probably due to the differences in access to education, which helps them to resist the impacts of floods. This is because education helps them to secure jobs in the formal sector which are able to resist the impacts of floods. Again the Muslims were also able to recover because of their better access to social and human capital. Access to social capital helped them to recover because they had friends and relatives who helped them to recover from the

impacts of floods. Also, human capital could have enabled them secure jobs in the formal sector which helped them to resist the impacts of floods.

The table 5.3.4.4 below shows the various religious groups and their access to social capital at Yapei. None of the Christians received help from friends, neighbors or relatives. Most of them had to stay at the community center, schools and rented houses.

Table 5.4.3.4 Religion and Access to Social Capital at Yapei

Religion	Counts and Percentages				Total	
	Receive help from relatives, friends		Did not receive help			
	Count	%	Count	%	Count	%
Christianity	0	0	3	100	3	100
Islamic	12	19	50	81	62	100

Source: Field Survey

Table 5.3.4.5 shows the counts and percentages of those who lost their properties during floods among the religious groups. All Christians in the sample lost their properties.

Table 5.3.4.5 Damages to Properties at Yapei

Religion	Counts and percentages				Total	
	Yes		No			
	Counts	%	Counts	%	Counts	%
Christianity	3	100	0	0	3	100
Islamic	51	82	11	18	62	100

Source: Field Survey, 2011

Table 5.4.3.6 presents the religious groups and the recovery rate. None of the Christians were able to recover within a year. Christians in Yapei take a longer time to recover from flood event and this makes them vulnerable to the next event.

Table 5.4.3.6 Recovery among Religious Groups at Yapei

Religion	Counts and Percentages					
	Less than a year		More than a year		Total	
	Counts	%	Counts	%	Counts	%
Christianity	0	100	3	100	3	100
Islamic	22	35	40	65	62	100

Source: Field Survey, 2011

Education enables people to secure jobs in the formal sector which are not vulnerable to floods. This enables people in the formal sector to be able to resist the impact of floods than those in the informal sector. Again access to social capital enables people to anticipate floods through friends, relatives and religious institutions. Most of the Muslims in the sample heard about the floods in the mosque. Also some Christians were able to recover due to the help offered by their churches.

None of the Christians at Yapei recovered faster from the flood event because of lack of access to human and social capital which prevents them from being able to anticipate and recover from the impacts of floods. Access to better social and human capital enabled the Muslims in the community to anticipate flood occurrence and resist the impacts of floods than the Christians.

From the access model, some social attributes can block people from accessing certain key assets. Differences in access to key resources affect people's ability to anticipate and recover from flood impacts. The Muslims and Christians had a better access to education than the traditionalist even though there were more educated Christians than Muslims at Buipe. However Muslims received help from friends and relatives. For instance during the FGD at Buipe a traditional man called Atsu "said I did not have anybody to come and help me so I lost all my properties and have to rent".

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Better access to education, social network and household relations helped most of the Muslims and Christians to resist and recover from the impacts of households than the traditionalist who could not resist the impacts of floods and recover in less than a year. But majority of the Muslims and traditionalist are the vulnerable groups in the community and turn to be vulnerable to subsequent floods. At Yapei, the Christians are more vulnerable than the Muslims since none of them recovered in less than a year. This is due to lack of access to education, social network and household relation which affected their ability to resist and recover from flood impacts.

Differences in access to social and human capital between the study areas have affected the ability of the respondents at Yapei to resist and recover making them more vulnerable than those at Buipe. This is because majority of the respondents at Yapei take a longer time to recover than those at Buipe making the respondents at Yapei vulnerable to subsequent floods.

The relationship between religion and access to social network was not statistically significant at 5 per cent confidence level since the p-value was 0.427. This shows that household relation at Buipe is deteriorating and therefore does not serve as an adaptive asset for the vulnerable in times of need. Ishawu at Buipe said "I slept in an abandoned structure for three months". This is because he did not have any body to help him whiles his family slept in a school. Hawa a Muslim respondent also said "I slept on a verandah for 3 months". Again, the relationship between religion and access to social network at Yapei was not statistically significant at 5 per cent confidence level since the p-value was 0.375. The result of hypothesis 6 is shown in table 5.4.3.7 below.

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Table 5.4.3.7 Chi Square test on Religion and Social Network

Pearson Chi-Square	Buipe	Yapei
Value	1.702^a	$.786^a$
Df	2	1
Asymp. Sig. (2-sided)	0.427	0.375

Source: Field survey, 2011

5.5 Ethnicity and Access to Physical and Natural Capital

This section presents the various ethnic groups in the communities and the differences in access to physical and natural capital. Also, how this difference has affected the rate of recovery among the different ethnic groups is presented. In this study, physical capital is represented by secured house whiles natural capital is represented by land.

5.5.1 Percentages of Ethnic Groups

Ethnic groups in Buipe and Yapei are represented with bar graphs below. Figure 5.5.1.1 shows the ethnic groups in Buipe. "Others" on the graphs represent the Gao, Fulanis and Zabarimas in the community. These tribes constituted the largest percentage in the community (38.2 per cent). The percentages of the various ethnic groups include, Gonjas, 32.2 per cent, Ewes, 11.8 per cent, Akan, 2.6 per cent, Dagomba, 3.9 per cent, Hausas, 6.6 per cent, Mamprusi, 2 per cent, Guans, 7 per cent, and Kassena 2 per cent.

Figure 5.5.1.1Ethnic groups in Buipe

Ethnic groups in Yapei are displayed on Figure 5.5.1.2. "Others" on the graph include the Gao, Fulanis and Zabarimas. The Gonjas in the community represented 80 per cent, Ewes, 4.6 per cent, Akan, 1.5 per cent, Dagombas, 1.5 per cent, Hausa, 4.6 per cent, Ga-Adangbe, 1.5 per cent, Nanumba, 1.5 per cent, and "others", 4.6 per cent.

Figure 5.5.1.2 Ethnic Groups at Yapei
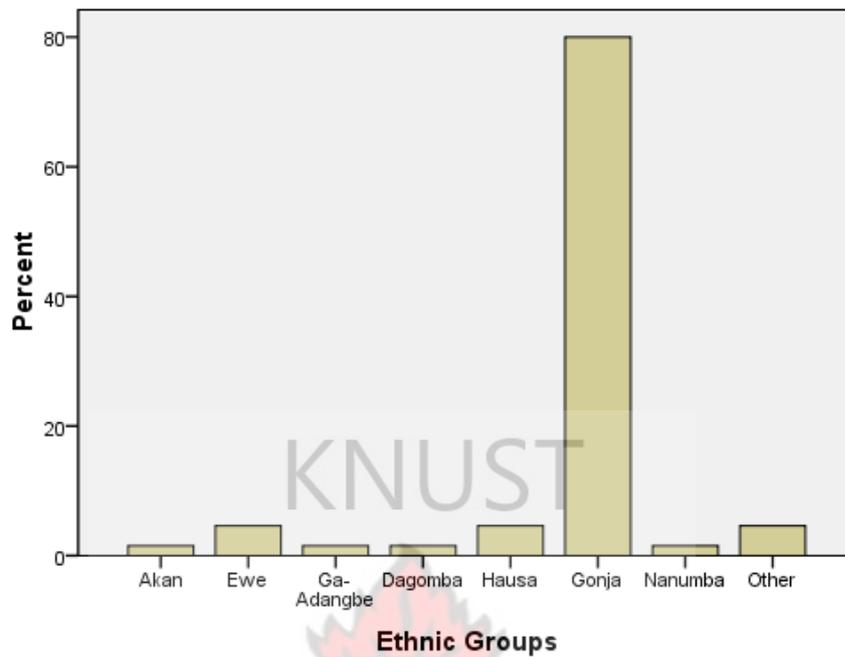
The predominant ethnic group in Yapei is Gonja and therefore supports census data that Gonjas' constitute over 80 per cent of the total population in the district (DPCU, 2010). Gonjas are the natives in both study areas.

5.5.2 Ethnicity and Access to Physical Capital (Secured Houses)

The findings from the research showed that majority of the ethnic groups own houses at Buipe. Again, the findings showed that cement houses are able to withstand floods than mud houses. This means that those who own and live in houses built of cement are more resistant to flood consequences than those who live and own mud houses. Most house owners are being able to make changes to their houses than those who rent. Table 5.5.2.1 shows the counts and percentages of those who own and rent houses.

Table 5.5.2.1 Ethnicity and Ownership of Houses at Buipe

Ethnicity	Counts and Percentages				Total	
	Own		Rent			
	Counts	%	Counts	%	Counts	%
Akan	1	25	3	75	4	100
Ewe	9	50	9	50	18	100
Dagomba	4	67	2	33	6	100
Hausa	7	70	3	30	10	100
Gonja	30	61	19	39	49	100
Mamprusi	0	0	3	100	3	100
Guan	1	100	0	0	1	100
Kassena-Nankana	0	0	3	100	3	100
Other	44	75	14	24	58	100

Source: Field survey, 2011

Again, from the findings, there are more houses built of mud than houses built of cement. This means that there are fewer houses that can resist the impacts of floods in Buipe. Table 5.5.2.2 shows the building materials of those who own houses in Buipe. Majority of Gonjas and Akans own houses built of cement in the sample.

Table 5.5.2.2 Building Materials of those who own Houses at Buipe

Ethnicity	Counts and Percentages				Total	
	Cement blocks		Mud			
	Count	%	Count	%	Count	%
Akan	1	100	0	0	1	100
Ewe	3	33	6	67	9	100
Dagomba	1	25	3	75	4	100
Hausa	1	14	6	86	7	100
Gonja	11	37	19	63	30	100
Guan	0	0	1	100	1	100
Other	9	20	35	80	44	100

Source: Field survey, 2011

The table 5.5.2.3 also shows the building materials of houses of those who rent. Majority of those who rent live in mud houses which are not resistant to floods. From the table, more migrants live in mud houses than natives.

Table 5.5.2.3 Building Materials of those who Rent at Buipe

Ethnicity	Counts and Percentages				Total	
	Cement		Mud			
	Count	%	Count	%	Count	%
Akan	3	100	0	0	3	100
Ewe	2	22	7	78	9	100
Dagomba	1	50	1	50	2	100
Hausa	0	0	3	100	3	100
Gonja	9	47	10	53	19	100
Mamprusi	0	0	3	100	3	100
Kassena-Nankana	2	67	1	33	3	100
Other	3	21	11	79	14	100

Source: Field survey, 2011

From the findings, houses which were built of cement blocks were more resistant to floods than those built of mud. Majority of the houses built of mud collapsed, others were at the verge of collapsing and had to be rebuilt as a result of floods whiles none of the houses built of cement blocks collapsed. Table 5.5.2.4 shows the counts and percentages of the ethnic groups whose houses got damaged by floods. All houses of Mamprusis, Hausas, Kassenas, Dagombas and Guans were destroyed by floods.

Table 5.5.2.4 Ethnicity and Damages to Houses at Buipe

Ethnicity	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Akan	3	75	1	25	4	100
Ewe	15	83	3	17	18	100
Dagomba	6	100	0	0	6	100
Hausa	10	100	0	0	10	100
Gonja	35	71	14	29	49	100
Mamprusi	3	100	0	0	3	100
Guan	1	100	0	0	1	100
Kassena-Nankana	3	100	0	0	3	100
Other	54	93	4	7	58	100

Source: Field survey, 2011

Most houses owned by Gonjas' were not destroyed because they were built with cement blocks. Again some of them live a little farther away from the river than the other tribes. During the 2010 floods most of the respondents owned and rented mud houses however some of the respondents have rebuilt their houses with cement and others have rented houses built of cement and so the numbers of cement block houses have increased. This explains why the number of houses not destroyed is lesser than cement houses. Majority of Gonjas, Akans and Kassenas are those who have rebuilt their houses with cement whiles others have rented houses built of cement blocks.

Unlike Buipe where a considerable number of respondents did not own houses, the situation is quite different at Yapei. All the ethnic groups at Yapei owned houses with the exception of only 4 percent of the total number of Gonjas and 33 percent

of the total number of Ewes who do not own their houses. Table 5.5.2.5 shows the counts

and percentages of those who own and rent houses at Yapei.

Table 5.5.2.5 Ethnicity and Ownership of Houses at Yapei

Ethnicity	Counts and Percentages				Total	
	Own		Rent			
	Count	%	Count	%	Count	%
Akan	1	100	0	0	1	100
Ewe	2	67	1	33	3	100
Ga-Adangbe	1	100	0	0	1	100
Dagomba	1	100	0	0	1	100
Hausa	3	100	0	0	3	100
Gonja	50	96	2	4	52	100
Nanumba	1	100	0	0	1	100
Other	3	100	0	0	3	100

Source: Field survey, 2011

Again at Yapei, more houses are built of mud with only a few houses built of cement

blocks. From table 5.5.2.6, all those who owned houses have them built of mud with the

exception only 6 per cent of the total number of Gonjas and 33 per cent of the total

number of Hausas own houses built of cement.

Table 5.5.2.6 Building Materials of those who own Houses at Yapei

Ethnicity	Counts and Percentages				Total	
	Cement		Mud			
	Count	%	Count	%	Count	%
Akan	0	0	1	100	1	100
Ewe	0	0	3	100	3	100
Ga-Adangbe	0	0	1	100	1	100
Dagomba	0	0	1	100	1	100
Hausa	1	33	2	67	3	100
Gonja	3	6	49	94	52	100
Nanumba	0	0	1	100	1	100
Other	0	0	3	100	3	100

Source: Field survey, 2011

None of those who rent live in houses built of cement blocks. Only few of Gonjas and Ewes rent and they all live in mud houses.

Table 5.5.2.7 Building Materials of those who Rent at Yapei

Ethnicity	Counts and percentages				Total	
	Cement		Mud			
	Count	%	Count	%	Count	%
Ewe	0	0	1	100	1	100
Gonja	0	0	2	100	2	100

Source: Field survey, 2011

Again at Yapei, the cement block houses were able to withstand floods than those built of mud. Most of the houses were destroyed by floods, those which were not, are at the verge of collapsing as sticks have been used to support the houses. From the table, 25 per cent of the total number of Gonjas and 33 per cent of the total number of Hausas did not have their houses destroyed but were almost collapsing.

Table 5.5.2.8 Ethnicity and Damage to Houses at Yapei

Ethnicity	Counts and Percentages				Total	
	Yes		No			
	Count	%	Count	%	Count	%
Akan	1	100	0	0	1	100
Ewe	3	100	0	0	3	100
Ga-Adangbe	0	0	1	100	1	100
Dagomba	1	100	0	0	1	100
Hausa	2	67	1	33	3	100
Gonja	39	75	13	25	52	100
Nanumba	1	100	0	0	1	100
Other	2	67	1	33	3	100

Source: Field Survey, 2011

5.5.3 Ethnicity and Access to Natural Capital (Land)

Race and ethnicity imposes language and cultural barriers that affect access to post-disaster funding and residential locations in hazard prone areas (Pulido, 2000; Peacock, Morrow, and Gladwin 1997, 2000; Bolin with Stanford 1998; Bolin 1993). The research showed that ownership of land which is not flood prone enables flood victims to recover from flood impacts. This is because the lands are sold or used as collateral to secure

loans in order to recover from flood impacts. In Buipe ethnicity is a cause of vulnerability to floods (Field survey, 2011). The natives who are Gonjas do not occupy flood prone areas but rather the migrants are those occupying the flood prone areas. This may account for the reason why Gonjas are not the predominant tribe in the sample. This is also the reason why some Gonjas did not have their houses destroyed. Those who had their houses destroyed own and farm on lands that are far from the river and so helped them to avoid floods. Also the migrants are more frequently affected by floods than the natives. This is not so at Yapei as most of the Gonjas are along the river banks. However, more Gonjas own land than the other tribes because they had inherited it and have refused to sell it.

The table 5.5.3.1 below shows the counts and percentages of those who own land among the ethnic groups at Buipe. From the table, more natives own land than the migrants. Majority of the lands apart from that of the Gonjas have been taken over by floods. During floods, the Gonjas are still able to go to their farms than the other tribes.

Table 5.5.3.1 Ethnicity and Access to Land at Buipe

Ethnicity	Counts and Percentages				Total	
	Land		Landless			
	Count	%	Count	%	Count	%
Akan	2	50	2	50	4	100
Ewe	6	33	12	67	18	100
Dagomba	2	33	4	67	6	100
Hausa	3	30	7	70	10	100
Gonja	34	69	15	31	49	100
Mamprusi	1	33	2	67	3	100
Guan	0		1	100	1	100
Kassena-Nankana	2	67	1	33	3	100
Other	11	19	47	81	58	100

Source: Field survey 2011

The table 5.5.3.2 below shows ethnicity and rate of recovery at Buipe. From the findings, a greater percentage of natives recovered in less than a year after floods than the other ethnic groups. Since majority of the other ethnic groups take a longer time to recover, they are then vulnerable to subsequent floods in the community.

Table 5.5.3.2 Ethnicity and Recovery Rate at Buipe

Ethnicity	Counts and Percentages					
	less than a year		More than a year		Total	
	Count	%	Count	%	Count	%
Akan	1	25	3	75	4	100
Ewe	6	33	12	67	18	100
Dagomba	2	33	4	67	6	100
Hausa	2	20	8	80	10	100
Gonja	36	74	13	27	49	100
Mamprusi	1	33	2	77	3	100
Guan	0	0	1	100	1	100
Kassena-Nankana	1	33	2	77	3	100
Other	25	43	33	57	58	100

Source: Field survey, 2011

As discussed earlier, cement houses are able to withstand the impacts of floods than block houses. Again access to land which are not flood prone helps in the ability to recover from the consequences of floods, from the findings, even though all the tribes were affected by floods some Gonjas did not have their houses destroyed because of the location and the building material. As a result they were able to withstand the impacts of floods. Also, even though all the ethnic groups owned land, Gonjas are the majority. However, the natives do not own lands which are flood prone. The migrants however own lands which are flood prone. During floods, the natives are able to sell off their lands or use it as collateral for loans to recover faster than the migrants. As a result of the

differences in access to physical and natural capital, Gonjas were able to resist and recover faster than the other tribes. This makes the other tribes vulnerable to subsequent floods in the future.

Unlike Buipe, where the Gonjas do not occupy flood prone areas at Yapei, the Gonjas are those who stay and farm along the river. This is because the lands along the river are fertile and so they prefer to farm there. In a FGD with the women, Mariamu said "people think we enjoy farming along the river, but that is not the case, we cannot buy fertilizer so we farm along the river in order to harvest much". Table 5.5.3.3 also shows the various ethnic groups at Yapei and those who owned land. Again, a greater percentage of natives own land than the migrants at Yapei.

Table 5.5.3.3 Ethnicity and Access to Land at Yapei

	Counts and percentages				Total	
Ethnicity	Land		Landless			
	Count	%	Count	%	Count	%
Akan	0	0	1	100	1	100
Ewe	0	0	3	100	3	100
Ga-Adangbe	0	0	1	100	1	100
Dagomba	0	0	1	100	1	100
Hausa	1	33	2	67	3	100
Gonja	29	56	23	44	52	100
Nanumba	1	100	0	0	1	100
Other	1	33	2	67	3	100

Source: Field survey 2011

From the findings, only 39 per cent of the total number of Gonjas and 33 per cent each of the total number of Ewes and Hausa recovered in less than a year after floods. None of

Akans, Ga-Adangbe, Dagomba, Nanumba and "others" recovered in less than a year. This could also be attributed to lack of access to physical and natural capital which affects their ability to resist and recover from flood consequences. Since majority of the other ethnic groups take a longer time to recover, they turn to be vulnerable to subsequent floods in the community.

Table 5.5.3.4 Ethnicity and Recovery at Yapei

Ethnicity	Counts and percentages				Total	
	less than a year		More than a year			
	Count	%	Count	%	Count	%
Akan	0	0	1	100	1	100
Ewe	1	33	2	67	3	100
Ga-Adangbe	0	0	1	100	1	100
Dagomba	0	0	1	100	1	100
Hausa	1	33	2	67	3	100
Gonja	20	39	32	61	52	100
Nanumba	0	0	1	100	1	100
Others	0	0	3	100	3	100

Source: Field Survey, 2011

The result of hypothesis 7 is presented in table 5.5.3.5. The results of the findings showed that more Gonjas owned land than the other ethnic groups at Buipe. There was a statistically significant relationship between ethnicity and access to land at a 5 per cent confidence level. The p-value was 0.000. The results from Yapei showed that there was no statistically significant relationship between ethnicity and access to land at a 5 per

cent confidence level. The p-value was 0.303. However, there were more Gonjas who owned land than the other ethnic groups at Yapei.

Table 5.5.3.5 Chi Square test on Ethnicity and Land

Pearson Chi-Square	Buipe	Yapei
Value	36.259[a]	8.346[a]
Df	8	7
Asymp. Sig. (2-sided)	0.000	0.303

Source: Field Survey, 2011

The access model shows how differences in the access profile of household differ due to different social attributes and the significance these differences has on the potential loss and rate of recovery from the impacts of a hazard and intensification of their vulnerability levels (Blaikie et al., 1994). This is shown in the study areas, as a result of ethnic differences the natives at Buipe have been able to occupy areas which are not flood prone making the migrants to settle in flood prone areas. Also lands aid in recovering from flood impacts but lands which are not prone to floods are owned by the natives while the migrants own lands which are prone to floods. This is because lands can be sold or used as collateral to help in recovery. Gonjas in Buipe recover faster from the consequences of flood event because of better access to land which are not flood prone. As a result, they are able to sell off their lands whiles others are still able to farm on their lands even during floods. Also the natives own and live in houses which are resistant to flood than the other ethnic groups. This helps them to resist flood impacts than the other ethnic groups.

From the study, the respondents at Yapei are more vulnerable to floods than those at Buipe. This is because of the differences in access to secured houses which help respondents to resist flood impacts. Also differences in access to land affect their

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recovery rate. Unlike Buipe where the Gonjas do not own flood prone lands, at Yapei all the ethnic groups own and live at the flood prone areas.

5.6 Summary

This chapter summarizes the findings from the study. The result of the findings showed that differences in social attributes affect ability to access key assets which include financial, social, human, physical and natural capital. The different social attributes are age, gender, religion, ethnicity and migration history.

The most vulnerable groups in the study areas are the females, the retired, the migrants and the traditionalists at Buipe whiles Christians are the most vulnerable groups in Yapei. This is due to lack of access to assets which enables them to anticipate, cope and recover from the impacts of floods.

Respondents at Yapei are more vulnerable to floods than those at Buipe due to differences in access to social, financial, human, physical and natural assets. Lack of these assets affects their ability to anticipate, resist and cope from the impacts of floods.
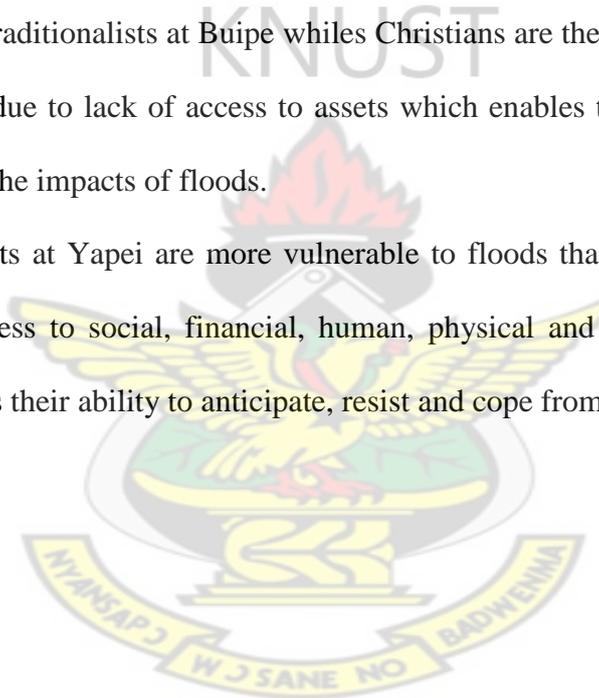
CHAPTER SIX: SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the major findings of the study, draws conclusions from the study and makes recommendations for interventions and further studies.

6.1 Summary of Major Findings

The summaries of these findings are based on the objectives of the study.

6.1.1   Gender and Access to Human and Physical Capital

The study identified that most of the respondents were not formally educated. Illiteracy rate in both communities is very high with majority of the uneducated being females. From the findings, 87 per cent of the total number of females and 59 per cent of the total number of males were not educated at Buipe. Females who were educated had not been to the secondary school. Only 41 per cent of the males in the sample had been educated. Out of this, 5 per cent of the sample had been to the tertiary level. Twenty-three per cent of the females in the sample at Buipe had been educated. At Yapei, 83 per cent of males and all the females in the sample have not been educated. The findings showed that only 27 per cent of the males in the sample have been educated.

Access to education in both study areas is very low and therefore could contribute to the vulnerability of the respondents to Floods. This is because lack of education affects their ability to secure jobs in the formal sector which are resistant to floods. As a result most of them often have their businesses destroyed. This is because majority of the respondents depend on farming and fishing as their sources of livelihoods. From the findings, 75 per cent of the total number of males and 91 per cent of the total number of females in Buipe lost their business. At Yapei, 82 per cent of males and 82 per cent of

females lost their businesses. Lack of education does not only prevent them from securing jobs but also failing to understand the human role in the causation of their vulnerability to floods.

The findings revealed that majority of the female respondents do not live in houses that are resistant to flood impacts. The research showed that only 34 per cent of males and 16 per cent of females owned houses built of cement blocks at Buipe whiles 8 per cent of males' live and own houses built of cement blocks at Yapei. Again 38 per cent of males and 31 per cent of females, who rent, live in houses built of cement blocks at Buipe. None of the respondents at Yapei rent a house built of cement.

From the findings, 84 per cent of the total number of males and 89 per cent of the total number of females had their houses destroyed by floods at Buipe. At Yapei, 73 per cent of the total number of males and 76 per cent of the total number of females had their houses destroyed. The houses which were not destroyed were at the verge of collapsing. The findings also showed that males own valuable and larger livestock in the study areas than the females. This enables the males in the study areas to recover faster from floods than the females.

Again the findings revealed that the females are the most vulnerable groups in both communities. They take a longer time to recover from the impacts of floods. They do not reconstruct their lives before being affected by subsequent floods making their vulnerability to floods cyclical.

In comparing the sex differences in vulnerability in both communities, the female respondents at Buipe are more able to resist the impacts of floods than those at Yapei. This is because of the differences in access to education and quality houses. This affects the ability of the female respondents at Yapei to resist the impacts of floods.

6.1.2   Age and Access to Financial and Social Capital

The findings at both study areas showed that the retired are the vulnerable group. At Buipe, 25 per cent out of the total number of those in the active age group and 24 per cent out of the retired received help from friends and relatives. At Yapei 13 per cent of the total number of those in the active age group in the sample and 26 per cent of the retired received help. The study showed that access to social capital helps in anticipation of flood occurrence in the community. Also some respondents like those in the active working population were able to recover due to assistance offered to them by friends and relatives.

Lack of access to financial capital affects the ability of the respondents to recover from the impacts of floods. At Yapei only 11 per cent each of the various age groups save monies. The findings revealed that, 8 per cent of those in the active working population and 4 per cent of the retired in the sample borrowed monies from friends and relatives at Yapei. At Buipe, 54 per cent of the total number of those in the active working population and 26 per cent of the retired in the population save, 53 per cent of the retired and 45 per cent of those in the active working population borrowed from financial institutions

The most vulnerable groups in both communities are the retired. This is because of the differences in the access to financial and social capital. This affects their ability to anticipate and recover from the consequences of flood events. The respondents at Yapei are more vulnerable to floods than those at Buipe. The respondents at Yapei do not have a better access to financial and social capital which plays a very important role in the ability of the local people to anticipate flood occurrence and also recovering before the next flood**.**

6.1.3 Religion and Access to Human and Social Capital

The findings on religion and access to human and social capital showed that 46 per cent out of the total number of Christians, 74 per cent of the Muslims in the sample and 50 per cent of Traditionalists in the sample are not educated at Buipe. From the findings, 64 per cent of the respondents who indicated as Christians, 26 per cent of the Muslims in the sample and 50 per cent of the total number of Traditionalists have had some form of formal education. At Yapei, none of Christians and 85 per cent of the Muslims in the sample have not been educated. Only 25 per cent of the Muslims in the sample have been educated. The findings showed that there are more educated Christians than Muslims and Traditionalists. The reverse is at Yapei, where more Muslims are educated than Christians.

Lack of access to education affects their ability to resist the consequences of flood event by securing jobs in the formal sector. At Yapei all Christians in the sample had their businesses destroyed whiles 81 per cent of the Muslims in the sample had their businesses destroyed. At Buipe, 79 per cent of the total number of Christians had their businesses destroyed. Also 81 per cent of the total number of Muslims in the sample lost their businesses. All the respondents who indicated as Traditionalists lost their businesses.

Again household relation among the various religious groups was deteriorating. Neighbors' do not feel any responsibility of helping one other. Only 18 per cent of the total number of Christians and 27 per cent of the total number of Muslims received help from their relatives, friends and religious institutions during floods. At Yapei, only 19 per cent of the total number of Muslims received help during floods. None of the Christians received help during the previous year's floods.

The findings showed that the most vulnerable religious groups in Yapei are the Christians. This is because Christians lack the resources that will make than resist and recover from floods. However at Buipe, Traditionalists are the vulnerable groups. This is because they do not have better access to education, social network and household relation which can help them to resist and recover from the impacts of floods. These groups take a longer time to reconstruct their lives after floods due to differences in access to human and social capital. The study also showed that the respondents at Yapei are more vulnerable to floods than those at Buipe due to the differences in access to education, social and household relation which help respondents to resist and recover from flood consequences.

6.1.4 Ethnicity and Access to Natural and Physical Capital

The study revealed that migrants at Buipe occupy flood prone areas. As a result most of them are frequently affected by floods than the natives. Also it was shown that majority of natives have a better access to land than the migrants. From the findings, 69 per cent of the total number of Gonjas own land that are not flood prone. The migrants in the community own land which are flood prone. At Yapei more natives owned land than the other tribes, 56 per cent of the total number of Gonjas own land. However, all ethnic groups occupy flood prone areas. Again it was revealed that, the lands in both study areas were degraded. This has pushed many of them to farm along the river banks especially those at Yapei. This usually results in massive loss of properties during floods. The study showed that ownership of land help respondents to recover from flood impacts. This is because they are able to sell off their lands or use it as collateral in order to recover from the consequences of the flood events.

Again most of the respondents at Buipe live in mud houses. A greater percentage of those who own and live in houses built of cement blocks are the Gonjas. The findings also revealed that a considerable number of them are rebuilding with cement, with most of them being Gonjas. Others would have wished to rebuild their houses with cement blocks but do not have the capacity to do so. At Yapei, the research showed that most of them stay in mud houses. However, none of them have rebuilt their houses with cement blocks, although most of them would have wished to rebuild their houses with cement.

The findings showed that the migrants are those unable to resist and recover the consequences of floods because of the differences in access to natural and physical capital. They are the vulnerable groups in the two study areas. Also the respondents at Yapei are more vulnerable to floods than those at Buipe due to the differences in access to natural and physical capital which affects their ability to resist and recover from flood impacts.

6.2 CONCLUSIONS

The study supports data that shows that flooding in the two study areas is an annual event. This occurs during the raining season between August and November, which is also the farming period. The outcome of the study showed that characteristics of natural events are not sufficient to explain human vulnerability to environmental hazards. This is because most of these people lack the assets that will make them anticipate flood occurrence, resist and recover from the impacts of floods.

The study showed that most of the females, especially at Yapei are uneducated. This affects their ability to secure jobs in the formal sector which are less vulnerable to flood impacts. Also, the study showed that land was an asset used to recover from floods. Those who owned land that are not flood prone were able to sell them or use them as

collateral to recover from floods. However, land which is a productive asset is degrading in the study areas especially at Yapei and has pushed many of the respondents at Yapei to farm along the river banks.

Also, from the study most of the respondents do not have access to social capital. This asset helps to anticipate and recover from floods. Those who had access to social capital were able to anticipate the occurrence of floods and recovered quickly.

Also the research showed that financial capital helps to recover from floods. Most of the respondents relied on financial capital to recover from flood impacts at Buipe. However, at Yapei there are no financial institutions which affect their ability to recover from flood events.

It was also shown that majority of the respondents do not have access to secured houses. This is because majority of the respondents in both study areas live in mud houses which are less resistant to floods. However, there are more cement houses in Buipe than at Yapei.

The research also showed that even though both communities lack access to key assets, the respondents at Buipe have a better access to key assets than those at Yapei. Locations of the two study areas do affect their level of vulnerability. In comparing the differences in access to assets in the study areas, respondents at Buipe had a better access to key assets than the respondents at Yapei. For instance, the respondents at Yapei do not have any access to financial institutions and this may have affected their ability to save.

The study concludes that the inability of the people to prevent the consequences of flood event is as a result of lack of access to key assets which prevents their ability to anticipate, resist and recover from flood impacts.

6.3   RECOMMENDATIONS

Following the conclusions and findings presented from the study, I put forward the following recommendations in order to reduce vulnerability of people to floods in Buipe and Yapei.

The study suggests that intervention efforts should be designed to build up the assets of the people. Since there have been limited success of major technological interventions in flood prevention, (Blaikie et al., 1994). Efforts to build up assets of the people of Buipe and Yapei will help them to withstand shocks and also recover quickly from flood events. Institutions such as NADMO, CGDA and other development NGOs should help in the development of such key assets of the local people.

Again, the study suggests that NADMO and the District Assemblies should design strategies to strengthen the coping strategies of the local people towards floods. As put by Blaikie et al., (1994) and others, interventions to strengthen capacities to cope is also a positive step towards the empowerment of communities rather than the reinforcement of dependency associated with flood relief efforts (Blaikie et al., 1994). Strengthening the coping capacities of the local people will help them to anticipate, resist and recover from flood consequences in the communities. This will in turn reduce the vulnerability of the people to flood.

The Non-Formal Education Directorate should sensitize the people on importance of education and encourage them to send their children especially females to school. In order to encourage people to send their wards to school, NGOs in the education sector and the Education Directorate should introduce scholarship packages for students who excel in their Basic Education Certificate Examination as a motivation to work harder. Packages such as exercise books should be given to females who are regular in school and are serious with their education. Educating their children will serve as a long term

measure to reduce vulnerability of the people to floods. This is because jobs would be secured in the formal sector which will enable them to resist the impacts of floods.

The Health directorate should embark on extensive education on the dangers of using water from the Volta River during floods. More so health practitioners and medicines should be made available during floods to reduce the outbreak of cholera and other diseases. Institutions such as the CGDA and other NGOs should provide portable water to the study areas especially those at Yapei.

MOFA and other stake holders in the sector should help provide farmers with fertilizers at reduced prices. This will stop them from farming along the river banks. Furthermore, there should be more irrigation facilities to help in all year round farming. This will help stop farmers from solely depending on the rainy season and farming along the river banks. Also NGOs in the development sector should help the local people to secure land which are not prone to floods. Securing lands which are not prone to floods will help them to recover fast from flood event.

Again the CGDA and other stake holders like SAVACEM as part of its social responsibility in the district should help provide the local people with cement at reduced prices. This will enable them build their houses with cement blocks and be able to resist the impacts of floods in the study areas. This will help reduce the annual destruction of houses by floods and will increase the capacity of the people to withstand the impacts of floods.

NADMO and MOFA officials should provide early warning information to those at Buipe and Yapei. Also early warning information should be disseminated in all the ethnic languages spoken in the communities. Religious institutions should also be provided early with the warning information. Since they play a very vital role in helping people anticipate flood occurrence in the communities.

Finally, further research in the study areas should concentrate on the perception of the people and also whether vulnerability of the people to floods has changed by looking at the assets of the people. Research in this area will help also bring a new dimension into hazard assessment in these areas which concentrate on the physical characteristics of the natural event.

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APPENDICES

APPENDIX I

DEPARTMENT OF GEOGRAPHY AND RURAL DEVELOPMENT

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

TITLE: COPING WITH VULNERABILITY TO ENVIRONMENTAL HAZARDS IN

CENTRAL GONJA: CASE STUDY YAPEI AND BUPEI

HOUSEHOLD QUESTIONAIRE

INTRODUCTION

This research is on how people's ability to cope with environmental hazards have been affected by causes not related to only the natural events themselves but also socio-economic and political factors. The exercise is purely academic and all responses will be treated confidentially.

Demographic Information

1. Name: …………………………………………………………………….
2. Name of Town: Buipe............... Yapei......................
3. Gender: Male…….. Female………
4. Age: …………………
5. Religion ……………………………….
6. Marital Status: Single….. Married ……. Divorced…….. Widowed ……….
7. Which of these ethnic groups do you belong? Akan…… Ewe……
   Ga-Adangbe…… Dagbani……Hausa…… Nzema…… Gonja………
   Mamprusi……… Guan……… Kassena-nankana……
   Konkomba……Nanumba……Bulsa…… Other………………….

Building Structure

8. What type of home do you live in? Single family home …...Compound house …
Self contained (Apartment) … Container/Kiosk .... No home……Other …......

9. What floor do you live on? Basement …… Ground floor …… First floor ………
   Second floor ……… Other ……………………
10. What is your house built of? Cement blocks...... Brick blocks..... Mud.......

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others......

11. Do you own your home? Own ………. Rent ……… Other …………………..

12. If you own, have you made any permanent changes since the last flood to reduce damages to your home? Yes …… No ………..

13. If yes, what did you do? ……………………………………………………….

14. If No, why not? ………………………………………………………………

Flood Experiences

15. Has your household ever been flooded? Yes…….. No…………..

16. If yes, how many times? ………………………….

17. List the years when you were flooded in the last ten years
    ....
    ....

18. When was the last time?………………….

19. Did you suffer any damages to your house? Yes …… No ………..

20. Did you suffer any damages to properties in your house? Yes ……. No ……….

21. What was the amount of damages to your? (A) house ……. (B) Contents ………..

22. Did you stay in your house after the last flood? Yes........... No ....

23. If no, how many days total were you out of your home in your last flood? ……….

24. Where did you stay? Friends…Relatives ….Church ….School ….Hotel ….Other …..........

25. Have you had a business or job closed due to flood? Yes…… No……..

26. If yes, how much did you lose? ……………….

27. Have you or any of your household been hurt due to flooding? Yes…. No …..

28. Who was injured? Self ….. Spouse … Child … Parent … Other …..

29. Do you receive warning information about flood? Yes........ No...........
    If yes, how do you receive the information? ....

30. Which of these do you have? Radio .... television ....other.....................

Recovery

31. Do you have relatives in this community and not living with you? Yes …… No ……

32. If yes, do they help you during and after flood? Yes …. No …..

33. Did you have flood insurance during your last flood? Yes……… No………

34. If yes, how much did your flood insurance pay for your damages? ……………….

35. If no, did you borrow to pay for the damages? Yes ….. No …….

36. How much do you have left to pay? …………………

37. How long did it take you to recover from your last flooding? …………………

38. Did you receive help from the government? Yes ….. No ……

39. Did you receive any help from any other agency? Yes … No …..

40. If yes, what agency? …………………………………………………

41. Do you save? Yes............ No....................

42. Are you willing to relocate? Yes ………. No………….
43. Why or why not……………………………………………………………………
44. Do you take part in community decisions?

    ....

    ....
45. How do you deal with flooding?
    a.   Before …..…………………………………………………………….

    b.   During…………………………………………………………………..

    c.   (c)After …………..…………………………………………………….

Changes in the level of Vulnerability

46. Which of these do you own? Land....... Livestock........ House........ Nets........
    Others...
47. Have there been changes in the number of assets you own?
    Yes........... No.................
48. If yes, what kind of change? Increase in number...........decrease in number...........
49. What caused these changes? ....
    ....

Other Demographic Information

50. Highest Education Level? None……. Primary………. JSS…………..
    SSS/Technical/Vocation……Bachelor/HND……Masters…… PhD… Other
    ………
51. Who is your employer? (a) Self …. (b) Government (c) Private…… (d)
    Other……….
52. What is the total monthly household income? Less than GH¢ 45 ….….., 45 –
    90…......., 91 –135 ………,136 – 180….., 181-225........, 226-270………271-
    315......., over 315......
53. Other comments?
    …………………………………………………………………………
    …………………………………………………………………………………
    …………………………………………………………………………………

DEPARTMENT OF GEOGRAPHY AND RURAL DEVELOPMENT

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TITLE: COPING WITH VULNERABILITY TO ENVIRONMENTAL HAZARDS IN

CENTRAL GONJA: CASE STUDY YAPEI AND BUPEI

INTERVIEW GUIDE (INSTITUTIONS)

INTRODUCTION

This research is on how people cope with environmental hazards. The exercise is however purely academic and any data generated would be used solely for that purpose. Confidentiality is assured. Thank You.

1. Name of agency ...……………………………………………………………..
2. Primary functions……………………………………………………………… ……....…………………………………………………………………………
3. What are the principal ethnic groups in this community? Akan…….. Ewe…… Ga-Adangbe…… Dagbani………Hausa…… Nzema………Gonja………Mamprusi………Guan………Kassena-nankana………………. Konkomba……… Nanumba………… Bulsa………… Other…………………..
4. Are the residents vulnerable to the risk of flooding? Yes …………. No ……
5. If yes, what type of flood: Flash flood ……………Slow onset………………..
6. What do you think causes flooding in this community? ………………………………………………………………………………… ………………………………………………………………………………........ ....
7. Can you explain how? ………………………………………………………………………………… ………………………………………………………………………………… …………………………………………………………………………………
8. Why do you think people settle on flood-prone areas? Land shortage...........Proximity to jobs............ Fertile land.............. Ancestral inheritance............... other............................. ....
9. What is the likelihood that this community will suffer serious damage from flooding within the near future? Very likely…… Somewhat likely …… Somewhat unlikely …………. Very unlikely ………………

10. How will you rank the importance of these problems to this community? (1, 2, 3, 4,5)

Food shortage …………………   Crime …………………………….

Road and street repair……………..   Diseases …………………………

Flooding ………………………….

11. Do you currently have any flood mitigation strategies? Yes……. No…………
12. If yes, what are the different types of mitigation strategies?
....
....
....
13. Do you know of any native mitigation and coping strategies? Yes…… No…….
14. Are these strategies different from your agency's strategies? Yes ….. No …….
15. How does it interact with your agency's attempt at mitigation?...
....
....
16. Why has recovery and not relocation been the choice of the people?
....
....
17. Do you give flood warning? Yes.................. No..........................
18. If yes, how do you communicate this information? Radio............
Television............... Information van................... Relatives and friends
...............Church..................... Mosque others................................
19. What language is normally used? English.......... Gonja........ Hausa...........
Akan........... Konkomba ....Others ....
20. Have there been changes in how people get access to health facilities?
Yes.........No..........
21. If yes, what kind of change?
....
....

22. What effect has it had on people?
....
....
..
23. Have there been changes how people get access to education?
Yes............ No.................
24. If yes, what change?
....
....
25. What effect has it had on people?
....
....
26. Other comments:

....
....

DEPARTMENT OF GEOGRAPHY AND RURAL DEVELOPMENT

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DISCUSSION GUIDE

INTRODUCTION

Thank you very much for agreeing to help out with this research. What we are about to do is called a focus group discussion but before I explain to you how it works I want you to know that this research is purely academic and any data generated will be beneficial to lots of people in the community and nothing you say will be associated with you or your community.

This is a discussion, as though you were sitting around just talking. So please feel free to talk. You can disagree with each other, or you can just comment on another person's view. One person should talk at a time, because we tape-record the session.

The subject for discussion is flooding. You all will agree with me that this has been occurring in this area for some time now. Today we are going to talk about flooding and changes that have occurred in the communities over the past years and community assets and how they have changed over time. But before I start does anybody have a question?

- Can anybody tell me more about the floods? How it used to happen, at what time of the year it used to happen and for how long it used to last.

- Did it happen every year?

- Were you always warned about the floods or it was your own knowledge that you were using to predict whether floods were to occur?

- O.k. what changes have occurred in the occurrence of floods? Has the occurrence increased or decreased?

- Again has the impact of the floods for the past ten years increased or decreased?

- What will you attribute the changes to?

- What are often lost during floods?

- Let's come to the community, what changes have occurred in the community? For instance regarding the population, buildings, infrastructural development.

- Has these changes had an effect on you?

- Have the number of health facilities in the community increased as compared to the last ten years. How were you getting access to health facilities? Have there been changes in how you get access to health facilities? Have the services improved or decreased?

- O.k. with regards to access to assets like land? Has there been any change in the way you used to get access to land? Also how you used to get your tools and seeds for farming?

- For fishermen, has the number of fishes you used to catch reduced or increased?

- Let's come to social capital, you will all agree with me that in those days, you saw each other as one, and one person's problem was another's, is it still like that? What about the community norms and regulation?

- You usually lose your houses anytime flood occurs have there been improvements in your houses so as for them to withstand the impacts of floods?

- How were you saving in the olden days, have there been any change in the way you save. Let's say are there banks, or recognized institutions you can borrow and save from?

- Will you say there have been changes in this community as regards to the buildings, availability of resources to people

- Has the changes in the community and the assets affected your ability to cope with floods?

- Before we end, do you have any other thing you would want to add or do you have any other question.

  Thank you very much for making this discussion a success.