

UNIVERSITY OF GHANA

**ASSESSING THE FLOOD VULNERABILITIES OF WOMEN IN THE COASTAL
COMMUNITIES OF ACCRA; A CASE STUDY OF GBEGBEYISE (DANSOMAN)**

DOREEN AGYEI

(10637751)

**THIS LONG ESSAY IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MSC.
CLIMATE CHANGE AND SUSTANABLE DEVELOPMENT DEGREE.**

JUNE 2018

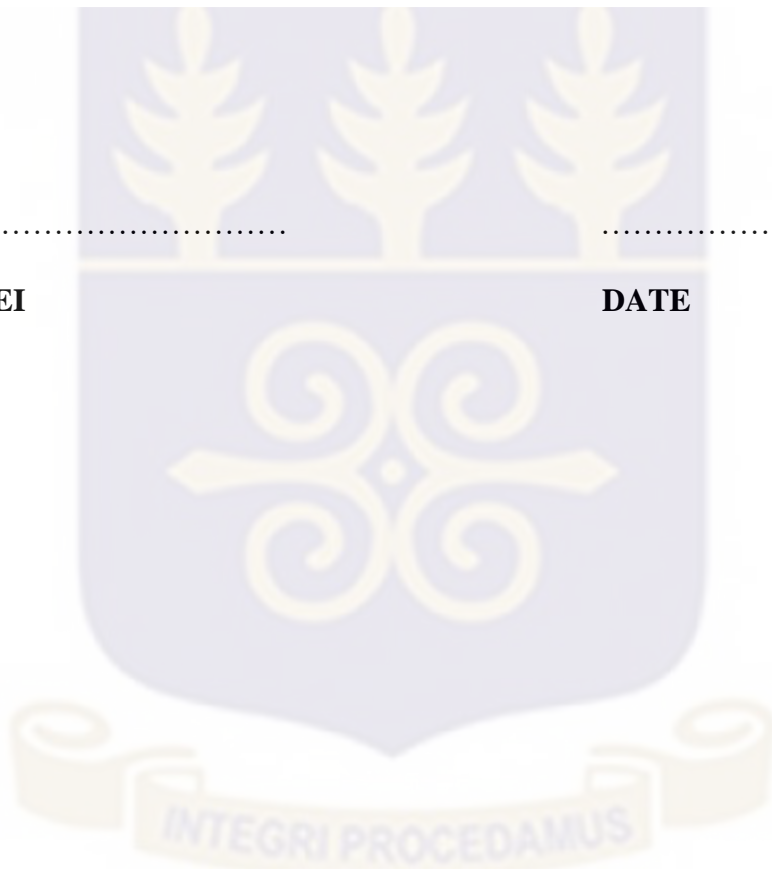
DECLARATION

I hereby declare that, except for references to other people's work which have been duly cited and acknowledged, this long essay is as a result of my own original work, and that neither in whole or in part has this work been presented in any institution.

.....
DOREEN AGYEI

(10637751

.....
DATE

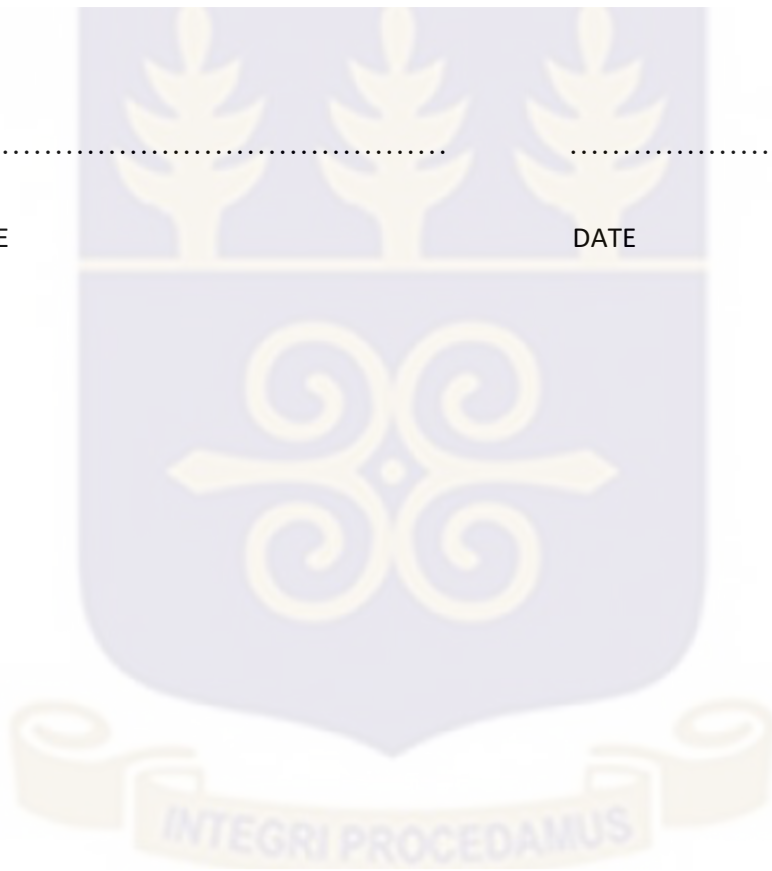


CERTIFICATION

I, hereby certify that this long essay was supervised in accordance with the procedures laid down by the University of Ghana and satisfies as a partial requirement for the award of Master's degree in Climate Change and Sustainable Development.

.....
PROF. J.N. BAWOLE

.....
DATE



ACKNOWLEDGEMENT

To God be the glory. I thank God for His mercies and grace in assisting me to complete this thesis. I would also like to express my most sincere gratitude to my supervisor, Prof. Justice Bawole for his guidance, advice and most importantly the patience he had. I couldn't have completed this research without his support and him believing and pushing me to do bring out the best in me.

I am so grateful to Bright Frimpong (Environmental Science Department) for his support, time and proofreading. And also to my Amazing sisters, Doris and Jacqueline for their moral support; and to Bishop Francis Sarpong and Rev. Akuamoah Boateng for their prayers. And to my dad and mom.

I would like to thank Dr. Ansah (Environment Science Department) and the assemblyman of Gbegbeyise and to all my respondents, couldn't have done this without them.

To my course mates Osman Fuseini and Samuel K. Ampofo, I enjoyed and appreciate our togetherness, advice and all manner of support since we became 'group members'.



Table of Contents

DECLARATION..... i

CERTIFICATION..... ii

ACKNOWLEDGEMENT..... iii

LIST OF TABLES..... vii

LIST OF FIGURES..... viii

ABBREVIATIONS..... ix

ABSTRACT..... x

CHAPTER ONE 1

INTRODUCTION..... 1

 1.0 Introduction 1

 1.1. General background to the study 1

 1.2. Problem statement 4

 1.2. Research questions 5

 1.3. Main objective..... 5

 1.5. Specific objectives..... 5

 1.6. Justification 6

 1.7. Limitations to the study..... 7

 1.8. Organisation of the study 7

CHAPTER TWO 9

LITERATURE REVIEW 9

 2.0 Introduction 9

 2.1. Climate change: definition, causes and impacts..... 9

 2.2. Climate-induced disasters 10

 2.3. The vulnerability concept..... 11

 2.4. Coastal systems and coastal flood vulnerabilities 13

 2.5. Gender inequalities in Ghana 14

 2.6. Gender differentiated climate change impacts 16

 2.7. Case studies of gender differentiated impacts of climate change 17

 2.7.1 Women, and emergency measures during natural disasters..... 17

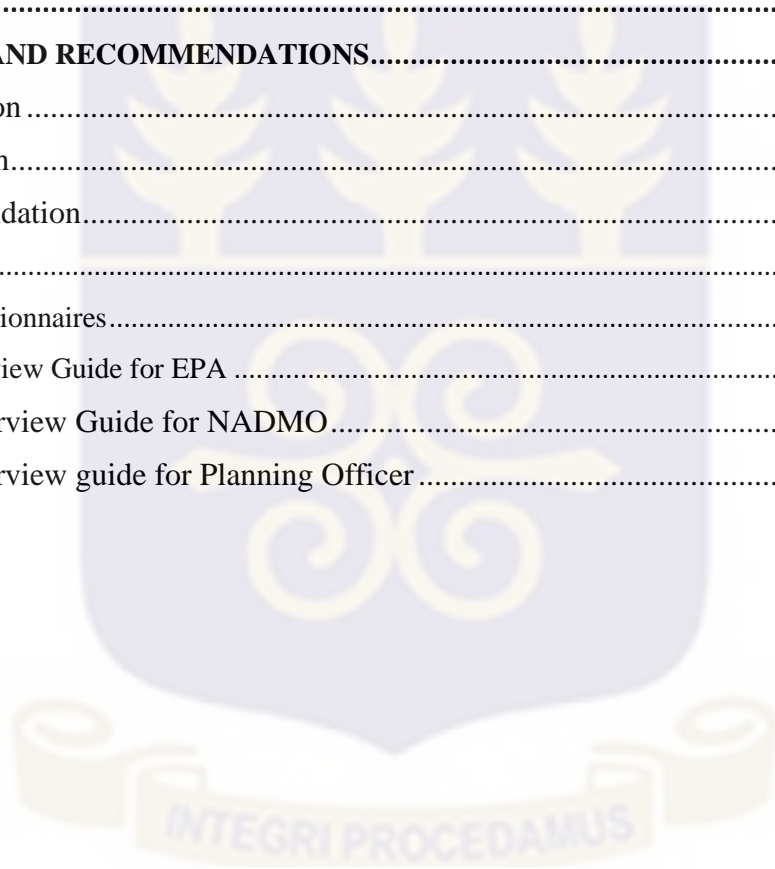
 2.7.2 Impacts related to food security 18

 2.7.3 Impacts on health 19

 2.7.4. Impacts on migration..... 20

2.7.5. Gender and climate change adaptation.....	21
2.8. Conclusion.....	25
CHAPTER THREE	26
METHODOLOGY	26
3.0. Introduction	26
3.2. Epistemology and ontological foundations of the study	26
3.3. Research design.....	27
3.4. Research approach.....	28
3.4.1 The mixed-methods research approach.....	28
3.4.2. The quantitative research approach.....	29
3.5 Collection of data.....	29
3.5.1.Survey.....	29
3.5.2.Qualitative resource approach.....	30
3.6 . Data Collection	30
3.6.1. Review of secondary sources	30
3.7.2. Key informant interview	30
3.7. Sampling Method.....	31
3.8.1 Inclusion criteria.....	31
3.8.2 Exclusion criteria.....	31
3.8.3. Study Area.....	31
3.9. Data analysis	32
3.9.1 Analysing quantitative data.....	32
3.10. Ensuring data validity and reliability	33
3.11. Ethical Considerations.....	33
CHAPTER FOUR	34
DATA PRESENTATION, ANALYSES AND DISCUSSIONS	34
4.0. Introduction	34
4.1 Demographic characteristics of respondents.....	34
Table 4.1. Age of respondents in the study area.	35
4.2 The effects of coastal flooding on women in Gbebegeyise.	36
Table 4.2 Respondents perception on causes of flooding in the study area.....	39
4.3. Perception of effects of flood on economic variables	39

Table 4.3 Perception of effects of flood on economic variables.....	40
4.5. Measures of association between demographic indices and effects of flooding.....	40
4.6. Coping strategies adopted to mitigate the effects of coastal flooding in Gbebegeyise.....	41
Table 4.6. Coping strategies used to mitigate the effects of floods by respondents	42
4.7. Support mechanisms available for women to cope with the effects of flooding	43
4.8. Sources of assistance during and after floods	45
4.9. Support mechanisms available from various local institutions to adaptation to climate change in the community	46
4.10. Mainstreaming gender in adaptation strategies.....	48
CHAPTER FIVE.....	49
CONCLUSION AND RECOMMENDATIONS.....	49
5.0. Introduction	49
5.1. Conclusion.....	49
5.2 Recommendation.....	50
References.....	51
Appendix 1: Questionnaires.....	58
Appendix 2: Interview Guide for EPA	64
Appendix 3: Interview Guide for NADMO.....	64
Appendix 4: Interview guide for Planning Officer.....	65



LIST OF TABLES

Table 4.1: Age of respondents in the study are.....	33
Table 4.2: Respondents perception on the causes of flooding in the study area.....	37
Table 4.3: Perception of effects of flood economic variables.....	37
Table 4.6: Copies strategies used to mitigate the effects by respondents.....	40



LIST OF FIGURES

Fig 4.1: Occupation of respondents in the study area.....34
Fig 4.2: Educational level of respondents in the study area.....35
Fig 4.3: Respondents perceptions on the effects of flood in the study area.....35
Fig 4.4: Kind of support respondents receive during and after the flood.....41



ABBREVIATIONS

EM- DAT	Emergency Events Database
EPA	Environmental Protection Agency
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
IPCC	International Panel on Climate Change
MDGs	Millennium Development Goals
MEST	Ministry of Environment, Science and Technology
NADMO	National Disaster Management Organisation
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNISDR	United Nations Office for Disaster Risk Reduction
WHO	World Health Organization

ABSTRACT

Flooding in coastal communities is a regular phenomenon and it has numerous devastating effects on the environment and subsequently affect humans. These impacts include loss of life, an increase of diseases, loss and destruction of property, and damage to agricultural crops, all of which result in poverty and an increase in vulnerability particularly women and children. Investigation were therefore conducted to assess flood vulnerabilities of Women in Gbegbeyise, a coastal community in Accra. The objective was to determine how coastal flooding affects women, how they cope with the effects of coastal flooding and the support schemes that exist for women. The study adopted a mixed method data collection approach using a semi-structured questionnaire. A total number of 120 women in households were sampled using systematic sampling technique. The results of the study showed that erosion was ranked foremost (78.3%) as this was followed by salt water intrusion into ground water (71.7%), and food shortage (67.5%). Other problems of flood cited by respondents included bad roads, environmental pollution/dirty environment, infestation by mosquitoes, neighborhood insecurity, poor electricity supplies, unemployment and prevalence of disease. The study found out that demographic variables such as age, marital status, and employment significantly influenced the perception of respondents with effects of flood such as water access, food security, sanitation and infrastructure ($P \leq 0.05$). Cleaning of choked gutters and drains, communal cleaning of surroundings after flood events (75.5%) were used as the main coping strategy for poor sanitation after floods. Filling roads with sand using sandbags, constructing passage for easy flow of water, raise floor levels with sand/sawdust (65.8%) were also used as coping strategies to control erosion by respondents. The results showed that most respondents receive support in a form of material support (65%), food supply (35%), cash donations (34.2%), provision of shelter (17.5%) and information giving (30.8%). This support

services comes from sources such as NGO's (82.2%), family members and friends (74.2%), individuals (24.5%) and government (15%). The study therefore recommends the district assembly and other relevant disaster risk management organizations to develop preventive measures to help address the flood challenges before major rains.



CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents an overview and introduction to this research. It presents the general background to this study, problem statement, the main objective and specific objectives, research questions, and the justification of the study. It highlights the limitations of the study and also covers the organization of the chapters.

1.1. General background to the study

Climate change can be defined as ‘‘the changes in the mean state of the climate or in its variability, that has carried on for some time.’’ It is not a new phenomenon because according to Avian, (2008) ‘‘the earth has been warming and cooling many times from the time of its formation over billions of years ago, due to both natural and human induced alterations within the atmosphere and in the use of land.’’ A number of features that stimulates the changes comprise of eruption of volcanoes which eventually escalates the concentrations of carbon dioxide in the atmosphere, alterations in the amount of energy the sun radiates and disparities in the position of the earth which relates to both the sun’s orbit and in the disposition of its axis (Schneider et al, 2008).

Nonetheless, climate change caused by humans has increasingly started from the time of the industrial era, specifically from the 1950’s, because of the accessibility and burning of fossil fuels, methane production, deforestation etc. (IPCC, 2007).

The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report highlighted that “greenhouse gases and other alterations to the ecosphere are contributors to climate change.”

Climatic changes brings about a range of several problems, which includes increased occurrences of weather extremes, flooding, powerful storms, severe drought, desertification, temperature increase of the sea, heat waves, the glaciers and permafrost melting. Eventually, level of sea rising and unpredicted fluctuations in sea currents threatens the coastal zones.

The rise in Sea-level caused by climate change has come to be a very severe challenge to managing the global coastal zones sustainably (Rahmstorf et al., 2007).

Climate change impacts displayed through hazards that happen naturally such as floods, powerful cyclones, hurricanes and drought are already being felt differently in regions and populations across the globe (IPCC, 2012), and Ghana is no exception. Accra, which is a low lying city along the coast stand the risk of flooding every year throughout their two seasons of rains.

A study by Appeaning Addo et al (2011), reveals “that around 650,000 people and almost 1,000 structures in the three communities in the Dansoman area of Accra would be vulnerable to perpetual inundating resulting from climate change by the year 2100, as the shoreline retreats by more than 200 metres.” It further revealed that both natural and industrial locations will be flooded, and their local structures which is generally built with used sandcrete (materials for building that is made of cement and sand) would be destroyed by the flooding. This would further lead to the outbreaks of endemic disease, population displacement, land loss and biodiversity, and reduced fishing harvest.

Physical and social factors can impact a group's or an individual's exposure to extremes climate. The physical factors consist of being exposed to risks such as floods, storm surges, hurricanes etc. whilst the social includes factors such as social, financial, institutional and political measures, which limits or enhances the capability of the individuals or social groups to deal with and adapt to climatic hazards or external stress that is placed on their livelihood and welfare (Adger and Kelly, 1999). The IPCC's second working group report concludes that 'climate change impacts will be dispersed differently among regions, generations, ages, classes, income groups, occupation and genders' (IPCC, 2012, p.786).

Therefore, vulnerability for women and men to natural disasters differs. Women are mostly more vulnerable to disasters than men because of their socially constructed roles and responsibilities, and because they are considered poor (Pan American Health Organization, 1998; Mitchell et al., 2007). Flooding in the coastal communities is a regular occurrence and it poses a lot of devastating ramifications on humans. These impacts include life loss, intensification of endemic diseases, damages and loss of assets, and destruction of farm crops, and all of this could lead to poverty and heightens women's vulnerability. Nasreen (1995, 2008) indicated that women are usually greatly affected than men during a disaster period according to his research.

In Ghana, the majority of the marginalized, mostly women that live in the slums and informal settlements, face the severe consequences of climate change. The National Climate Change Adaptation Strategy (NCCAS) of Ghana has also identified women to be one of the groups mainly susceptible to climate change impacts (MEST, 2010).

Therefore, this study seeks to assess the extent to which women are the most vulnerable in the coastal communities of Accra, Ghana.

1.2. Problem statement

The rise in Sea-level caused by climate change has come to be a very severe challenge to managing the global coastal zones sustainably (Rahmstorf 2007). A study done by Appeaning Addo et al (2011), states “that nearly 650,000 people and almost 1,000 buildings in the three communities in the Dansoman area in Accra will be exposed to perpetual flooding resulting from climate change by the year 2100, as the seashore retreats by more than 200 metres.”

The IPCC’s 5th Assessment Report (2013) states “that climate change hazards intensifies or heighten existing gender inequalities, thus contributing to the greater vulnerability to climate of a lot of women.” A study by Azad et al (2013) showed that both men and women are liable to risks due to dynamic, external pressures, but women in particular are more sensitive to coastal floods impacts.

Climate change might also heighten existing inequalities (UNDP 2007) such as gender-based inequality (Aguilar, et al., 2009). Because of the gender-based roles in society, men and women bear different coping and adaptive capabilities, which presents them to differing vulnerabilities and responses (UNDP 2010b). Gender-based inequalities that exist such as land accessibility and other assets limit women’s ability to react to the effects of climate change (FAO 2011; World Bank 2011a). A recent study by the World Bank, for example, shows that 103 of 141 countries (25 of 35 economies in sub-Saharan Africa) have lawful differences between men and women that may hinder women’s economic opportunities (World Bank 2011b). Gender roles and social status may also inhibit women from effectively responding to climatic risk because of sociocultural barriers that manifest themselves (Röhr 2006; World Bank 2010; Nellemann, Verma and Hislop 2011). A study on the impact of climate change on women in three districts has confirmed that, even though women take on 85% of Ghana’s food distribution, they have complications in land acquisition,

security of land tenure and proper financial services. Therefore, efforts to address gender concerns in climate change must first address gender inequities and recognize that climate change effects are likely to differently affect men and women'' (National Climate Change Policy, 2013).

However most disaster-related researches in Ghana suffers from less focus on the various gender differentiated impacts, therefore this study seeks to assess the degree to which women are greatly vulnerable in terms of natural disasters like flooding in the coastal communities.

1.2. Research questions

1. How does coastal flooding affect women in Gbebegeyise?
2. How do they cope with the effects of coastal flooding?
3. What support schemes exist for the women in Gbebegeyise?

1.3. Main objective

The key aim of this research is to assess women's flood vulnerabilities in coastal communities of Accra. In doing so, this research will contribute to knowledge that will address the gender differential impacts of flooding.

1.5. Specific objectives

1. To investigate the effects of coastal flooding on women in Gbebegeyise.
2. To assess how women cope with the effects of coastal flooding in Gbebegeyise.
3. To assess the support mechanisms or schemes available for women in Gbebegeyise to cope with the effects of coastal flooding.

1.6. Justification

This research would help to better understand the socioeconomic dynamics, on the impacts of flooding on women living in the coastal areas of Accra. Vulnerability and its underlying causes play significant roles in determining the severity of impact on a particular social group; therefore it is essential to have a greater understanding of the dynamics of the vulnerabilities of women living in areas prone to disaster in Accra.

The findings of the study would be useful to the government and relevant Authorities like the National Disaster Management Organization to institute mitigation measures for the vulnerable women in the study area.

Women perform a fundamental part in the management of natural resources and in other productive and reproductive activities at the community and household levels, hence the findings will help develop appropriate climate change adaption strategies to the changing environment.

Furthermore, studies have also discovered the importance of integrating gender equality and women's empowerment to environmental sustainability and the achievement of the Millennium Development Goals. (World Bank 2012).

Therefore this study is imperative to fully recognize how climate change has differentiated impacts on women and the existing adaptation strategies that must be strengthened and supported, or to design new strategies at the national or community levels which would be beneficial.

1.7. Limitations to the study

The limitation to this study was the absence of secondary empirical data because studies concerning the vulnerabilities of women to climate change in the coastal communities are few in literature, particularly in Ghana. The other thing was the language barrier that was encountered during the survey administration and interviews and also there were some difficulty in translating climate change terminologies or concepts into the local language or dialects, which was addressed by using interpreters. However, it is acknowledged that nuances could be lost in translation.

1.8. Organisation of the study

The study consist of five chapters that will cover the assessment of the vulnerabilities of women in living in the coastal communities of Accra: (A case study of Gbegbeyise).

This is an overview of the content of each presented chapter;

- Chapter one: This chapter gives the background information of the study, the problem statement, research questions, the main objectives, the specific objectives and the justification. It also discusses the limitation of the study.
- Chapter Two: this chapter contains the literature review; which is the previous related studies that been done before. Additionally, this chapter presents important information for better understanding of the study.
- Chapter Three: This chapter also covers the methods used for the research which is the mixed methods approach. That is the usage of both quantitative and qualitative approaches.
- Chapter Four: It includes data presentation, analyses and discussions.
- Chapter Five Contains the Conclusion and recommendations for the study

- Appendix



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The aim of the study is to investigate the differential effect of flooding on women, how they cope and the adaptive capacity level that exist in the coastal communities for women in particular. This chapter deliberates the significant researches that had been done before by researchers. And the existing theories concerning coastal flooding, vulnerabilities and the differential impacts it has on both men and women.

2.1. Climate change: definition, causes and impacts

Climate change is definitely not a new phenomenon. The IPCC's special Report of Working Groups I and II of climate change defines it as:

“an alteration in the state of the climate that can be identified by variations in the mean and /or the variability of its properties, and that continues for a prolonged period, typically decades or longer.”

In view of this report, climatic change may be due to: “natural internal processes or external forcing”, or to insistent climate change caused by human in the structure of the atmosphere or in the use of land (IPCC), 2012.p.29).

Climate change caused by humans have progressively developed ever since the industrial era, specifically since the 1950's, which is because of the availability of cheap fossil fuels such as coal, oil and natural gas, and the intense increase in its consumption (IPCC, 2007). The IPCC in its Fourth Assessment Report emphasized that greenhouse gases and other changes to the ecosphere

are contributors to climate change. The panel also concluded that “climate change has started to be evident with multifaceted results that are and will be dramatic unless instant mitigating actions are taken” (IPCC, 2007). Climatic changes can result in a variety of direct problems, comprising amplified occurrence of extreme weather events, severe flooding, storms surges, severe drought, desertification, increases in sea temperatures, heat and cold waves, glaciers and permafrost melting. Eventually, rise of sea level and sudden alterations in sea currents threatens areas along the coast, ecosystems and geophysical cycles. These changes will have major impacts ecologically, socially, economically and political, as well as effects on food production, availability of water, and increase of wildfires, mud-streams, coral bleaching, alterations in epidemic vectors and annihilation of pollinators.

It is broadly observed that vulnerability and exposure usually differ between regions and among populations within regions (de Sherbinin et al, 2007). In general, developing countries are known to face the harsh ramifications of climate change and have the greatest number of people who have the least capability to adjust to climate change (de Sherbinin et al, 2007). Although the influence of Africa’s input to greenhouse gas emissions is insignificant by global standards (Codjoe et al, 2012), it is recognized to be the most vulnerable region when it comes to the number of people who are least capable to easily adapt to climate change (IPCC, 2007).

2.2. Climate-induced disasters

A disaster that occurs naturally can be defined as “a short-term incident, which is caused by a natural hazard that devastates local response capacity and extremely affects social and financial development” (Hodell et al., 1995). Disasters caused by climate need not to be elaborated much:

presently, climate-induced natural disasters (caused by weather-related and climatic incidences) are distracting millions of people's livelihoods, and there are strong indications that most developing countries would experience greatly increased vulnerability in the coming years due to climate change (Stern, 2006; IPCC, 2007a). Recently, there is a common consent that natural disasters have escalated globally, whether it is measured in frequency, the number of affected people or the economic damage (UNDP 2004, 2008; World Bank, 2009). As recorded by the cross-national database on natural disasters i.e. the Emergency Events Database (EM-DAT, 2012), which is gathered by the World Health Organization(WHO) and the Collaborating Centre for Research on the Epidemiology of Disasters, the increase in natural disasters has been triggered almost entirely by amplification of climate driven hazards. Worldwide, these catastrophes such as floods, droughts and storms burgeoned from approximately "200 in 1990 to 440 in 2010" (EM-DAT, 2012). The number of affected people worldwide by such disasters also burgeoned from "52 million annually in the 1970s to 232 million annually during the 2000s" (EM-DAT, 2012).

2.3. The vulnerability concept

The concept of vulnerability is understood by a number of scholars based on their disciplinary backgrounds, as well as the vulnerability circumstances that is studied (Fussel, 2007). This has subsequently resulted in the development of distinct and sometimes diverse definitions and assessment methodologies: For instance, Mose and Ekstrom (2010, p.2) define vulnerability as:

"the extent to which systems are prone to loss, harm, anguish and death when a natural disaster occurs." In this context, systems could be represented as households, communities or organizations.

Wisner et al, (2004, pp. 4-11) also define vulnerability as: ‘‘ a person or group’s characteristics and their condition influencing their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard.’’ He further suggest that a vulnerability approach to the study of natural disaster is needed as ‘‘the perils involved in disasters must be associated with the vulnerability formed for many people through their normal existence.’’ The commonly used definition by the IPCC Fourth Assessment Report, defines vulnerability to climate change as; ‘‘The extent to which geophysical, biological and socio economic systems are susceptible to, and unable to cope with antagonistic climate change impacts’’ (IPCC, 2007 p. 21).

According to the report, the factors that make a system vulnerable are its ‘‘exposure, sensitivity and adaptive capacity.’’ Hence vulnerability in the climate change context refers to the ‘‘susceptibility, sensitivity and lack of resilience or capabilities of the exposed system to deal with and adapt to both extremes and non-extremes’’ (IPCC. 2007 p. 70). The various descriptions of vulnerability in the climate change related literature normally falls into two groups; seeing vulnerability either in terms of the amount of potential harm caused to a system by a specific climate-related event or hazard (Jones and Boer, 2003),

Or as a state that occurs within a system before it comes across a hazardous event (Allen, 2003). The earlier opinion has come about from an approach centered on the assessment of hazards and their impacts, whereby the role of human systems in intervening the consequences of hazardous events is downplayed or ignored. Existing studies on climate change impacts have usually observed elements that intensifies a number of people at risk of flooding based on predictions on the rise of sea level (Nicholls et al., 1999), and have therefore concentrated on how humans are exposed to hazard instead of the capability of individual to deal with the hazards when they occur. The approach to the effects and hazards normally observes how the vulnerability of a human

system is figured out by the nature of the physical threat(s) to which it is exposed, the probability or rate of recurrence of the hazard(s), the degree to which humans are exposed to the hazard, and how sensitive the system is to the effects of the hazard(s).

2.4. Coastal systems and coastal flood vulnerabilities

According to IPCC's Second Assessment Report in Watson et al., (1996), vulnerability could be explained as "the degree to which climate change may damage or harm a system; it be contingent not only on a system's sensitivity but also on its capability to adapt to new climatic situations." Sensitivity, in this context, is "the extent to which a system will react to a change in climatic conditions." Specifically in the case of flooding, a system is vulnerable to floods due to how exposed it is, in affiliation with its ability/ inability to be resilient, to deal with, or acclimatize to the extent. Coasts are usually extremely vigorous and geo-morphologically multifaceted systems that react in different behaviors to extreme weather events. Flooding in the coastline areas are identified to be among the most perilous and dangerous of natural disasters (Douben 2006). It is mostly known that the built-up areas closer to the shorelines are extremely concentrated with increasing human populations, socio-economic activities and settlements. In view of the fact that "21 % of the world's population live within coastal zones" (du Gommès et al. 1997; Brooks et al. 2006), the probable sea-level rise impacts are significant for the broader coastal ecosystem (Kumar 2006). Hoozemans et al, (1993) did a universal assessment of vulnerability and projected that, under the current circumstances, "an average of 46 million people per year experience storm-surge flooding." Baarse (1995) also proposes that "some 189 million people presently live below the one-in-a-hundred-year storm-surge level." It has been anticipated that, due to climate change, communities in the coastal areas all over the world would be progressively affected by floods. As a matter of fact, some are even now considered vulnerable to current climatic variability (IPCC

2007a, b; Mirza 2003). Climate change is anticipated to cause increased sea-level rise with increased tidal inundation, increased flood occurrence, accelerated erosion, rising water tables, increased saltwater intrusion, increasing storm surges and increasing occurrence of powerful cyclones (Fenster and Dolan 1996). Massive people are found in coastal areas where their exposure to coastal flooding is very high (Small and Nicholls 2003). The total number of people that would be affected is likely to intensify, due to net coastward migration across the world (Bijlsma et al. 1995). On one hand, some of the exposed populations are shielded from flooding through different structural and non-structural methods that are part of the resilience strategy. On the other hand, most of them have nothing, or only feeble, flood defenses and the populations exposed are more often subjected to flooding with consequential disturbance, financial loss and sometimes loss of life. Smith and Ward (1998) revealed that rising sea levels will raise flood levels; it is also expected that, the number of people affected by flood in a particular year by storm surges would rise six times and fourteen times given a 0.5-m and 1.0-m rise in worldwide sea levels, correspondingly (Nicholls 2004).

2.5. Gender inequalities in Ghana

According to the Ghana National Climate Change Policy (2013), the ministry of Gender, Children and Social Protection was formed as an outcome of the awareness by the government that, there remained a critical need for the setting up of a high-level body which would specially be accountable for organizing nationwide response to gender inequality. The Department also supports the carrying out of events that address the rights of women and children with the ambition of proceeding the status of women and making sure of the progress, survival and development of our children. The Ministry has, since its formation, led national drives to overcome the defiances of gender inequality.

Equality in gender is thus an essential precondition for effective adaptation to climate change and mitigation responses and unbiased social development. Because of existing gender disparities and prejudiced practices, the IPCC (2007) has stated that, climate change does not affect women and men in the same way. Thus there exists ‘gender-differentiated effects on society that show a discrepancy between regions, generations, ages, classes, income groups, occupations and along gender lines.’ Women are mostly given due consideration to be the key producers, but they are often discriminated in making decision and employment, and have unequal access to resources such as land, credit, technology and information. Predominantly those at risk are the poor urban and rural women who live in compactly populous coastal and low-lying areas, dry lands and high hilly areas.

The NCCP of Ghana states that: ‘Women harvest 70% of the nation’s subsistence crops, account for 52% of our labour force and contribute 46% of our total GDP. They tend to be responsible for household water provisions and energy for cooking, and for securing food and are highly reliant on local natural resources for their livelihoods, all of which make them disproportionately vulnerable to climate change. A study on the impact of climate change on women in three districts has confirmed that, although women undertake 85% of Ghana’s food distribution, they have complications in acquisition of land, land tenure security and formal economic services. Attempts to address gender concerns in climate change must first address inequities in gender and identify that the effects of climate change are likely to affect men and women differently.’

2.6. Gender differentiated climate change impacts

The definition of gender can be stated as,

“the financial, societal, political, and cultural qualities and opportunities connected with being a woman or a man.” The social meaning of what it means to be a woman or a man varies among culture and alters over time. Gender therefore is a sociocultural appearance of specific features and characters that relates to certain collections of people with reference to their sex and sexuality. A distinction must therefore be made between gender and sex as both perceptions are not the same. Sex refers to natural variances concerning women and men. Gender therefore remains an imperative feature that regulates people’s capability to mitigate and adapt to the impacts of climate change variability. The IPCC states in its Second Working Group Report that “climate change will be dispersed differently amongst regions, generations, ages, classes, income groups, livelihoods and gender” (IPCC, 2007, p. 786).

With regards to the IPCC’s Statement, there remains the acknowledgement that, there is undoubtedly a gender dimensions to climate change as the effects are felt in different ways by women and men thus adaptation interventions needs to be gendered. There have been the recognition of several scholars the gender repercussions of disasters caused by climate change in terms of awareness and effects (Enarson et al, 2007; Anderson et al, 2009); partition of labour (Enarson and Fordham, 2001), and post disaster restoration and recovery (Bradshaw, 2010).

2.7. Case studies of gender differentiated impacts of climate change

2.7.1 Women, and emergency measures during natural disasters

Essentially, the mortality rates for women and men often differ in the incidence of natural disasters. A research undertaken in 2006 of 141 natural disasters (largely defined, not restricted to climatic factors) by the London school of economics showed that, when both men and women are given the same economic, social rights and political status, equal number of women and men pass away in disasters (Neumeyer, 2006). In the same instance, when women do not in the same way relish in economic and social rights to men, more women than men tend to die in disasters. Nevertheless, Suarez et al (2009) also noted that differentiated gender roles do not at all times cause greater victims for women. Indication from Central America also revealed that instant death instigated by ‘Hurricane Mitch’ was quite greater for men possibly due to the fact that men was more affianced in outside activities in that region (Bradshaw 2004).

For instance, in Gujarat, India, during the floods, Ahmad and Fajber (2009) found that, catastrophe forewarnings every so often came through the broadcasting such as the radio, television, or the internet, which are regularly used by men than by women which means men are more likely to be prepared or aware of looming disasters to women. Moreover, according to the them, most women are not able swim, while at least 40% of the men can, considering the fact that it is a skill that could be a critical contributing factor for survival. Another is the Asian Tsunami that occurred in 2004, where a lot of women were announced to have passed away than kids or men in the Andaman and Nicobar islands because of gender inequalities, rather than “by chance” (UNISDR, 2008).

Given women’s roles and responsibilities as caretakers and mothers meant that when the tsunami hit, they placed the well-being of their children and assets before their own survival. Suarez et al,

(2009) suggests that women usually prioritize other peoples good far more than men which makes them more vulnerable.

2.7.2 Impacts related to food security

Climate-extreme happenings such as severe drought or floods might often lead to food insecurity and malnourishment in households, with differential ramifications for men, women, disabled people or the elderly. Predominantly, for the reason that women are mostly the chief suppliers of food and meals for their relations, they are often faced with a huge burden to achieve this responsibility in the occurrence of these climatic events. Jungehülsing (2010) assessed the effects of ‘hurricanes Mitch and Stan’ that led to flooding in Chiapas, Mexico, and ascertained that while men lost earnings from accorded work on farms, women lost the vegetables, chickens, fruits etc. from their home farm yards. The women were extremely affected by this since their ability to feed their families were highly dependent from their own home farm yards. Furthermore, where severe drought and flooding in Niger are having major impacts on their crop yields, female-headed households are mainly more probable to be considered food insecure than male-headed household (Zakari et al, 2014).

In the communities of Inuit, once food becomes limited, the women are habitually the first to sacrifice or miss meals and retail their resources so as to make sure that there is sufficient food available in their household (Beaumier et al, 2010). Also other subgroups of Inuit women, example is those that are not married or with lesser educational accomplishment, are mainly exposed to food insecurity (Beaumier et al, 2015).

These illustrations indicate that the food security of people can be affected differently by climate change but women are and their dependent children however mostly go through the most in terms of health.

2.7.3 Impacts on health

Notwithstanding the fact that flooding is one of the most prevalent climatic hazard that places a lot of jeopardies to the health of humans but yet, Few et al., (2004) has noted that, there is a limited efficient study on the health consequences of flooding. They further claimed that, ‘‘health and other impacts of flooding have differentiated impacts on men, women, children, disabled people and the elderly.’’ Also, severe impacts of climate on health might happen for women and children because of the indirect effects of undernourishment, which make them easily vulnerable to illnesses and this is often apparent in poor developing countries. Reyes (2002) recognizes the effects of the 1997–98 El Nino occurrence in Peru and describes that the inequalities in gender in the dispensation of food and consumption in households were usual which led to health conditions.

According to a study by Tunstall et al. (2006), health effects that are physical which results from floods appear to be comparatively not that severe or are short lived, but the emotional impact may last long (Tapsell et al., 2003). Flooding may exacerbate a person’s susceptibility to not only physical ailment, but also to poor mental health (Norris et al, 2004). For example at the aftermath of Hurricane Katrina, the probabilities of women that suffered from severe stress condition were 4.1 times higher than that of the men (Mills et al., 2007). Similarly, after the floods that occurred in 2007 in the United Kingdom, the probabilities of women that experienced depression were 1.7 times higher than that of men (Paranjothy S, et al, 2011). The psychological and emotional toll of climate happenings therefore seems to be weightier for women as they are not able to perform their

responsibilities and roles, specifically in the provision of care for their children and other members of the family.

2.7.4. Impacts on migration

The IPCC asserts that ‘‘climate change will have an effect on the settlements of humans through the effects it has on the health of human, food security and reduction in the sustainability of natural resource based fiscal activity’’ (Parry et al 2007). Several studies conducted by Shrestha et al., (2007), Bohra-Mishra et al., (2010) Massey et al., (2007), in the Chitwan Valley of Nepal revealed that, after a climate-induced disaster has happened, there was an escalation in the time that women in the town used to collect forage and wood for fire, and also the decline in agricultural yield increased the likelihood of migration within the local district. Consequently, migration caused by climate change for the women is carefully connected with debilitation of the nature resources as women are mostly both the principal gatherers and users.

In developing countries such as Bangladesh where women’s movement is highly constrained, they are more likely to die during naturally occurring disasters (Fothergill, 1996). So, even the deliberate relocation of women because of climate change is extremely associated to certain societal settings. The capability of women to cope with climate change is hitherto another characteristic of their exposure to migration caused by climate change, therefore Lambrou et.al., (2006) argued that ‘‘ the ability of women to adjust to climate change is subject to their socio-cultural and socio-economic norms.’’ A research that was done in the river basin of Ganga after the enormous riparian flooding also revealed that women that were particularly poor from Nepal were required to relocate locally because of their low capacity to adapt (Mitchell et al., 2007, p 16).

Agwu and Okhimambe (2009) discovered that, in Nigeria, during flooding or drought seasons, there is a short-term migration of the men to the urban parts which results in the women being left on their own to cater for the household which places extra load on them. The social implication of migration may also have differential effect on men and women. For instance in Bangladesh, a study done by Kartiki (2011) also discovers that the ‘cyclone Aila’ which caused major destructions in 2009 compelled some affected households to relocate, and the social impacts were experienced by women differently to that of men.

A lot of factors with diverse gender dimensions might influence decisions to relocate as a response to adaptation to climate signals. For instance, Jungehülsing (2010) discovers in Chiapas, Mexico, that relocation decisions are linked to land ownership. In approximation, half of the cases of male migrants studied, showed that the effects from climate change constituted an imperative reason in their decision to migrate, since men in that area usually worked in farming and owned lands. Additionally, in the women’s case, who mostly did not possess land, this association was less apparent or was only indirectly linked to the effects of climate change. Women have a tendency to migrate due to lost proceeds which is resulted from the low regional economy, mainly in activities that is associated with vending food or other items. Single mothers were more likely probable to migrate than mothers that were married because of the fact they are the only breadwinners for their families and therefore have no other choice but to do so when their livelihoods are battered.

2.7.5. Gender and climate change adaptation

The IPCC, (2012) explains adaptation as:

“The process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities.”

Research studies from the Developing World have acknowledged the distinct roles played by men and women in preparing for disasters. For instance, studies carried out in the various regions in four countries in the Pacific Island in the 2002 Disaster Risk Programme that took place in the Pacific South revealed that even though women were most likely to carry out certain tasks that is associated to the preparation of households practically, such as giving information to members of the family, putting away foodstuff and water, and the protection of family possessions, whilst men, on the other hand, were responsible for interacting with government officials by making decisions about the timing and sites to evacuate to, handling water sources, handing out emergency relief packs, and delivering and distributing early warnings to the entire public (Lane et al., 2009).

It remains evident that participation in decision-making on disaster risk management is critical to adaptation and yet evidence that exists in literature suggest that women do not have equal opportunity as men in the community level decision-making processes in most countries especially in the developing world. In a study carried out by Lane and McNaught (2009) in two communities on Ambae Island, Vauata, concerns were raised by the women concerning the point that the greater aspect of making decision with respect to the allocation of resources after disasters was being done by men. Coupled with this apprehension was the fact that men’s decisions made at the household and community levels were considered biased, and usually didn’t include women. “Mountain women” when equated to women in the lowlands in Nepal, however greatly input in decisions and also have a greater sovereignty. Albeit their knowledge is useful in caring for their families and their survival which allows in the adaptation during extreme conditions, like wars, disasters and dislocation, their knowledgeable inputs and skills are still not recognized and esteemed in

adaptation planning (WHO 2011). The cases above clearly make evident that the different roles played by gender during disasters often have gendered-effects. The roles shows functions of interactions of authority and impact among women and men in both the community and the household. The cases also make known the intrinsic danger in supposing that diverse and separate roles played by gender are always favorable to the various zones of the community. Whereas roles played by gender may correlate each other and also enable societies to be able to adapt more proficiently and effectually to climatic risks, there are cases in which these roles may produce unequal access to important resources, informing early warning and making decision unequally (Lane and McNaught 2009). For instance, Cohen et al., (2016) studied in Solomon Islands that, women and youth reported that “the limitation to education, free movement and activity constrained their ability to form relationships with essential organizations to enable access to get support technically or acquire new information essential to acclimatize to climate change.”

Education as a form of human capital is considered as a basis to be able to successfully adapt in the household to climatic change. Evidence abounds in the literature signifying an affirmative connection in the educational level of household head and taking on of better technology (Igodan et al., 1988), and being able to get to information about improved technologies and advanced production (Norris and Batié (1987). Asfaw et al., (2004) also argues that households headed by males are very likely to be informed concerning new technologies and take on businesses that are dicey than households than are headed by females. Additionally, Tenge et al. (2004) recommends that if a household is headed by a female, it may effect adversely on how their soil and water conservation measures are adopted, this is because the women are not able to adequately get information, land and other resources because of traditional societal obstacles. However, this

argument is one-sided in that it neglects the precarious role of female household heads in climate change adaptation techniques.

Nhemachena et al., (2007) concluded that women are able to likely adapt because they are accountable for most of the farming work and so they are better skilled and are able to get to information on farming and management practices. It is therefore imperative that this type of knowledge and experience which are context-specific be recognized by participating in research to highlight the exact encounters and approaches that the women and men adopt, predominantly in Africa where there exist little or no recognized study or research that asks exactly what women and men want (Demetriades and Esplen 2008).

In addition, gender disparities in getting assets and the process of making decision at both household and community levels generally mean that adaptation strategies have a habit of being gendered.

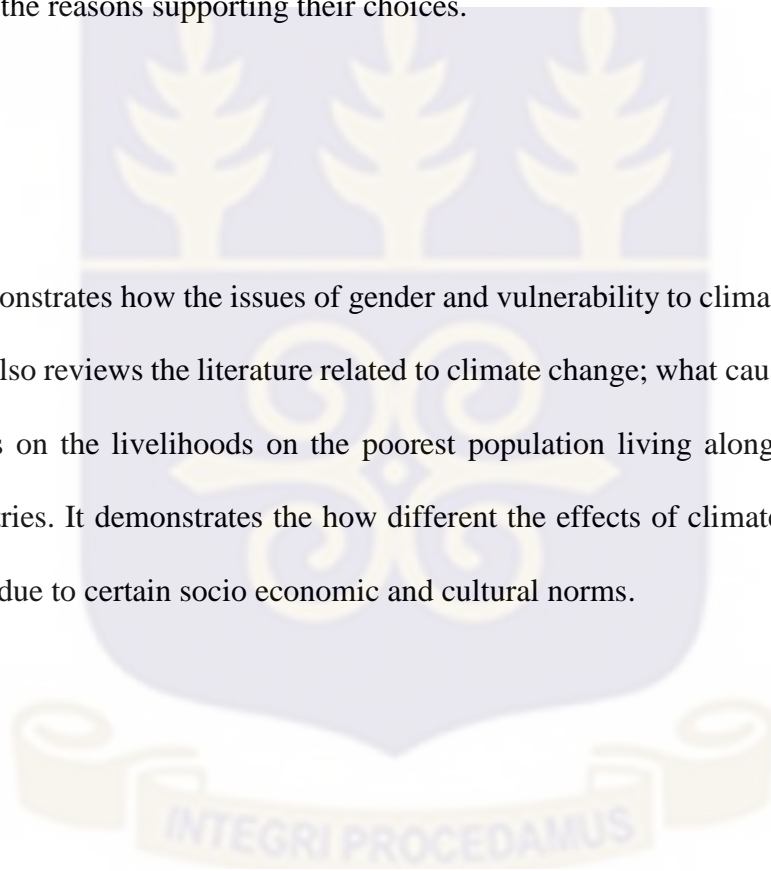
Codjoe et al. (2012) studied and categorized the adaptation strategies that is preferred during flood and drought by male and female farmers in Ghana specifically, the Afram Plains, and revealed that even though the farmers that are females ranked wells and boreholes, the controlling of bushfire and harvesting of water as the three strategies mostly preferred, the male farmers, by contrast, also ranked irrigation, boreholes and crops that can tolerate drought as the adaptation strategy they mostly also prefer. The women in this study contended that, it was their responsibility to provide water for their families and that they spend a lot of time everyday carrying water from aloof places. Thus, boring holes for water and wells, and gathering water remained to be an important strategies of adaptation throughout drought periods. In the same way, a study conducted by the Food and Agriculture Organisation (FAO) in combination with local Indian institutions on the strategies that are preferred for coping with weather shifts that are long-term, found that the men highly preferred

to migrate i.e. (47% of men against 18% of women), while a lot of the women would choose to do labour for wages, (58% of women against 38% of the men) (WHO 2011).

Therefore, it can be concluded from the above illustrations that women and men often prefer different adaptation or coping strategies, and different factors interact to influence their choice of adaptation strategies. This emphasizes the need for a more gender- focused study to assess the various adaptation mechanisms preferred by men and women, particularly in coastal communities and to determine the reasons supporting their choices.

2.8. Conclusion

This chapter demonstrates how the issues of gender and vulnerability to climate change are linked with theory and also reviews the literature related to climate change; what causes it, the actual and expected impacts on the livelihoods on the poorest population living along the coast in many developing countries. It demonstrates the how different the effects of climate change are felt by women and men due to certain socio economic and cultural norms.



CHAPTER THREE

METHODOLOGY

3.0. Introduction

This chapter centers on the approach and specific method that was used to look into the research questions. It is then proceeded by a critical overview about the epistemological and ontological positions of the study. It also provides a rationalization for merging the two approaches in the form of a mixed- methods procedure. A brief overview of quantitative and qualitative research procedures, description of the area under study and the data analysis procedures. The last section provide information about the ethical principle foundation of the study.

3.2. Epistemology and ontological foundations of the study

Throughout the years, a lot of questions have been asked concerning how the social world should be studied and if a scientific approach or technique is a suitable framework to embrace (Garner et al. 2009; Bryman 2012). These questions, surrounding epistemological issues influence the manner in which social research is conducted (Bryman 2012). Basically, epistemology is the branch of philosophy that has to do with knowledge (Crotty 1998; Krauss 2005). On the contrary, the questions about the nature of social occurrences are ontological concerns. The significant view in epistemological philosophy has to do with the question of if the social world would be able to and should be studied centered on the same values, processes and norms as the natural sciences (Bryman 2012). Ontology, however, includes the philosophy of realism. According to Bryman (2012), the main matter in social ontology includes the question of if social entities would be able and should be identified as an objective entity that have a reality that is external to social actors,

or if they would be considered social structures that is built up from the insights and creations of social actors.

In the context of this study, the constructionist approach is well-thought-out as the suitable epistemological model for the notion about the risks, and changing our understanding of the role played by social, institutional, and socio-economic factors in creating the difference in vulnerability among women when they are faced by climatic risks or hazards in the coastal communities. To be specific, the emphasis of this study is on the analysis of occurrences and human experience, thus, how the climate changes and how it has different impacts on women from their perspective.

3.3. Research design

There seem to be different definitions of the phrase research design, but Fraenkel et al, (2012) argue that “the overall plan for collecting data in order to answer the research question” is referred to as a research design. They further explain that it also consist of “the specific data analysis techniques or methods that the researcher intends to use.” So simply, it means the logical structure of an enquiry which a researcher hopes to find answers to.

3.4. Research approach

3.4.1 The mixed-methods research approach

Mixed methods approach to research consist of using two or more different kinds of collection of data and analysis methods within the same study or research (Greene et al. 2005). Similarly, mixed methods research can be explained as “the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative views, data collection, analysis, inference techniques) for the wide purposes of breadth and depth of understanding and validation” (Johnson et al. (2007, p.123).

The quantitative-qualitative approaches have got their strengths and weaknesses in guiding social research. This assumes that it is imperious to combine different methods in a single research project so that the weakness of one could be overridden or enhanced by the other method. The rational for choosing mixed methods approach for this study was based on these reasons; First of all, it was intended to accomplish the ‘logic of triangulation’ (Denzin 1989, p. 13) because a single method could not entirely grasp all the key details of the study. Secondly, using the quantitative-qualitative approaches also aided in the study to double-check gathered data from the field by various methods thus establishing the validity and reliability of the study outcomes. The combination of the different methods in a one study enriches the claim made by the researcher for the validness of the conclusions that he/she made and if they can be revealed to provide common approval (Bryman 2004). Using of the mixed methods approach can be justified on the grounds that, it did help the researcher to explore the research questions from different perceptions, which allowed a wider acceptance of the issues connected with the flood vulnerabilities of women living in the coastal communities. Quantitative research is linked with how the researcher perceives the issues, whereas

qualitative research is also linked with perceiving the issues through the eyes of the people being studied (Bryman 2004). Therefore, the combination of the two methods in this study was helpful in accurately encapsulating the factors that influences women's climate change vulnerabilities from their view.

3.4.2. The quantitative research approach

Quantitative research can be defined as an approach that focuses on the gathering and analysis of data in the form of values (Bryman 2012). In this study, data concerning the demographic characteristics of respondents such as age, marital status, educational level, as well as other characteristics were required for the analysis so as to answer some of the research questions. Because the opinions of individuals were also required for the analysis in this study, some concepts which relates to the perceptions, attitudes and experiences of the women regarding vulnerability to climate change were conveyed. It was therefore important that a quantitative approach in the form of a semi-structured questionnaire, was used to help gather the right data to answer the research questions according to specific characteristics in this study.

Methods of collecting data in quantitative research, can be through survey in the form of structured or semi-structured questionnaires. It is claimed that the nature of the analysis, the aims of the study and the knowledge of respondents determine how the questionnaires would be completed in quantitative research (Spratt et al. 2004; McGiven 2006).

3.5 Collection of data

3.5.1 Survey

Women in households living in the coastal community of Gbegbeyise (Dansoman) in Accra formed the basic unit of inquiry for this study. Therefore, data from women above the age of 18

were collected through the utilisation of semi-structured questionnaire. The questionnaire was designed based on the study objectives. Thus, the questionnaire had characteristics of the study objectives in order to get information from respondents regarding the perceptions and knowledge about environmental hazards linked to climate change, effects of flooding on women, how they cope with the flooding, and the support or type of mechanism or adaptation strategies that exist for the women.

3.5.2 Qualitative resource approach

Qualitative research deals with the gathering and analysing of data in words or pictures form (Neuman and Kreuger 2003; Bryman 2012). To put it another way, emphasis is made on words rather than quantity. Therefore the qualitative data collection tools used to balance data gathered from the quantitative sources for this study are below;

3.6 Data Collection

3.6.1 Review of secondary sources

Several secondary sources were used in addition to the primary sources of data to ensure conformity of this study to the current literature on how climate change impacts differently on gender. Therefore, appropriate literature concerning gender and vulnerability to climate change in Ghana, and other areas of the world where they are hit the hardest by climate extremes, were used.

3.7.2. Key informant interview

Key officers from institutions in the district assembly whose work or activity covers climate change within the community, like the National Disaster Management Organization (NADMO),

Environmental Protection Agency(EPA), and also the Planning officer was considered as key informants of the study.

3.7 Sampling Method

Households were be put into clusters using the Ghana Demographic household survey report, 2010 and systematic sampling technique was used in sampling households. Purposive and incidental sampling technique will be used to sample respondents from each household for the questionnaire administration. 120 respondents were used as the sample size.

3.8.1 Inclusion criteria

Any household member who is 18 years and above and agree to be interviewed was included in the study.

3.8.2 Exclusion criteria

Any household member who declined to be part and less than 18years at the time of the study was excluded.

3.8.3. Study Area

The area under study is one that experiences erosion on the coast, flooding and inundation. The distance of the area is approximately 3.06 km and is positioned at latitude 5.3180°N and longitude 0.10010°W alongside the Gulf of Guinea. The area has a mildly sloppy coastline and sandy beach. The Dansoman area, which has similarities to most areas of the Accra coast, possesses a

comparatively open coast that allows a significant solid unhindered swell waves to reach the coast and break indirectly thereby producing currents that are long shore (Ly, 1980) as cited by Appeaning et al, (2009). Gbegbeyise is a community in Dansoman and undergoes recurring inundation which is resulted from episodic spring tides.

Gbegbeyise is populated and is in the Africa/Middle East region font code. It is positioned at an altitude of 114m atop the level of sea. It has 5°31'0" N and 0°16'0" W as its coordinates in Degrees Minutes Seconds or 5.51667 and -0.266667 in decimal degrees.

3.9. Data analysis

3.9.1 Analysing quantitative data

Administered questionnaires went through quality checks through editing and data cleaning to make sure that the basic procedures had been followed. The data collected were then given codes and put into a spread sheet in the Statistical Package for Social Sciences (SPSS) Version 22 for statistical analysis. Quality checks were carried out again on the spreadsheet to make sure the data had been entered appropriately. The chi-square was also used to test association between dependent and independent variables and the statistical implication was recognized at $p \leq 0.05$.

3.9.2 Analysing qualitative data

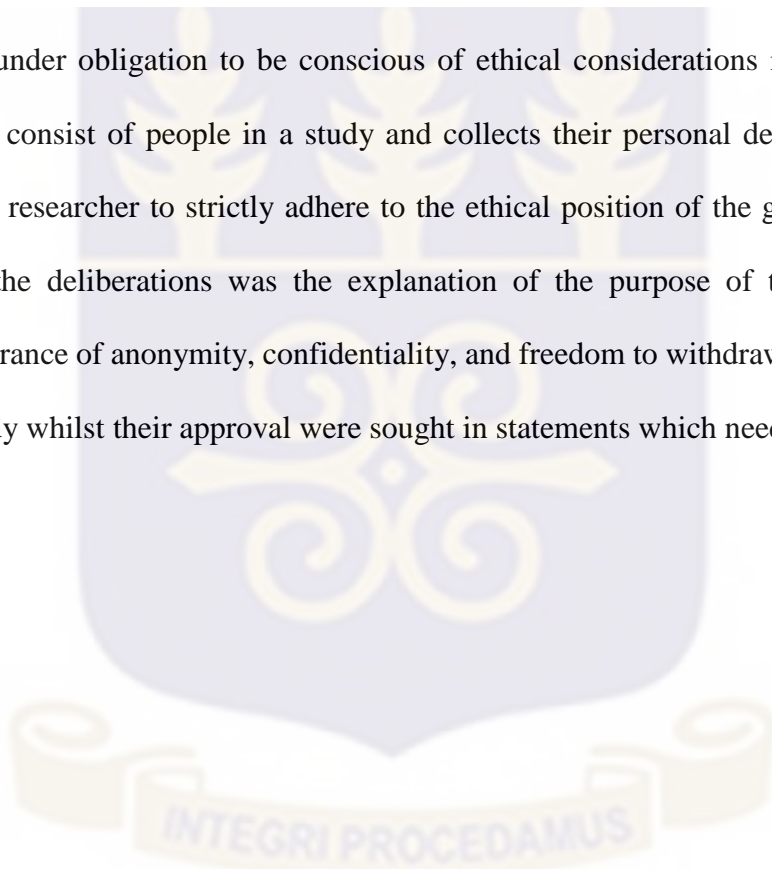
Qualitative Data Analysis could be defined as “ the variety of processes and procedures in which the qualitative data that have been collected is transformed to some type of clarification, accepting or analysis of the persons and circumstances under investigations” (Taylor et al., 2010).

3.10. Ensuring data validity and reliability

Phelan and Wren (2005) state that validity talks about “how accurate an assessment measures whatever it is purported to measure.” To ensure data validity and reliability, the triangulation technique was used to cross-check information gathered from the different sources using the various methods.

3.11. Ethical Considerations

Researchers are under obligation to be conscious of ethical considerations in research. This is because research consist of people in a study and collects their personal details, therefore it is important for the researcher to strictly adhere to the ethical position of the generalised research code. Amongst the deliberations was the explanation of the purpose of the research to the respondents, assurance of anonymity, confidentiality, and freedom to withdraw at any point in the course of the study whilst their approval were sought in statements which needed to be quoted.



CHAPTER FOUR

DATA PRESENTATION, ANALYSES AND DISCUSSIONS

4.0. Introduction

This chapter consists of analysing the mixed methods i.e. quantitative approach involving survey (questionnaire) and the qualitative approach through interviews of persons in institutions which was used in data collection process for the study, and their analysis and a discussion of issues based on the analysis. The study was to find out the flood vulnerabilities of women living in the coastal community of Gbegbeyise.

4.1 Demographic characteristics of respondents

This segment consist of analysing the questionnaire that was administered to certain individuals that live in the residential houses in Gbegbeyise (Dansoman) study area. A total of 120 women were interviewed and all the questionnaires were completed and given back providing a 100% response. Below is Table 4.1 which shows the respondents' ages in the study area. 1.7% of the respondent were between the 18-25 years, 26-35yrs (28.3%), 36-45yrs (35.8%) and 34.2% were 45years and up.

Table 4.1. Age of respondents in the study area.

Age Group (Years)	percentage (%)
18-25	1.7
26-35	28.3
36-45	35.8
>45	34.2
Total	100.0

Concerning the marital status of respondents, 70% of the respondents were married, 20% were single,

6% were divorced whilst the remaining 4% were widowed. With regards to occupation of respondents, majority (64%) engage in trading, 20% are fish mongers, 16% are into public service (Fig 4.1). This is an indication that a great percentage of respondents in community are involved in the unofficial sector. Significant numbers of respondents are traders and engage in several services while the remaining few are engaged in fishing.

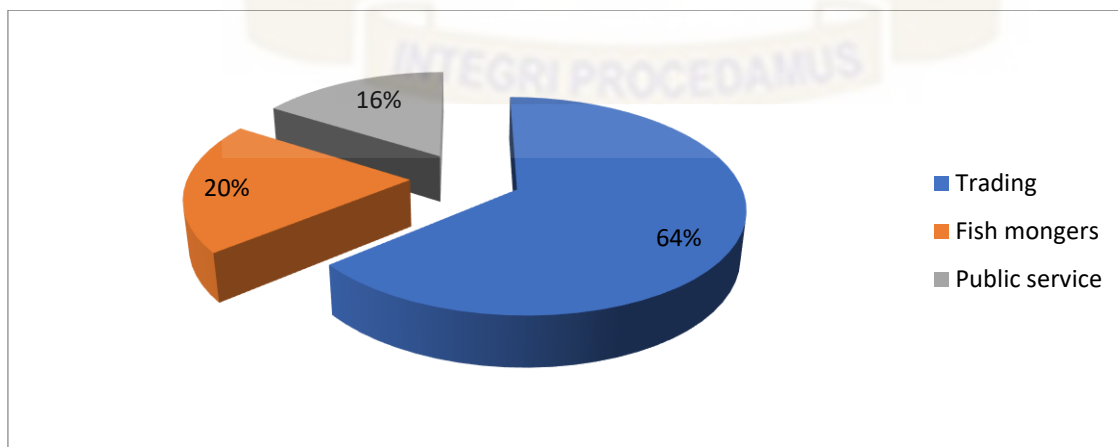


Fig 4.1: Occupation of respondents in the area of study.

As per the social assessment, the levels of education of the women were required because it has an important part in comprehensive understanding of problems that relates to flood vulnerability and appropriate coping or mitigation strategies. The analysis showed that majority of the respondents i.e. 46.7% have had no formal education, 45% had primary education, and 28.3% had secondary education whilst the remaining 5.8% had tertiary education. The findings shows that, the low educational level of respondents is closely connected to their professions and consequent poor financial status.

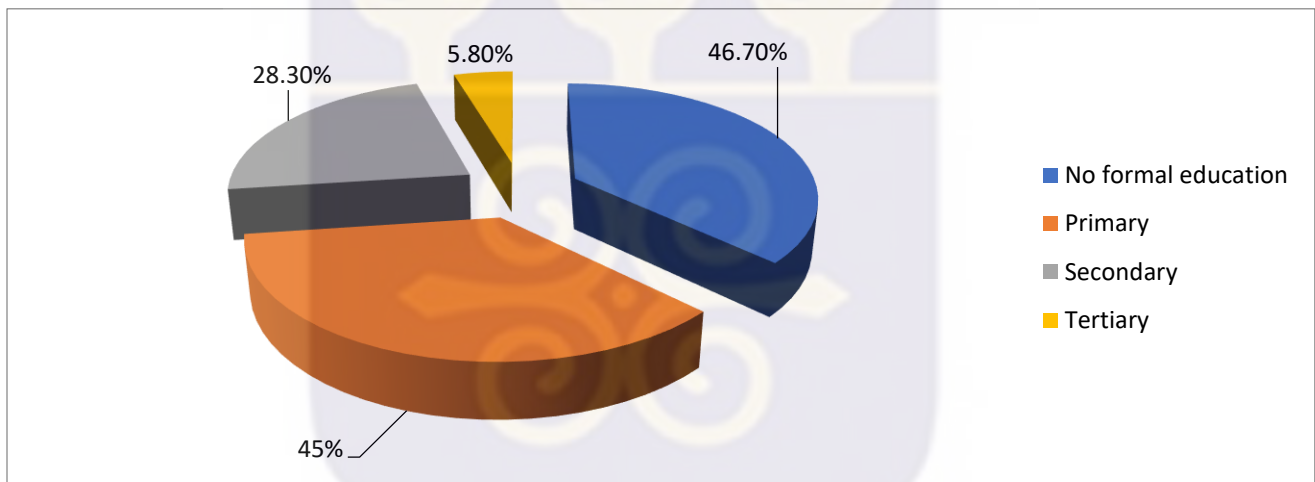


Fig 4.2 Educational level of respondents in the study area

4.2 The effects of coastal flooding on women in Gbebegeyise.

Out of the problems of flooding that the respondents listed in the surveyed community, erosion was rated foremost (78.3%). This was followed by salt water intrusion into ground water (71.7%), and food shortage (67.5%).

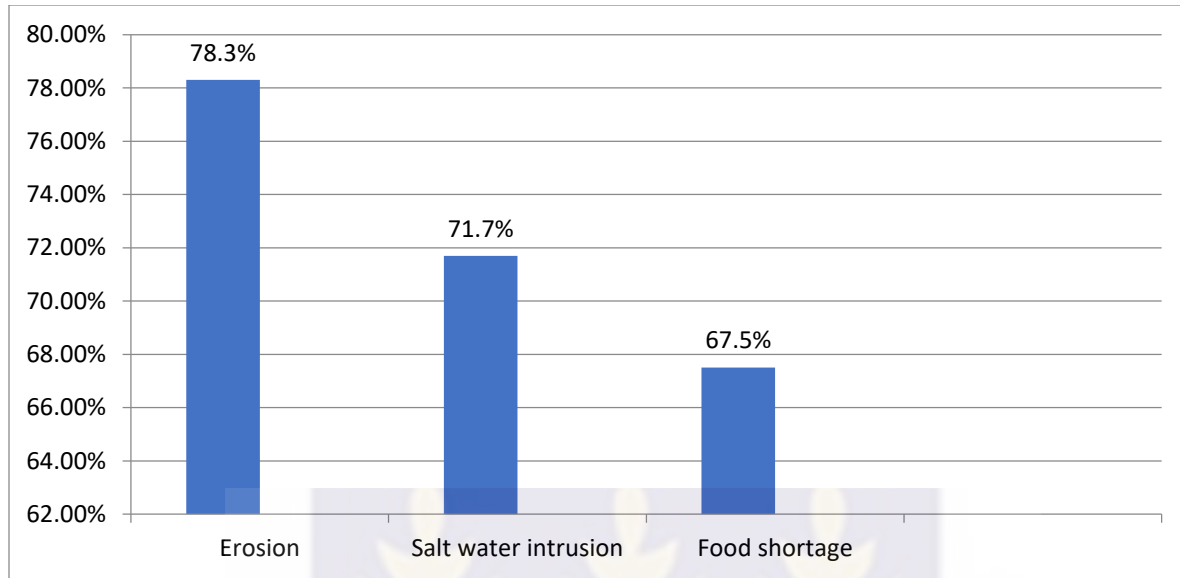


Fig 4.3 Respondents perception on the effects of flood in the study area.

The respondents cited other problems of flood which comprised environmental pollution or unclean environment, bad or damaged roads, mosquito invasion, insecure neighborhood, poor electricity supplies, unemployment and incidence of diseases. A lot of these problems, for instance bad or damaged roads, contamination of water bodies, mosquito invasions and endemic diseases according to the respondents were largely attributed to flooding in the community. When their water gets contaminated for example, the women complained of it having a toll on them since they have to travel to other communities nearby to fetch water. The mosquito invasion brings malaria in which when any of their family members are affected; they have to take a break from work and take care of the affected person/persons.

The respondents also noted that when floods occurs, sewage and rubbish from dumpsites and drainage canals are swept into their abodes, which brings about all types of ailments such as diarrheal and cholera. Which also compounds their workloads in their household because of the social roles and norms of women being the ones that is responsible for keeping their homes tidy.

Respondents noted that floods affected the community especially in areas close to channels of drainage. This is partly due to solid wastes that blocks the drain canals. In areas like these, the levels of the flood outside houses and in the streets can go up to knee level dependent on the force of the rains and the place. Wherever the effluent system is poor, flooding tended to be more problematic.

The respondents attributed the floods to a variety of causes as shown in table 4.2. More than 43 per cent (43.3%) stated lack or poor storm water drainage structure as major causes of flooding. Building on flood drains in the community remained the second most mentioned reason for the incidence of floods representing 36.7% and the effects that was observed was how solid wastes was increased in its generation, which are disposed of on the streets and in drains. And also the violations of buildings and structures onto otherwise illegal or prohibited lands. Therefore, these factors exacerbate the flooding, since the rain water are unable to flow through proper drains and this increases their vulnerabilities.

Other factors contributing to flooding that emanated from the study by respondents included: failure to maintain existing drainage (5.8%), weak institutional capacity (5.8%) and changes in the intensity and patterns of storm (8.3%).

Table 4.2 Respondents perception on causes of flooding in the study area

Causes	Frequency	Percentage
1. Lack of storm water drainage	52	43.3
2. Building on flood drains	44	36.7
3. Failure to maintain existing drainage	7	5.8
4. Weak institutional capacity	7	5.8
5. Changes in the pattern and intensity of storm	10	8.3

Source: Field work, 2018

Majority of the respondents cited that they women suffers comprehensively from flooding (52.5%) whilst the remaining 47.4 cited children as the most affected. None of the women interviewed mention men as being mostly affected by floods. When asked whether the weather per their experience had changed in the last ten to twenty years, 46.7 per cent of respondents were of the opinion that there had been an increase, 2.5% asserted that there had been a decrease, 37.5% said there had not being any change whilst 13.3% had no idea about any weather changes.

4.3. Perception of effects of flood on economic variables

On the perception of floods on economic variables, most respondents strongly agree and agreed to the perception that floods have an effect on agriculture, water access, health, food security, sanitation, infrastructure and properties.

Table 4.3 Perception of effects of flood on economic variables

Effects of flood	Strongly Agree	Agree	Not sure	disagree	Strongly Disagree
Access to water	68(56.7)	20(16.7)	5(4.2)	23(19.2)	4(3.2)
Health	0(0)	83(69.2)	37(30.8)	0(0)	0(0)
Food security	34(28.3)	86(71.7)	0(0)	0(0)	0(0)
Sanitation	34(28.3)	49(40.8)	37(30.8)	0(0)	0(0)
Infrastructure	83(69.2)	37(30.8)	0(0)	0(0)	0(0)
Property	49(40.8)	34(28.3)	37(30.8)	0(0)	0(0)

Note: Numbers in parenthesis are percentages and outside are frequencies

4.5. Measures of association between demographic indices and effects of flooding

The study revealed that women's age was significantly associated with their perception of flood on water access, food security, sanitation and infrastructure at 95% level of confidence. The analysis of bivariate when using the chi square shown statistically significant links between age and the effect of floods on water access, food security, sanitation and infrastructure ($\chi^2 = 32.236$, $P < 0.001$). There also was shown a significant association between the level of educational achieved and perception on effects of floods ($\chi^2 = 3.614$; $P \leq 0.05$). Marital status was also significantly associated with the perception of the effects of floods on water access, sanitation, food security and infrastructure ($\chi^2 = 32.236$, $P < 0.001$). Employment status also significantly influenced the perception of respondents on the effects of flood on water access, food security and sanitation ($\chi^2 = 3.614$; $P \leq 0.05$).

With respect to food security from table 4.3, it was noted that, majority of the respondents agreed flooding had impacted it and they stated that, it makes life difficult for them since they have to sacrifice or skip meals in order to make sure their families especially their children have enough

to eat. This then put them at risks of a lot health issues relating to malnutrition. This was also revealed in a study done by Beaumier et al., (2010), which says that in communities where food is scarce especially due to flooding, most women usually sacrifice or skip meals and sell their possessions in order to make sure that there is sufficient food in their household. For instance, a particular subgroups of women in Inuit, such as those that are not married or those that has low educational level are particularly vulnerable to food insecurity (Beaumier et al, 2015). These instances indicate that, the food security of people could be affected by climate change in diverse ways but women in particular and their dependent children mostly suffer the most health wise. During times of climate induced disasters, women are mostly under pressure to make available food for their families because they are considered to be accountable primarily for food security in their household.

4.6. Coping strategies adopted to mitigate the effects of coastal flooding in Gbebegeyise

One significant way to mitigate flooding in coastal communities is to adopt local coping strategies. The research identified several coping strategies (multiple response) and the type of strategy adopted depended on the type of effects or impacts of the flood. For instance, cleaning of choked gutters and drains, communal cleaning of surroundings after flood events were used as the main coping strategy for poor sanitation after floods. Filling roads with sand using sandbags, constructing passage for easy flow of water, raising floor levels with sand/sawdust were also used as coping strategies to control erosion by respondents. For springing of water into rooms during floods, respondents usually raise floor levels with sand/sawdust; keep personal effects in friends and relatives houses in nearby communities as a coping measure. Table 4.6 illustrates the various

effects of flood and the major coping strategies adopted by respondents in the area of study. The study however identified that, a lot of unemployed and lower-income level households could not benefit from this coping measures and as a result are very vulnerable to the impacts of flood. When the respondents views were sought whether the coping strategies used are effective, 96.7% answered in the affirmative. Ahmed and Fajber (2009) suggest that, ‘‘planned adaptation enables autonomous adaptation processes in two ways. First is how the development of flexibility is supported, how resilient it is, and the accessibility of social and physical infrastructure systems; and secondly, the capability of plummeting the impact of climate change on vulnerable groups by establishing social protection systems.’’

Table 4.6. Coping strategies used to mitigate the effects of floods by respondents

Effects	Coping strategies
Erosion	Using sandbags to fill roads, constructing passage for easy flow of water, elevating the levels of floors with sand/sawdust.
Salt water intrusion into ground water (Lack of potable water)	Purchase packaged water, protecting water sources, constructing high storage tanks.
Poor sanitation	Cleaning of chocked gutters and drains, cleaning of surroundings by the community after flood events.
Health (Malaria infestation)	Use of herbal medicines and malaria prevention drugs, visit health care.
Damage to property and infrastructure	Sleep outside the community, Temporal relocation to lodge in relatives or neighbor’s house, raising levels of household property.
Food shortage	Going without cooked food until the situation improves, and relying on family members and friends for support.
Water coming from the ground into rooms	Elevating the levels of floors with sand/sawdust, preserve personal effects in friends and relatives house.

Source: Fieldwork, 2018

It is imperative to stress that adaptation should not only be focused on biophysical dimensions, but also on social factors that will either facilitate or hinder the capacity of individuals, households, and communities to modify or adjust their societal, financial and environmental systems in the face of changing climate. Another point worth stressing is that adaptation approaches have advanced from a primary preoccupation with interferences and infrastructure, towards a more “development oriented” method that emphasizes on tackling the fundamental vulnerability stimulators of, instead of reacting to symptoms (WHO 2011). Adaptation, in principle and practice, must not be construed as a bunch of separate procedures planned to tackle climate change. But it must rather be viewed as a continuous procedure that contains factors to many responses, which includes changing skills reducing planning and actions with both vulnerabilities and vulnerability, as well as perception of risk (Tschakert and Dietrich 2010).

4.7. Support mechanisms available for women to cope with the effects of flooding

When the respondents were asked whether they receive any support during and after floods, 93 out of the 120 respondents representing 77.5% answered in the affirmative. The results showed that most respondents receive support in a form of material support (65%), food supply (35%), cash donations (34.2%), provision of shelter (17.5%) and information giving (30.8%)

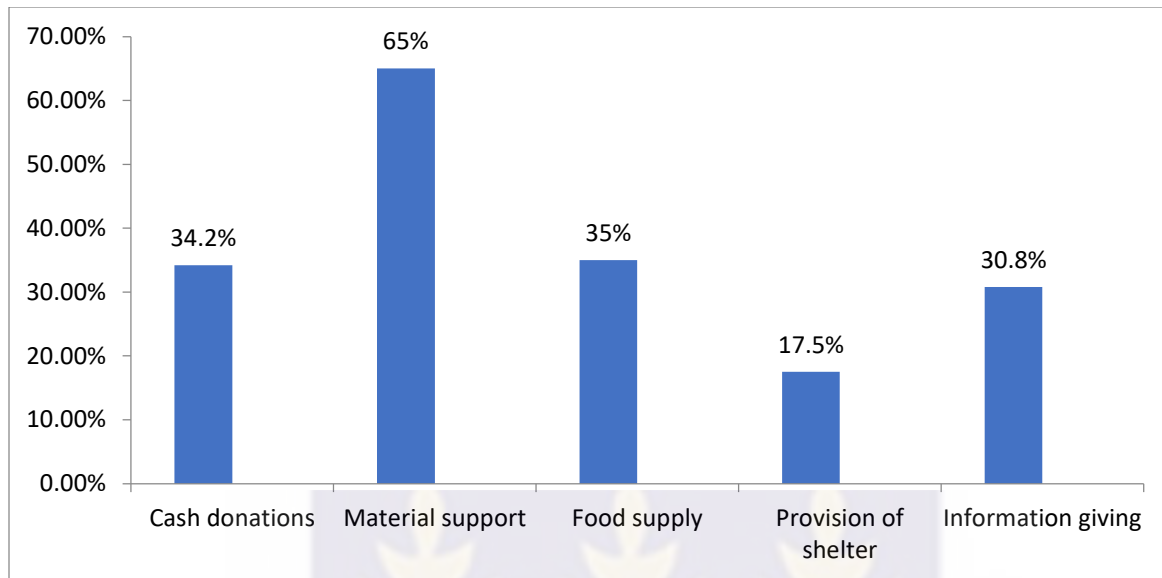


Fig 4.4 Kind of support respondents receive during and after floods

A significant source of support for the duration of flood happenings in the community surveyed comes from NGO's (82.2%), family members and friends (74.2%), individuals (24.5%) and government (15%). The findings of this study is consistence with the findings of Adelakan (2010) who also conducted a study on poor urban vulnerability of communities in the coastal areas to flooding in Lagos, Nigeria and reported that a total of 75.3% of respondents got support from friends and family, NGO's (75.8%), government (10.8%) and religious groups (6.5%).

The impacts of flood events on the livelihoods and assets of coastal communities are intensified by factors that are observed to be multifaceted. Vulnerability to the hazard of flood usually functions by various biophysical, geographical, climatic and socio-economic factors. The situation asserted that clumsy expansion of urban settlements into areas prone flood, and the intensification in the force and volume of rain also contributes to the occurrence of flood hazards in most coastal communities.

However, respondents noticed that within communities, the effects were diverse. Example; McGranahan et al. (2010) conducted a study on the assessment of climate change risks and the settlements of human in low altitude coastal areas in Uganda, most residents asserted that communities benefited by experiencing less flooding because of an improved drainage system than communities whose drainage system was poor. This findings confirms the findings of this present study where most respondents were of the view that people whose effluent system was improved usually experience a lesser amount of flooding than areas with unimproved effluent system which is linked to financial constraints or poverty. Therefore this confirms the argument Mitchell et al (2007) stated that, females are mostly greatly exposed to natural disasters more than males since they are poorer.

In this study, the key preventive or coping strategy that most for households opt for is by elevating the levels of floors by buying considerable quantities of sand and broken sandcrete blocks within dwelling units. Therefore, households with lower-income level or unemployed are not able to engage in such strategy and are consequently very vulnerable to flood impacts.

4.8. Sources of assistance during and after floods

The effects of climate change are serious and affect the operation of the community and its members. Waterborne diseases and malaria are endemic because of the deteriorated environmental conditions that resulted from the flood events and all other forms of productive activities are also affected by the floods.

When the respondents were asked whether their inputs are considered in the development of adaptation plans by city authorities, 82.5% said no, their inputs were not considered. In a study by Cohen et al. (2016) in Solomon Islands, women and youth reported that low educational levels,

restricted movement constrained their ability to build relationship with important organizations to get technical support or first-hand information essential for acclimatizing to the change in climate. Social capital in the form of education is considered pivotal in household adaptation to climate change.

4.9. Support mechanisms available from various local institutions to adaptation to climate change in the community

Since the study wanted to assess what kind of support mechanisms existed for the women as part of its research question, an officer from Environmental Protection Agency (EPA), NADMO, and planning officer from the local District Assembly in the community were interviewed. The presence of collaborative cooperation in adaptation to climate change activities and integration of gender in adapting to climate change development were somehow the main focus of discussion.

Measham et al (2011) has argued that collaborative cooperation amid local institution in the governance arrangement is considered essential for successful local adaptation and preparation to climate change.

The results of the key informant interviews showed that some system of collaborative cooperation existed among the local institutions which was involved in adaptation planning and management to climate change.

The EPA for instance has cooperated with other organisations like the ABANTU for Development to perform training in climate change adaptation information distribution in vulnerable communities.

A member from EPA therefore stated that; “The EPA has been cooperating with the NGO (ABANTU for Development) in the training of climate change education and information distribution in vulnerable areas.”

NADMO also organizes with other institution’s activities to aid in avoiding floods and to react to emergencies that relates to other disasters. They set out public education on the reasons of floods in communities prone to floods. The officer of NADMO however stated that;

“Residents disregard simple safety rules and regulations given out to them before the rains”. He further stated that early warning signals are given to them via radio or television about the weather.

However a research studied in Gujarat, India, found that, during the floods, disaster forewarnings often came through the broadcasting such as the radio, TV set, or the internet, that are regularly exploited by men rather than women which means men are most probable to be prepared or conscious of looming disasters to women (Ahmad and Fajber, 2009).

Information that was gathered by interviewing the planning officer also revealed that, many policies endorsed at the national level need District Assemblies to execute them but without any associate funding or practical capacity. He further went on to say that, the impacts of flooding could be reduced or even prevented by having enough funding to support adaptation strategies like the construction of sea defense walls.

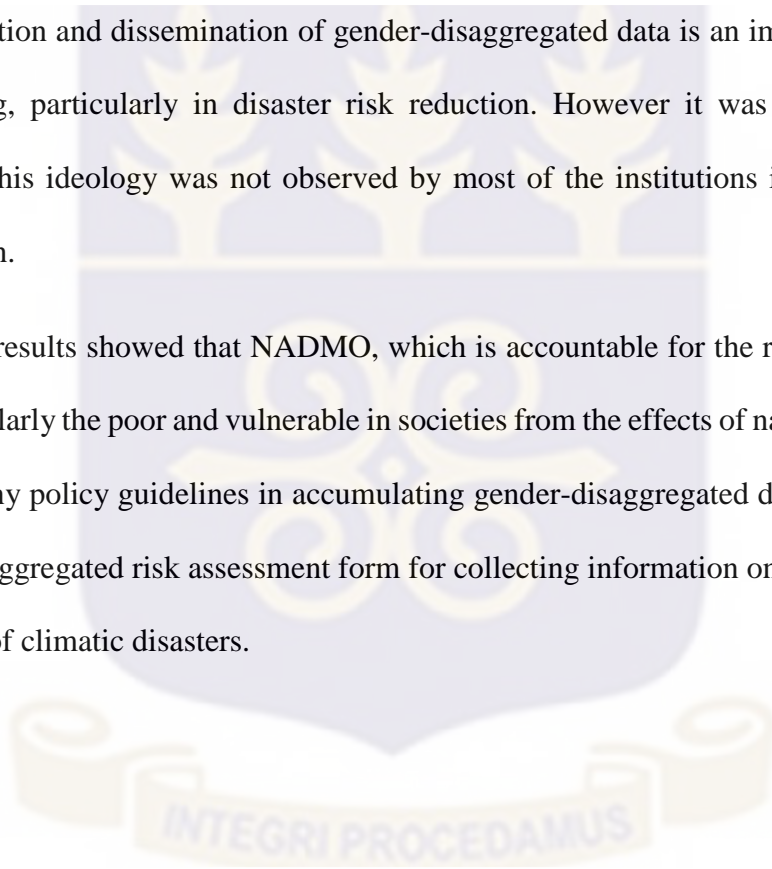
It was also noted that whenever natural disasters occurs, agencies such as NADMO alongside NGOs (whose percentage was much higher than the rest) as stated by the respondents, respond with emergency relief services. He also claimed that, ‘an absence of practical efforts on prevention and early warning makes the coastal communities constantly susceptible to the impacts of coastal flooding’.

4.10. Mainstreaming gender in adaptation strategies

Since this study seeks to assess the kind of support schemes that existed for the women, it probed questions concerning gender mainstreaming and it was noted from the interviews that, some form of gender mainstreaming was carried out in adaptation related activities of some of the institutions. For instance is the improvement of the National Climate Change Adaptation Strategy (NCCAS) and the NCCP which includes some aspects of gender.

Albeit, the collection and dissemination of gender-disaggregated data is an important component of mainstreaming, particularly in disaster risk reduction. However it was gathered from the interviews that, this ideology was not observed by most of the institutions involved in climate change adaptation.

Indicatively, the results showed that NADMO, which is accountable for the reduction of the risk of people, particularly the poor and vulnerable in societies from the effects of natural and manmade hazards lacked any policy guidelines in accumulating gender-disaggregated data but instead they use a gender-disaggregated risk assessment form for collecting information on impact assessment in the aftermath of climatic disasters.



CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0. Introduction

This chapter concludes the outcomes of the study. It also assesses the extent to which the study objectives have been achieved. Essential recommendations have also been stated.

5.1. Conclusion

The study was conducted in assessing the flood vulnerabilities of Women in Gbegbeyise, a coastal community of Accra, Dansoman. The study found out that of the problems of flooding the respondents listed in the surveyed community, erosion was rated the most significant. This was followed by salt water intrusion into ground water and food shortage. Other problems of flood included bad or damaged roads, environmental pollution and mosquito's invasion, unemployment and prevalence of diseases. Flooding as a factor was attributed to a range of causes such as lack or poor storm water drainage system, building on flood drains in the community and the buildings and structures encroached on illegal or prohibited land. Other factors contributing to flooding that emanated from the study included the failing to maintain existing effluent or drainage, weak institutional capacity and changes in the intensity and patterns of storm because of climate change. It was observed that floods was perceived to have an effect on water access, health, food security, sanitation, infrastructure and properties which impacts negatively on the women because of their socio-cultural norms and responsibilities. Coping strategies and the type of strategy adopted depends on the type of effects or impacts of the flood. The coping strategies identified were cleaning of chocked gutters and drains, cleaning of surroundings after flood events by the community, filling of roads with sand using sandbags, constructing passage for easy flow of water and raising floor levels with sand/sawdust were also used as coping strategies to control erosion.

Most respondents receive support in a form of material support, food supply and cash donations and a significant support system throughout flooding events for poor households in the community comes from NGO's, family members and friends, individuals and the government.

Even though the institutions claim to have some form of schemes that exist, it was however noted from the response of the respondents that it was not adequate particularly for the women.

The study therefore accentuates the need for the district assembly to support the community with relevant information and preventive measures before major rains. And also involve the women in decision-making during disaster risk reduction at the community level.

5.2 Recommendation

Based on the study findings, the following recommendations were made:

1. The government and the Disaster management organization should engage the community members particularly women in decision-making to assist them with appropriate preventive measures before the rain seasons.
2. The District assembly and other relevant Authorities should intensify their education in communities along the coast on the effects of floods.
3. Further research studies should be conducted to determine if a causal relationship exist between floods and the prevalence of diseases in the study area.

References

Adger, W. N., & Kelly, P. M. (1999). Social vulnerability to climate change and the architecture of entitlements. *Mitigation and adaptation strategies for global change*, 4(3-4), 253-266.

Adger, W. N. (1996). Approaches to vulnerability to climate change. *CSERGE GEC WORKING PAPER*. Anderson, C, Ahluwalia, M, Castaneda, I, Moya, X, Van Dyck, R, Fordham, M & Raczke, T 2009, 'Making disaster risk reduction gender-sensitive: policy and practical guidelines'. UNISDR, UNDP, and IUCN, Geneva.

Ahmed, S., & Fajber, E. (2009). Engendering adaptation to climate variability in Gujarat, India. *Gender & Development*, 17(1), 33-50.

Alston, M. (2013). Environmental social work: Accounting for gender in climate disasters. *Australian Social Work*, 66(2), 218-233.

Appeaning Addo, K., Larbi, L., Amisigo, B., & Ofori-Danson, P. K. (2011). Impacts of coastal inundation due to climate change in a cluster of urban coastal communities in Ghana, West Africa. *Remote Sensing*, 3(9), 2029-2050.

Asfaw, A., & Admassie, A. (2004). The role of education on the adoption of chemical fertiliser under different socioeconomic environments in Ethiopia. *Agricultural economics*, 30(3), 215-228.

Baarse, G. (1995). *Development of an Operational Tool for Global Vulnerability Assessment (GVA): Update of the Number of People at Risk Due to Sea Level Rise and Increasing Flooding Probability*. Coastal Zone Management Centre.

Bank, W. (2010) *'Economics of Adaptation to Climate Change, Ghana'*, Unpublished Report. Washington, DC.

Barnett, J. (2010). *Human rights and vulnerability to climate change* (pp. 257-271). Cambridge University Press, Cambridge.

Bradshaw, S. (2010). Women, poverty and disasters: exploring the links through Hurricane Mitch in Nicaragua. *The international handbook of gender and poverty*. Northampton, Edward Elgar Publishing. Beaumier MC, Ford JD (2010) Food insecurity among Inuit women exacerbated by socio-economic stresses and climate change. *Can J Public Health-Rev Can Sante Publique* 101(3):196–201.

Beaumier, M. C., Ford, J. D., & Tagalik, S. (2015). The food security of Inuit women in Arviat, Nunavut: the role of socio-economic factors and climate change. *Polar Record*, 51(5), 550-559.

Bijlsma, L., Ehler, C. N., Klein, R. J. T., Kulshrestha, S. M., McLean, R. F., Mimura, N., ... & Turner, R. K. (1996). Coastal zones and small islands. *Climate Change 1995: Impacts, Adaptations, and Mitigation of Climate Change: Scientific-Technical Analyses. Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change*, 289-324.

Brooks, N., Nicholls, R., & Hall, J. (2006). Sea level rise: coastal impacts and responses. *Norwich WBGU ISBN*, 3-936191.

Codjoe, S. N. A., & Owusu, G. (2011). Climate change/variability and food systems: evidence from the Afram Plains, Ghana. *Regional Environmental Change*, 11(4), 753-765.

Cohen, P. J., Lawless, S., Dyer, M., Morgan, M., Saeni, E., Teioli, H., & Kantor, P. (2016). Understanding adaptive capacity and capacity to innovate in social–ecological systems: Applying a gender lens. *Ambio*, 45(3), 309-321.

Conley, T. G., & Udry, C. R. (2010). Learning about a new technology: Pineapple in Ghana. *American economic review*, 100(1), 35-69.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Sage.

Demetriades, J., & Esplen, E. (2008). The gender dimensions of poverty and climate change adaptation. *Ids Bulletin*, 39(4), 24-31.

Douben, K. J. (2006). Characteristics of river floods and flooding: a global overview, 1985–2003. *Irrigation and drainage*, 55(S1).

du Gommès R, Guerny J, Nachtergaele F, Brinkman R (1997) *Potential impacts of sea-level rise on populations and agriculture*. FAO, Rome.

Enarson, E., Fothergill, A., & Peek, L. (2007). Gender and disaster: Foundations and directions. In *Handbook of disaster research* (pp. 130-146). Springer, New York, NY.

Enarson, E., & Fordham, M. (2001). From women's needs to women's rights in disasters. *Global Environmental Change Part B: Environmental Hazards*, 3(3), 133-136.

EM-DAT (2012) Emergency events database. Retrieved 15 June 2012, from Website: <http://www.emdat.be/> Few, R. and P. Tran (2010) *Climatic hazards, health risk and response in Vietnam: Case studies on social dimensions of vulnerability*, *Global Environmental Change* 20: 529–538.

Fenster, M., & Dolan, R. (1996). Assessing the impact of tidal inlets on adjacent barrier island shorelines. *Journal of Coastal Research*, 294-310.

Few, R., Ahern, M., Matthies, F., & Kovats, S. (2004). *Floods, health and climate change: a strategic review*.

Field, C. B., Barros, V., Stocker, T. F., & Dahe, Q. (Eds.). (2012). *Managing the risks of extreme events and disasters to advance climate change adaptation: special report of the intergovernmental panel on climate change*. Cambridge University Press.

Füssel, H. M. (2007). Vulnerability: A generally applicable conceptual framework for climate change research. *Global environmental change*, 17(2), 155-167.

Hayward, D.F and J.S. Oguntoyinbo (1987) *Climatology of West Africa*, HarperCollins Publishers Ltd

Gommès, R., Guerny, J. D., Nachtergaele, F. O., Brinkman, R., & Low, P. S. (2005). Potential impacts of sea-level rise on populations and agriculture. *Climate Change and Africa*, 191-203.

Hoozemans, F. M., Stive, M. J., & Bijlsma, L. (1993). A global vulnerability assessment: vulnerability of coastal areas to sea-level rise. In *Coastal Zone'93* (pp. 390-404). ASCE.

IPCC. *Climate Change 2007: The Physical Science Basis (Summary for Policymakers)*; Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change; IPCC: Geneva, Switzerland, 2007; Available online: <http://www.ipcc.ch/SPM2feb07.pdf> (accessed on 20 April 2007)

J. Avian Sci. Ibis 2008 Ingersoll, A.P. *Global Warming*. Microsoft® Student. Microsoft Corporation, 2007. Int., 150, 18-20.

Jungehülsing, J. (2010). Women who go, women who stay: reactions to climate change. *A Case Study on Migration and Gender in Chiapas. Heinrich Boll Stiftung, Mexico, Centroamerica, y El Caribe, Climate Change, Online URL: http://www.boell.Org/downloads/MIGRACION_Gender_Climate_Mexico_ing_les.Pdf*.

Kumar, P. D. (2006). Potential vulnerability implications of sea level rise for the coastal zones of Cochin, southwest coast of India. *Environmental Monitoring and Assessment*, 123(1-3), 333.

Keeling, R. F., Parker, D. E., & Somerville, R. C. (2007). Recent Climate Observations Compared to Projections.” *Science* 316 (5825): 709.

Krauss, S. E. (2005). Research paradigms and meaning making: A primer. *The qualitative report*, 10(4), 758-770.

Lane, R., & McNaught, R. (2009). Building gendered approaches to adaptation in the Pacific. *Gender & Development*, 17(1), 67-80.

Mastrandrea, M.; Schneider, S.H. 2008. Microsoft Student; Microsoft Corporation: Redmond, DC, USA,

MEST 2010, *National Climate Change Adaptation Strategy (NCCAS)*, Ministry of Environment, Science and Technology, Accra, Ghana.

Meehl, G. A., Covey, C., Delworth, T., Latif, M., McAvaney, B., Mitchell, J. F., ... & Taylor, K. E. (2007). The WCRP CMIP3 multimodel dataset: A new era in climate change research. *Bulletin of the American meteorological society*, 88(9), 1383-1394.

Mirza, M. M. Q. (2003). Climate change and extreme weather events: can developing countries adapt?. *Climate policy*, 3(3), 233-248.

Mills, M. A., Edmondson, D., & Park, C. L. (2007). Trauma and stress response among Hurricane Katrina evacuees. *American Journal of Public Health*, 97(Supplement_1), S116-S123.

Moench, M., & Dixit, A. (2004). *Adaptive capacity and livelihood resilience: adaptive strategies for responding to floods and droughts in South Asia*. Institute for Social and Environmental Transition (ISET).

Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the national academy of sciences*, 107(51), 22026-22031.

Nasreen, M., Hossain, K. M., & Azad, M. A. K. (2013). Climate Change and Livelihood in Bangladesh: Experiences of people living in coastal regions. *Proce. of Int. Con. of Building Resilience*, 1-25.

Nellemann, C., Verma, R., & Hislop, L. (2011). Women at the frontline of climate change: Gender risks and hopes. *A Rapid Response Assessment. United Nations Environment Programme, GRID-Arendal.*

Nicholls, R. J. (2004). Coastal flooding and wetland loss in the 21st century: changes under the SRES climate and socio-economic scenarios. *Global Environmental Change*, 14(1), 69-86.

Nicholls, R. J., & Tol, R. S. (2006). Impacts and responses to sea-level rise: a global analysis of the SRES scenarios over the twenty-first century. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 364(1841), 1073-1095.

Norris, F. H., Murphy, A. D., Baker, C. K., & Perilla, J. L. (2004). Postdisaster PTSD over four waves of a panel study of Mexico's 1999 flood. *Journal of Traumatic Stress*, 17(4), 283-292.

Nhemachena, C., & Hassan, R. (2007). *Micro-level analysis of farmers adaption to climate change in Southern Africa*. Intl Food Policy Res Inst.

Owusu, M. (2017). *Gender vulnerability to climate change and livelihood security in urban slum communities in Accra, Ghana* (Doctoral dissertation).

Paranjothy, S., Gallacher, J., Amlôt, R., Rubin, G. J., Page, L., Baxter, T., ... & Palmer, S. R. (2011). Psychosocial impact of the summer 2007 floods in England. *BMC public health*, 11(1), 145. unpagged

Pachauri, R. K., Allen, M. R., Barros, V. R., Broome, J., Cramer, W., Christ, R., ... & Dubash, N. K. (2014). *Climate change 2014: synthesis report. Contribution of Working Groups I, II and III to the fifth assessment report of the Intergovernmental Panel on Climate Change IPCC.*

Keeling, R. F., Parker, D. E., & Somerville, R. C. (2007). Recent Climate Observations Compared to Projections.” *Science* 316 (5825): 709.

Rain, D., Engstrom, R., Ludlow, C., & Antos, S. (2011). Accra Ghana: A city vulnerable to flooding and drought-induced migration. *UN-Habitat (Ed.), Background paper for.*

Red Cross/Red Crescent (2007) *Climate guide*. Retrieved 15 June 2012, Roberts, J. and B. Parks (2007) *A climate of injustice – global inequality, North South politics, and climate policy*, Cambridge: MIT Press.

Rubin, O. (2014). Social vulnerability to climate-induced natural disasters: Cross-provincial evidence from Vietnam. *Asia Pacific Viewpoint*, 55(1), 67-80.

Smith, K., & Ward, R. C. (1998). *Floods: physical processes and human impacts* Chichester: Wiley.

Somekh, B., & Lewin, C. (Eds.). (2005). *Research methods in the social sciences*. Sage.

Stern, N. (2006). Stern review report on the economics of climate change.

Stockler, T. F., Qin, D., Plattner, G. K., Tignor, M., Allen, S. K., Boschung, J., ... & Midgley, P. M. (2013). Climate change 2013: the physical science basis. Intergovernmental panel on climate change, working group I contribution to the IPCC fifth assessment report (AR5). *New York*.

Tschakert, P., & Dietrich, K. A. (2010). Anticipatory learning for climate change adaptation and resilience. *Ecology and society*, 15(2). unpagged

UNDP (2004) Reducing disaster risk. A challenge for development – A global report. *Crisis-prevention-and-recovery/ reducing-disaster-risk--a-challenge-for-development .html*

UNDP (2008) Fighting climate change: *Human solidarity in a divided world, human development report 2007/ 2008*, New York: United Nations Development Programme.

UNEP (2002) *Global environment outlook 3*. Earthscan, London.

UNEP (2007) *Global environment outlook 4*. 15 June 2012.

Watson, R. T., Zinyowera, M. C., & Moss, R. H. (1996). *Climate change 1995. Impacts, adaptations and mitigation of climate change: scientific-technical analyses*. World Bank (2009) World development report 2010: Development and climate change. Retrieved 15 June 2012, from Website: <http://go.worldbank.org/ZXULQ9SCC0>

World Bank, World Development Report (2012) – *Gender Equality and Development*.

Zakari, S., Ying, L., & Song, B. (2014). Factors influencing household food security in West Africa: The case of Southern Niger. *Sustainability*, 6(3), 1191-1202.



Appendix 1: Questionnaires

We would appreciate it if you could take time to complete the questionnaire. Thank you.

Please circle the number or tick the box

Demographics

Gender: Female []

Age: []

Marital Status: 1. Single [] 2. Married [] 3.

Divorced [] 4. Widowed []

Number of children: []

Educational level: 1. No formal education [] 2. Primary [] 3. Secondary [] 4. Tertiary []

1. According to personal experiences, how has the weather changed in the past 10/20 years or since your childhood?

1. Increased []

2. Decreased []

3. No change []

2. What are some of the challenges you encounter during the rainy season (Tick as many as applied)?

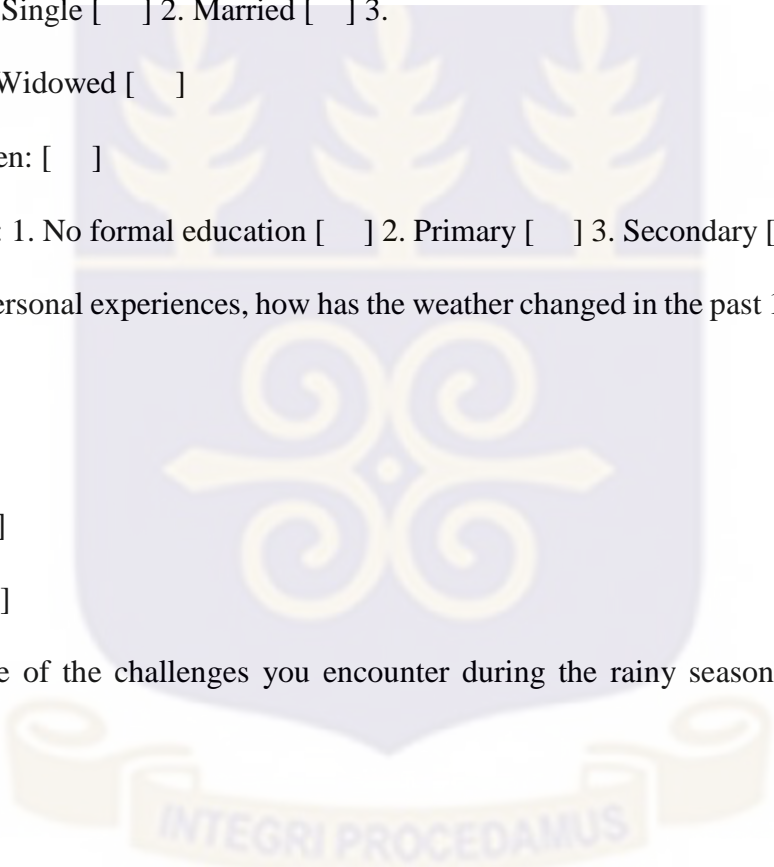
1. Flooding []

2. Food shortage []

3. Erosion []

4. Salt water intrusion []

Others (please specify).....



3. What are the main sources of livelihood for most households in the community?

Give sources

1. Fisheries []
2. Woodlots []
3. Trading []
4. Others (Please specify)

.....

4. What are the main sources of income?

Give sources of income

1. Fishing[]
2. Trading []
3. Others (Please Specify).....

5. What are the main sources of food?

Give sources of food

1. Farm produce []
2. Buy from other areas []
3. Others (Please specify)

.....

6. In your opinion, who do you think suffers most from the flooding: men/ women?

1. Men []
2. Women []
3. Children []

7. How would you describe the impact of the floods on women’s livelihoods?

1. Positive []

2. Negative []

3. No impacts []

4. Others.....

8. Rate the effect the effect of the flood on the following;

Area	Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree
Agriculture	
Water Access	
Health	
Food security	
Sanitation	
Infrastructure	
Property	

9. Was there an increase in disease outbreak/ incidents due to the floods?)

1. Yes [] 2. No. [] 3. Don’t know [] if yes go to Question 10

10. Explain, giving details of major health problems and age groups/gender affected

.....
.....
11. What are the main coping strategies that you employ during floods?

A. Protecting Water Sources

- 1. Constructing high storage tanks []
- 2. Constructing gutters around water source for easy drainage []
- 3. Constructing water sources with concrete []
- 4. Raising foundation of water sources []

Others.....

B. Protecting houses (You may tick more than one)

- 1. Constructing passage for water to flow []
- 2. Cleaning of choked gutters/drains []
- 3. Collecting water out of rooms []
- 4. Rely on family members for support []
- 5. Sleep outside the community []
- 6. Other (specify).....

C. Protecting personal effects (You may tick more than one)

- 1. Collecting water out of rooms []
- 2. Rely on family members for support []

3. Keep personal effects in friend's house []

4. Other (specify).....

D. Protecting Waste disposal sites (You may tick more than one)

1. Use of bigger waste containers []

2. Construct big gutters/drains around waste disposal sites []

3. Relocating refuse containers []

4. Regular emptying of waste container []

5. Regular burning of refuse []

6. Other (please specify).....

12. Are the choices you ticked effective? 1. Yes [] 2. No []

13. Do you receive support from any organization after floods? 1. Yes [] 2. No []

14. If yes, where do you normally receive support from?

1. The government []

2. NGOs []

3. District bodies []

4. Individuals []

5. Family & friends []

15. What kind of support do you receive during and after disasters?

1. Cash donations []
2. Materials support []
3. Food supply []
4. Shelter []
5. Information []
6. Others []

16. Are your inputs considered in the development of adaptation plans by the city authorities?

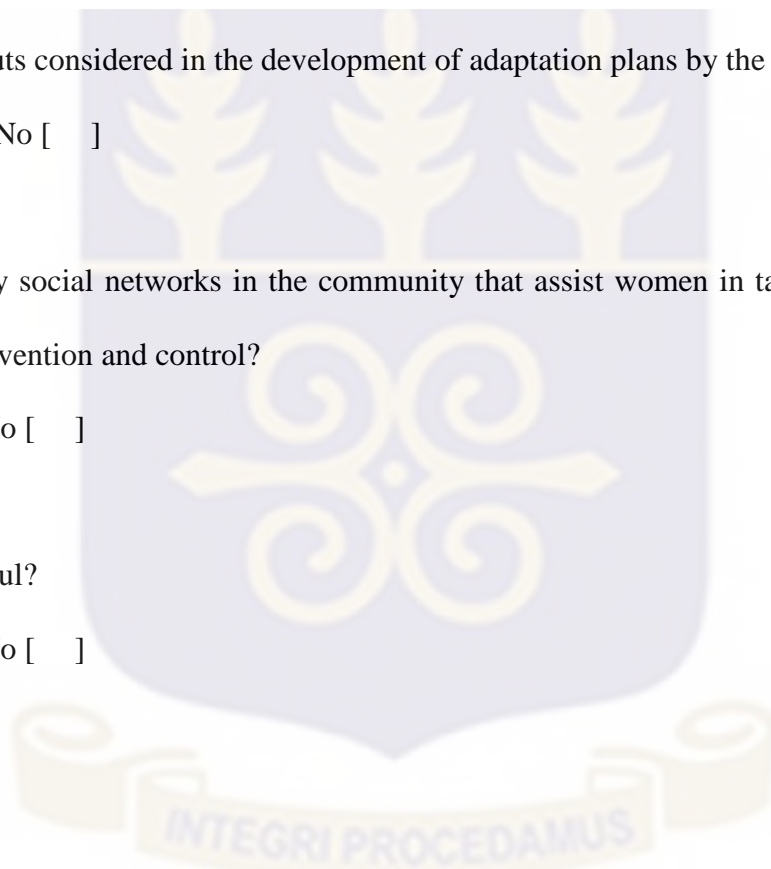
1. Yes [] 2. No []

16. Are there any social networks in the community that assist women in taking action against flood/erosion prevention and control?

1. Yes [] 2. No []

17. Are they useful?

1. Yes [] 2.No []



Appendix 2: Interview Guide for EPA

1. Is there any existing collaborating between this institution and other institutions for climate change adaptation planning?
2. What does the activities involve?
3. In what ways do you disseminate information about early signs to the communities?
4. Does the NCCAS contain any gender specific projects?
5. Was there any involvement of local authorities in the development of adaptation strategies in vulnerable communities along the coast?

Appendix 3: Interview Guide for NADMO

1. Does NADMO have any policy guidelines regarding collection of gender disaggregated data in its disaster prevention and management activities?
2. To what extent are women involved in climate change related activities in adaptation strategies?
3. What climate change related disasters mostly affect coastal communities in Accra?
4. Do you have any special regulations to control flooding in coastal areas?

Appendix 4: Interview guide for Planning Officer

1. What aspects of climate change activities does your department get involved in this community?
2. Is there any specific policy guideline which mandates the agency to include gender in your planning activities?
3. What are the most common climate change related disasters that affect women in particular in this community?
4. In what ways do women cope with the effects of climate change related hazards

