GENDER VULNERABILITY TO CLIMATE CHANGE AND LIVELIHOOD SECURITY IN URBAN SLUM COMMUNITIES IN ACCRA, GHANA

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ABSTRACT

Climate change remains a major development challenge for cities in the developing world due to their limited capacity to prepare for and to cope with its impacts. It is recognised that the impact of this phenomenon will be distributed differently among regions, ages, income groups and women and men living in cities. In Ghana, the marginalised majority, particularly women living in slums or marginalised communities bear the brunt of the climate change impacts. In spite of this, adaptation research in Ghana has focussed on the livelihoods of rural women to the detriment of poor women living in hazardous urban spaces. Yet, the challenge posed by climate change to urban residents in Ghana cannot be adequately met without understanding its gender dimensions.

This study explored the role of gender in shaping men's and women's vulnerabilities to climate change in three urban slum or marginalised communities in Accra, Ghana. A mixed methods design was used to collect quantitative and qualitative data which included 350 survey respondents, 7 key informant interviews and a number of focus groups. The findings of this study showed that climate change poses serious environmental hazards to residents of slum communities in Accra. However, in spite of their exposure to similar hazards, results showed that respondent perceptions regarding the causes and impacts of these hazards are gendered. Women in comparison to men showed a low level of awareness about climate change, even though it impacted negatively on their livelihoods. Women tended to more vulnerable because of the vulnerable location of their livelihood activities, limited access to productive resources, poor conditions of housing, low participation in localised adaptation decision making, as well as the heavy domestic responsibilities placed on them. The findings also demonstrated that men and women had different capabilities for coping with climate change which have resulted in different adaptive capacities. Although a number of local institutions were involved in building the adaptive capacities of slum residents, there were weak collaborative partnerships among these institutions to ensure effective gender mainstreaming in adaptation policy planning and management.

This study concludes that it is imperative for adaptation policy makers to consider the important role of gender in determining different levels of vulnerabilities among slum residents in order to develop appropriate adaptive strategies that address gender-differentiated vulnerabilities.

DECLARATION

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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ABBREVIATIONS

AMA	Accra Metropolitan Assembly
CBD	Central Business District
CBO	Community-Based Organisation
CSO	Civil Society Organisation
DACF	District Assemblies Common Fund
DFID	Department for International Development
EPA	Environmental Protection Agency
FGD	Focus Group Discussion
G4	Ghana Goes for Green Growth
GBV	Gender- Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GLSS	Ghana Living Standards Survey
GSGDA	Ghana Shared Growth and Development Agenda
GSMA	Ga South Municipal Assembly
GSS	Ghana Statistical Service
HBE	Home- Based Enterprise
HFA	Hyogo Framework for Action
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
LAs	Local Authorities
MEST	Ministry of Environment, Science and Technology
MGCSP	Ministry of Gender, Children and Social Protection
MGDs	Millennium Development Goals
MLGRD	Ministry of Local Government and Rural Development
MoFEP	Ministry of Finance and Economic Planning
MTDP	Medium Term Development Plan

NADMO	National Disaster Management Organisation
NALAG	National Association of Local Authorities.
NAMAs	Nationally Appropriate Mitigation Actions
NCCAS	National Climate Change Adaptation Strategy
NCCC	National Committee on Climate Change
NCCP	National Climate Change Policy
NCCPF	National Climate Change Policy Framework
NDPC	National Development Planning Commission
NGO	Non-Governmental Organisation
NREG	Natural Resources and Environment Governance
PDHS	People's Dialogue on Human Settlements
SBS	Budget Sector Support
SDGs	Sustainable Development Goals
SWD	Social Welfare Department
TEK	Traditional Ecological Knowledge
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	United Nations Human Settlement Programme
UNICEF	United Nations Children's Emergency Fund
UNISDR	United Nations Office for Disaster Risk Reduction
WEDO	Women in Environment and Development Organisation
WHO	World Health Organisation

1 CHAPTER ONE: INTRODUCTORY BACKGROUND AND STATEMENT OF RESEARCH PROBLEM

1.1 Introduction

Climate change remains one of the most challenging issues currently facing cities in the world, particularly those in the developing world. It is widely recognised that the impact of this phenomenon will be distributed differently among regions, across ages, income groups and between men and women. Notwithstanding this recognition, the focus of global adaptation research has been scientifically and technologically driven leaving the social dimensions of the phenomenon largely unexplored. Yet the challenge posed by climate change to cities, particularly those in the developing world, cannot be adequately met without understanding its gender-differentiated vulnerabilities, as well as the collective agency and knowledge of men and women.

This thesis examines the linkages between gender, socio-economic and institutional factors in determining women's and men's vulnerability to climate hazards in three slum or marginalised communities in Accra, Ghana. Specifically, it examines how climate hazards including, but not limited to, flooding, sea erosion and salinity intrusion have differently affected the livelihoods of men and women, as well as the existing mechanisms for overcoming vulnerability to climate change.

This chapter begins by providing the rationale of this study. It then outlines the purpose of the study highlighting the aim, research questions and main objectives of the study. Section three provides a justification for this study by highlighting the main gaps existing in the literature with respect to the issue of gender and vulnerability to climate change, and addresses any gaps. A brief structure of this thesis is provided in section four.

1.2 Statement of Research Problem.

Climate change remains one of the development challenges confronting developing countries, such as Ghana in the 21st century. The Fourth Assessment Report of the

Intergovernmental Panel on Climate Change (IPCC) defines climate change as "any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC 2007, p.21). Impacts of climate extremes manifested through natural hazards such as floods, cyclones, hurricanes and droughts are already being felt by different regions and populations across the globe (IPCC 2012), of which Ghana is no exception. Indeed, climate projections made by the Environmental Protection Agency of Ghana (EPA) indicate that climate change has already affected Ghana and will continue to do so. According to the Ministry of Environment Science and Technology (MEST) (2010), there is ample evidence that over the past 40 years, average annual temperatures in Ghana have been rising steadily in five of the six ecological zones, whereas rainfall levels and patterns have been generally reducing and increasingly becoming erratic. This trend is projected to continue into the future (MEST 2010).

These climate projections are very worrying, particularly for cities, such as Accra lying along the coast of Ghana. The IPCC model ensemble for both northern and southern parts of Ghana, of which Accra is part, indicates a possible increase in mean monthly precipitation of 80 mm over the summer months of June, July and August (Codjoe *et al*. 2011). Accra being a low lying coastal city is at risk of flooding every year during the two rainy seasons. This seasonal flooding has been associated with widespread destruction, loss of lives and properties, especially in low-income or vulnerable settlements. Accra's vulnerability is further exacerbated by factors such as lack of, or low levels of, awareness of weather and climate issues, rapid urbanisation, weak urban planning regime, weak institutional capacity, and inadequate infrastructure (ILGS and IWMI 2011).

Both physical and social factors influence a group's or individual's susceptibility to climate extremes. The former involves exposure to risks such as floods, storm surge, hurricanes, cyclones, while the latter involves factors, such as social, economic, institutional and political arrangements, that limit or enhance the capacity of individuals or social groups to cope with and adapt to climate hazard or external stress placed on their livelihood and well-being (Adger and Kelly 1999). Studies that make reference to social vulnerability theory stipulate that vulnerability is influenced by social inequalities inherent in gender, class,

culture, race, age and other power structures, coupled with situational variables such as where people live, their physical and mental health, household composition and size, literacy status, and resources available to them to cope with crises (Cutter *et al*. 2003; Cannon and Müller-Mahn 2010; Enarson 2012).

Thus gender remains an important social factor that influences people's ability to mitigate and adapt to climate change impacts. Indeed, the IPCC confirms this in its Second Working Group Report which concludes that "climate change impacts will be differently distributed among regions, generations, ages, classes, income groups, occupations and genders" (IPCC 2012, p.786). This means that impacts of climate change are felt differently by women and men and therefore adaptation interventions need to be gendered. Women's vulnerability compared with men is partly attributed to their relative lack of access, to and control over, productive resources (Terry 2009; Alston 2015). Coupled with this are social and cultural norms about the gendered division of labour, physical mobility as well as entitlement to decision-making processes at both the household and community levels which work to the detriment of women (Terry 2009; Aboagye 2012; Alston 2015).

In Ghana, the marginalised majority, particularly women living in slums and informal settlements, bear the brunt of the impacts of climate change. For instance, the National Climate Change Adaptation Strategy (NCCAS) of Ghana identifies women as one of the groups particularly susceptible to the impacts of climate change (MEST 2010). However, one criticism levelled against the NCCAS report is that it views women as a homogenous category and therefore neglects the peculiar vulnerability faced by women occupying hazardous urban spaces. Livelihoods of women living in hazardous locations in Accra are greatly affected by the impact of flooding. For example, a study by Aboagye (2012) in two vulnerable communities in Accra found that women suffered disproportionately during flooding compared to men. The study attributes this state of affairs to two causes; firstly, that most women in the study area are not able to compete favourably with men for available resources; and secondly, that most Ghanaian women are in retail trade in physical areas that are most vulnerable to flooding and thus, their income is usually the most affected.

In spite of the peculiar vulnerability of women in poor urban areas to climate change-related hazards, there have not been any systematic attempts to understand how gender roles and responsibilities interact with socioeconomic status, place, environmental conditions, and institutional arrangements to shape their vulnerability, and how their experience matches or differs from men. A few studies that have been conducted in the sub-field of gender and climate change have tended to focus on livelihoods of rural women and men (e.g. Dasgupta and Baschieri 2010), thus largely ignoring the experience and perception of urban poor women living in hazardous locations. This lack of study of the gender specific vulnerability in urban contexts in Ghana has created a gap in the climate change literature, thus contributing to a limited understanding of the interactions between gender and cross-level socio-economic and institutional variables in shaping the vulnerabilities of men and women to climate variability in slum communities.

The above therefore raises critical research questions: what are the causes of gender vulnerability to climate change; what does that vulnerability look like and how does it affect livelihood security in slum communities in urban Accra? The central argument of this thesis is that the impacts of climate change-related hazards are experienced differently by men and women living in slum communities in urban Accra. Patterns of differentiation in vulnerability between men and women are underpinned by the intersection of gender with other socio-economic, institutional and physical factors. This argument is pursued within the context of the relational nature of gendered power and the interdependency of women and men at the community level. In this regard, the thesis acknowledges men's vulnerabilities where they do exist and recognises the positive contributions that men can and are making to ensure gender equality and achievement of sustainable environmental goals

1.3 Purpose of the Study

1.3.1 Aims and Objectives

The overarching aim of this thesis is to examine the interconnections between gender and socio-economic and institutional factors in determining men's and women's vulnerabilities to climate hazards and their consequential effects on livelihood security. It focusses on three

slum communities in urban Accra, Ghana as a case study and has the following specific objectives:

1. To identify the environmental hazards/risks posed to slum communities by climate change and to determine the experiences and perceptions of men and women of these hazards.
2. To examine the underlying factors influencing gender vulnerability to climate change.
3. To assess the impact of climate hazards on the livelihoods of women and men.
4. To examine the mechanisms used by men and to cope with the impacts of climate hazards.

To achieve the above objectives, the study will raise, and seek to answer the following research questions:

- What environmental hazards are posed to men and women living in slum communities by climate change and what are their perceptions of these hazards?
- In what ways do the socio-demographic characteristics of men and women influence their knowledge and perceptions of climate change?
- What socio-economic and institutional factors drive men's and women's vulnerabilities to climate hazards?
- What are the main forms of livelihoods for men and women and how are they affected by climate hazards?
- What coping practices are employed by men and women to cope with impacts of climate hazards and what constraints or challenges do they face in coping with hazards?
- What is the nature of institutional response to climate change adaptation in urban slums and what are the strengths and weaknesses of such responses?

1.4 Justification for Study and Contribution to the Discipline

In spite of many studies highlighting the gender implications of climate change the global adaptation literature still has a number of gaps. The study therefore aims to contribute to filling the following gaps:

1.4.1 Social Dimensions of Vulnerability Largely Unexplored

The focus of the global adaptation research has been described as too scientific and technologically driven and as such it is unable to address the existing social dimensions of vulnerability in society (Alston 2013b; Nelson *et al*. 2002; Terry 2009). Yet there is ample evidence in the literature to suggest that climate change poses different challenges for men and women, and that it may further accentuate the existing gender inequalities and vulnerabilities in Accra. Therefore there is the need for a gender specific study to examine these vulnerabilities, particularly in the urban context. This study will contribute further understanding to illuminate the debate on gender dimensions of vulnerability in Ghana.

1.4.2 Extending the Discourse beyond the Gender Dichotomy

A number of dominant narratives on gender and climate change exist in the literature which tend to portray women as vulnerable victims or responsible caregivers in disaster contexts, and men as heroes or sexual abusers in post-disaster contexts (e.g. Denton 2002; Arora-Jonsson 2011). Evidence from around the developing world indicates that women are more likely to be killed or injured in disasters than men and are also likely to have low coping capacities (Neumayer and Plümper 2007). As convincing as this argument is, it focuses on a simplistic dichotomy between men and women leaving out other equally important bases of social differentiation (such as class and age) and also contextual variables such as deep-rooted inequalities, patterns of marginalisation, and unequal power relations, that accentuate or reduce the vulnerability of women and men living in urban slum communities.

Another shortcoming of these dominant narratives is that they offer little analytical information about the variations in the experiences of different groups of men and women. The IPCC (2012) report, for instance, argues that to provide an appropriate level of synthesis there is the need to avoid a review of singular dimensions of vulnerability. It is therefore

important to consider not just differences between single categories, such as between women and men, but also the differences between women. In the view of the IPCC (2012), a significant variable such as gender must be combined with race or ethnicity and some other variables in vulnerability assessments. However, a few scholars have explored the intersection of gender and climate change-related disasters with other variables, such as age, household composition and size, class, cross-level political and institutional arrangements, and have offered varying conclusions (Fordham 1999; Pincha *et al.* 2007). This study will further contribute to this understanding by examining how gender interacts with other variables to shape urban poor women's vulnerability to climate change.

1.4.3 Limited Understanding of the Peculiar Vulnerability of Informal/Marginalised Settlements

Climate change impacts are likely to fall disproportionately on residents of informal settlements mostly located in hazardous urban spaces in the developing world. The IPCC (2012) acknowledges that because of their location, slums and informal settlements are often exposed to hydrometeorological-related hazards such as landslides and floods. It further states that factors, such as poor health, livelihood insecurity, lack of access to service provision and basic needs can contribute to elevate the vulnerability of informal settlements (IPCC 2012, p.79). This vulnerability is particularly heightened for women due to deep rooted gender inequalities, the lack of productive assets and low educational levels (Satterthwaite *et al*. 2007; Terry 2009; Alston 2015). In spite of this recognition, this particular area remains largely understudied resulting in paucity of data to inform the design and implementation of context-specific adaptation interventions in urban areas. By examining the peculiar vulnerabilities faced by gender groups, this study aims to provide a new perspective to the ongoing discourse on the impacts of climate change on informal settlement in the developing world. The examination of the coping strategies of men and women in this study will also prove useful in the design and implementation of context specific capacity building and support interventions as part of the adaptation programming process. Furthermore, it will lay the foundation for other researchers with similar interests to carry out further investigations into other aspects of vulnerability experienced by residents of informal settlements in the developing world.

1.4.4 Neglect of Livelihood Security of Urban Poor Women in Adaptation Research in Ghana

In Ghana, the adaptation research has focused on the livelihoods of rural women (e.g. Dasgupta and Baschieri 2010) to the detriment of poor women living in hazardous urban spaces. Yet, a study conducted by Aboagye (2012) into the impact of flooding in urban Accra found that the social, economic and political factors within society that contribute to social vulnerability, are implicated in the impact of disasters in Accra. This makes gender mainstreaming in policy design and implementation difficult. In this regard, the study seeks to examine the impact of climate change on the livelihoods of poor women and men in urban slum communities in order to provide gender disaggregated data to help mainstream gender in the national climate change policy framework development process.

1.5 Structure of Thesis

This thesis is divided into eight chapters. Chapter one provides essential background to the study highlighting the research problem. It also outlines the aims and objectives of the research and provides a justification for studying the gender dimensions of climate change in urban slums. The remainder of this thesis is organised according to the following format and structure.

Chapter two provides the context of this study by examining how the concept of gender has been contextualised and mainstreamed in the climate change policy and institutional frameworks of Ghana. It begins with a brief description of Ghana in terms of its geographical location, political administration, demography, and economy. It further examines the conditions of its slum or marginalised settlements focussing particularly on their hazardous locations, as well as their peculiar vulnerability to climate hazards. In addition, it provides a more focused discussion on how climate change is occurring in Ghana through the examination of its manifestations and projected socio-economic impacts. This chapter also describes the climate change institutional and policy framework of Ghana focussing particularly on the actors and their expected roles in addressing the climate change challenge. The issue of gender inequality as a development challenge in Ghana is also examined to highlight how the inequalities have contributed in exacerbating the vulnerability of women

living in slums to climate change in Ghana. The last section of this chapter evaluates the national climate change institutional and policy frameworks to highlight the inherent gaps and flawed assumptions with respect to their approach to conceptualising and mainstreaming gender in policy formulation and implementation process.

Chapter three provides a literature review that presents how the issues of gender, slum and vulnerability to climate change are framed within the current theoretical debates. It begins with an examination of the phenomenon of climate change, its causes and the actual and expected impacts on the livelihoods of people, especially the urban poor in the developing world. It then critically looks at the conceptual formulations on gender and their inherent assumptions and biases. This is followed by a review of the concept of slum as it applies in the context of the developing world. In addition, the dominant theoretical formulations and approaches to the study of vulnerability to climate change are evaluated. The drivers or causes of gender vulnerability to climate change are further examined. It also examines issues around gender and climate risk perceptions as well as adaptation to climate change.

Chapter four focuses on the methods used to investigate the research questions. It begins with the presentation of the theoretical framework on which this study is based. This is followed by a critical overview of the epistemological and ontological positions of the study. It then evaluates the arguments for and against quantitative and qualitative approaches to social research and provides a justification for combining the two approaches in the form of mixed methods for this study. Further, it provides a brief theoretical background to focus group discussions as a method of qualitative research elaborating on the purpose and justification for its adoption in this study. The process of conducting and documenting the outcomes of the Focus Group Discussions (FGDs) is also described in this chapter. In addition, the chapter provides a brief overview of quantitative research methods and outlines the selection of participants for the survey. The issue of data management and analysis is presented with emphasis placed on qualitative and quantitative data analysis. The main limitations of the study is also provided. Moreover, the ethical principles underpinning the study are examined, while the last section provides brief socio-economic and environmental

profiles of the study communities, as well as socio-demographic background of the survey respondents.

Chapter five presents findings, and explores men's and women's perception and knowledge of climate change, as well as the factors that shape their vulnerabilities to associated hazards. It begins by examining the environmental hazards posed to slum communities by climate change. It then explores the linkages between socio-demographic characteristics of respondents and perception and knowledge of climate change. Also, the social, economic and institutional factors driving men's and women's vulnerabilities to climate change are explored.

In Chapter six, results highlighting the impacts of climate change on the livelihoods of men and women living in the slum communities are discussed. The chapter begins with a description of the main sources of livelihoods for men and women and how they were affected by climate change-related hazards. It further explores the impacts of climate change on the physical and human assets of men and women.

Chapter seven focuses on the mechanisms employed by men and women to cope with the impacts of climate hazards. It specifically focuses on the coping practices of men and women and also explores the differences in their coping practices. The factors that influenced their coping practices are also highlighted. It further explores the constraints faced by men and women in coping with the impacts of climate hazards where issues relating to access to early warning information, social capital and participation in localised adaptation decision-making processes are examined. Moreover, the chapter presents an assessment of the role played by local institutions in building the adaptive capacities of men and women to cope with the impacts of climate hazards highlighting the strengths and weakness in the process.

Chapter eight provides a summary of the key findings and discusses their implications for adaptation research and policy making in Ghana and the developing world in general. The

relevant recommendations on issues which have been identified in the study are also integrated throughout the discussion. It further provides suggestions for future research which could assist in response to some of the salient questions that emerged from the study and if answered, might improve comprehension in the area of research.

2 CHAPTER TWO: CONTEXT OF STUDY

2.1 Introduction

This chapter examines how the concept of gender has been contextualised and mainstreamed in the climate change policy and institutional frameworks of Ghana. It begins with a brief description of Ghana in terms of its geographical location, political administration, demography, and economy. It further examines the conditions of its slum or marginalised settlements focussing particularly on their hazardous locations as well as their peculiar vulnerability to climate hazards. It also offers a more focused discussion on how climate change is occurring in Ghana by examining its manifestations and projected socio-economic impacts. This is followed by a description of the context of climate change institutional and policy framework of Ghana focussing on the actors and their expected roles in addressing the climate change challenge. The issue of gender inequality as a development challenge in Ghana is examined to highlight some of the peculiar vulnerabilities faced by poor urban women in Ghanaian society. Moreover, it examines how the existing gender inequalities have contributed to producing gender-differentiated vulnerabilities to climate change in the urban built environment of Ghana. An evaluative analysis is also conducted to highlight the gaps and flawed assumptions inherent in the national climate change institutional and policy frameworks with respect to their approach to conceptualising and mainstreaming gender in policy formulation and implementation process. The last section summarises the main ideas.

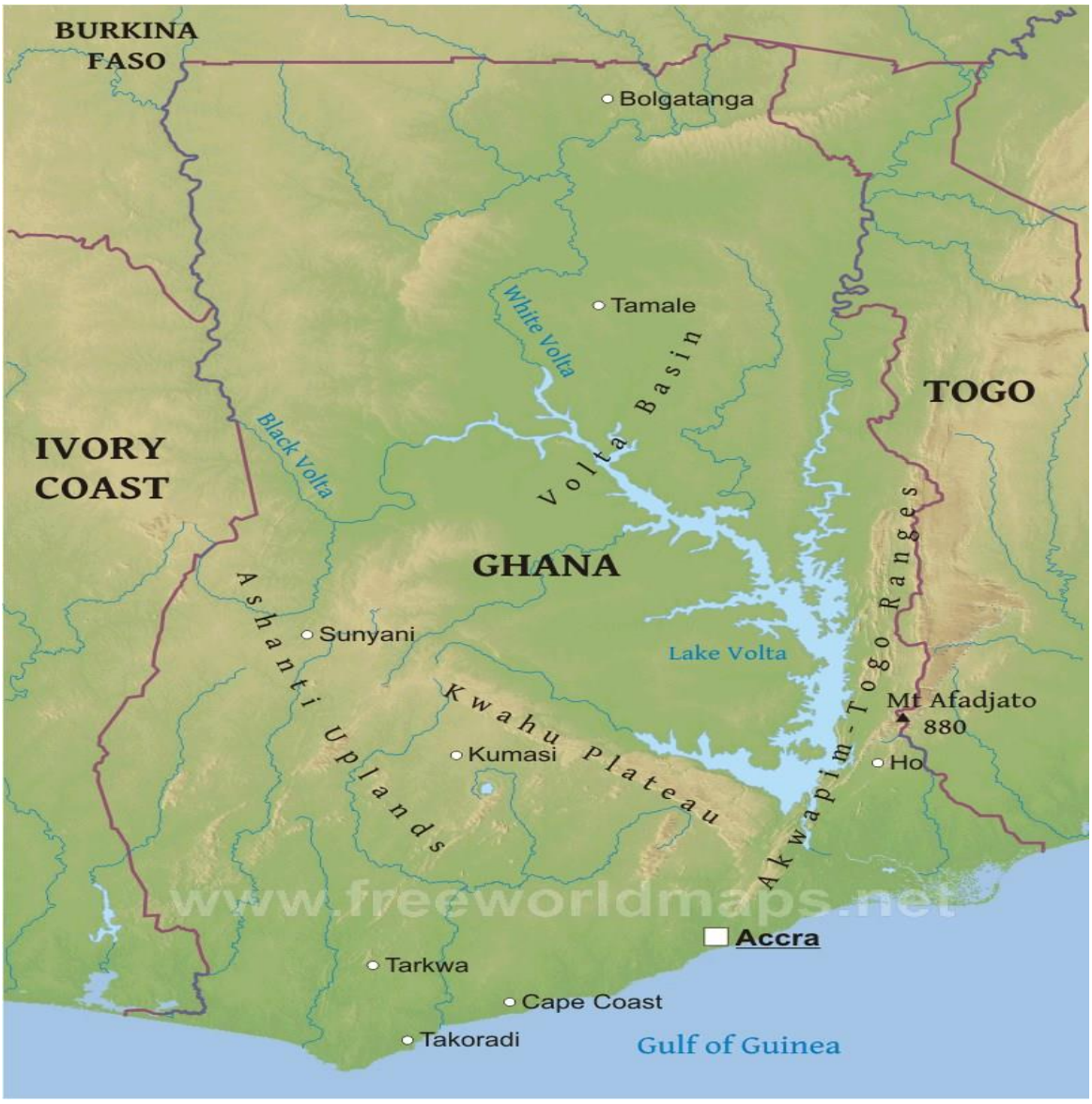
2.2 Profile of Ghana

2.2.1 Geographical Location

Ghana is a Lower-Middle Income country located in the Western Coast of Africa on the Gulf of Guinea (Atlantic Ocean). It is located between Longitude 3°15' W and 1°12' E, and above the Equator on Latitude 4°44'N and 11°15' in West Africa. Ghana shares boundaries with Togo to the east, Ivory Coast to the west, Burkina Faso to the north and Gulf of Guinea (Atlantic Ocean) to the south. In terms of size, the country covers a total area of about 238,537 square kilometres and has an equatorial climate (EPA 2005). As shown in Figure 2.1, the country encompasses flat plains, low hills and a few rivers. Southwest and south central Ghana is made up of a forested plateau region consisting of the Ashanti Uplands and

the Kwahu Plateau; the hilly Akuapim-Togo Ranges are found along the country's eastern border

Figure 2.1 A Map of Ghana Showing Some Important Geographical Features



Source: http://www.freeworldmaps.net/africa/ghana/map.html (accessed 11th August, 2016)

The Volta Basin also occupies most of central Ghana. Ghana's highest point is Mount Afadjato which is 885 m (2,904 ft) and is found in the Akwapim-Togo Ranges. The country is criss-crossed by a number of rivers prominent among which are the Volta, Pra, Tano,

Offin, Ankobra, Birim and Todzi. In addition, the Volta Lake which is reputed to be the biggest man-made lake in the world is found in Ghana. The total amount of water collectively drained by these rivers is estimated at 54.4 billion m^3 (EPA 2005). The country is divided into six main ecological zones namely: the Rainforest, Semi-Deciduous Forest, Sudan Savanna, Guinea Savanna and the Mangrove Forests (see Figure 2.2). The coastline is mostly a low, sandy shore backed by plains and scrub and intersected by several rivers and streams while the northern part of the country features high plains. The country has 550km of coastline, a 20,900 square kilometres continental shelf and 218,100 square kilometres of EEZ respectively representing about 6.5 percent of the area of the country with a population density of 263 per square kilometres (EPA 2005).

Figure 2.2 A Map Showing the Ecological Zones of Ghana

Source: Dankelman (2008, p. 34)

In terms of climate, Ghana exhibits the characteristics of a tropical climate. There are two main seasons namely: the wet and the dry/harmattan seasons. The northern part of the country experiences its rainy season from March to November while the southern part, within which Accra is located, experiences the rainy season from April to mid-November. The temperature distribution also varies throughout the country. The eastern coastal belt is warm and comparatively dry, the southwest corner is hot and humid, and the north is hot and dry.

2.2.2 Socio-Demographic Characteristics

Data collected in the 2010 National Population and Housing Census by the Ghana Statistical Service indicate that the country has a total population of 24,658,823 of which 12,024,845 (representing 48.8 percent) are male and 12,633,978 (51.2 percent) are female (GSS 2010). The annual average intercensal growth rate is estimated to be 2.5 percent. This gives a population density of about 103 persons per square km. Greater Accra which is the focus of this study is identified as being the most densely populated region with a density of about 1, 236 persons per square km. This high population density has both direct and indirect implications on the existing social and economic infrastructure in Accra.

Generally, Ghana's population is described as youthful with a large proportion of children under 15 years and a small proportion of elderly persons (65 years and older). The youthful structure of the population has been attributed to high fertility and decreasing mortality rates in the country (GSS 2010). The median age is estimated to be 20.7 years. Ghana has also experienced tremendous growth in its urban population over the last decades. In 2000, the proportion of urban residents was 43.8 percent of the population. However, this increased to 50.9 percent in 2010 (GSS 2010). This means that Ghana has reached the urban threshold. However, the level of urbanisation differs from region to region. Greater Accra has the highest proportion of urban population (91 percent). The high concentration of industries and commercial activities in Accra has been identified as a contributory factor to this growth.

Available data from the 2010 National Population and Housing Census indicate that there are 5,467,136 households in Ghana. In terms of composition, about 42.4 percent of households members are children of the household heads, 22.7 percent are considered household heads and 10.5 percent are spouses respectively (GSS 2010). The average household size of the country is estimated to be 4.4 (GSS 2010). Although there are more households headed by males (65 percent) than females (35 percent), available data suggest that there has been a steady decline in the proportion of male-headed households in Ghana, especially in urban areas (GSS 2010). For instance, data from the 2010 Population and Housing Census Report show that the proportion of male-headed households declined steadily from 71.4 percent in 1970 to 65.3 percent in 2010 (GSS 2010). One consequence of this decline is the increase in the number of female-headed households. This has a number of social implications including climate change policy formulation and implementation in Ghana. This means that all the existing planning paradigms which tend to assume male autonomy in the household need to be re-examined and reframed to reflect the current gender dynamics in the Ghanaian household. As more women assume the role of household headship, there is the need for policy makers to mainstream gender in the climate change policy and planning process to effectively address the differentiated vulnerabilities faced by men and women.

2.2.3 Political Administration

Politically, Ghana is a unitary democratic republic with sovereignty residing in the people. At the national level, governance is exercised by three arms, namely the Executive, the Legislature and the Judiciary. The Executive power of the state is exercised by the President who is elected by popular majority. Below the President is the Vice-President who is appointed by the President. Elections to the Executive and the Legislative arms of government are through the universal adult suffrage. Elections for the Presidency and the Legislature are held every four years. The national governance system is based on the 1992 Republican Constitution of Ghana.

Local administration is based on the local governance system established by the Local Government Act (Act 462). For administrative purposes, the country is divided into ten

regions each with its own administrative capital. The city of Accra, on the Atlantic coast, is the administrative as well as the commercial capital. The regions are further sub-divided into districts with each district having its own district assembly or local government authority. Below the districts are various types of units including sub-metros (for metropolitan assemblies), town or areas councils, and zonal councils. Two-thirds of the members of the local assemblies are elected on non-partisan basis while the remaining members are appointed by the President. The heads or Chief Executives of the Local Government Authorities are appointed by the President. The local authorities are mandated by Act 462 to perform executive, legislative and planning functions. In this sense, it is the responsibility of the local government authorities to initiate, plan and execute development interventions based on their peculiar needs and priorities, albeit, in alignment with overall national development strategy.

2.2.4 Economy

Ghana is classified as a Lower-Middle Income Economy by the World Bank and the International Monetary Fund (IMF). Agriculture including forestry and fishing is the backbone of the nation's economy and contributed 36 percent to the Gross Domestic Product (GDP) for the period 2000-2006 (MEST 2012). In terms of employment, the agricultural sector provides jobs to about 42 percent of the economically active population aged 15 years and older (GSS 2010). Other major sectors of the economy are wholesale and retail trade (19 percent) and manufacturing (11 percent). According to GSS (2010), about 36 percent of the economically active population in Greater Accra are likely to be engaged as service and sale workers, while only 5 percent are likely to be engaged as skilled agricultural, forestry and fishery workers.

Ghana is relatively endowed with a diverse and rich mineral resource base. Minerals, principally gold, diamonds, manganese ore, and bauxite are produced and exported. Noted for its gold in colonial times, Ghana continues to remain one of the topmost producers of gold in the world. In addition to mineral resources, the country exports cocoa and timber for foreign exchange. Available data indicate that timber, cocoa, minerals and fish still represent 48 percent of GDP, 90 percent of foreign exchange export earnings, and 70 percent of total

employment in Ghana (World Bank 2010). These statistics are indicative of the fact that Ghana's economy is heavily dependent on natural resources. A major oil discovery off the coast of Ghana in 2007- the Jubilee Field- began production of oil in December 2010. This discovery has led to significant international commercial interest in Ghana. Some industry experts believe that within 5 years, Ghana is likely to be the third-largest producer of oil in West Africa. The oil production and its associated activities are also believed by environmentalists to pose a great environmental challenge to the country in the future.

2.2.5 Conditions of Slum/Marginalised Communities in Accra

Accra, which is the site of all three study communities, serves as both the administrative and financial capital of Ghana. It is the smallest of the ten administrative regions of Ghana. In terms of area, it occupies a total land surface of about 3,245 square kilometres or 1.4 percent of the total land area of Ghana. Accra Metropolitan Assembly (AMA) is one of the ten local government authorities within Accra. Even though it is the smallest region in terms of land size, it is the second most populated region with a population of about 4 million (i.e. 16 percent of Ghana's total population) (GSS 2010). This large population places a huge burden on the city's existing socio-economic infrastructure, such as housing, education, health, water and sanitation. Consequently, there has been the emergence and proliferation of informal settlements or slums which are mostly found in marginalised locations (World Bank 2006) such as along railway lines, on the banks of waterways and along the sea.

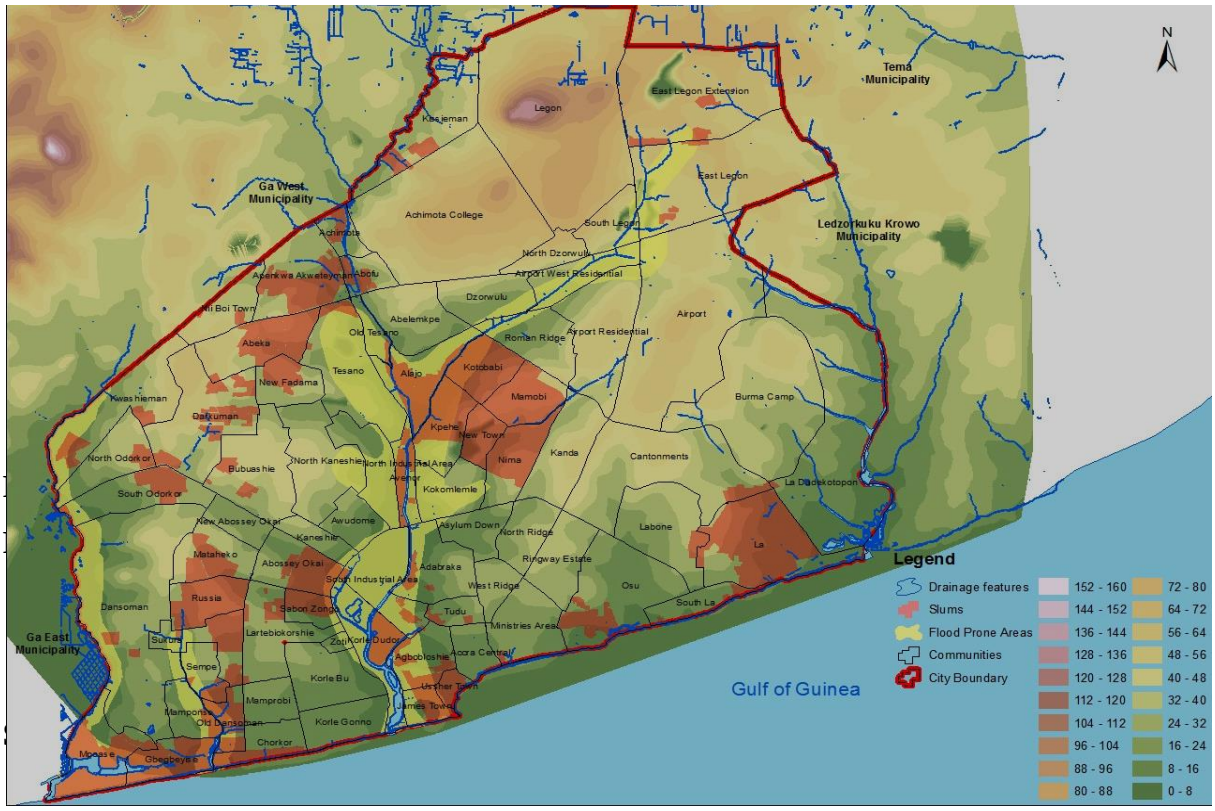
A report about a participatory slum upgrading and prevention study undertaken by AMA and the UN-HABITAT in 2011 identifies about 78 slum settlements and pockets in Accra (UN-HABITAT 2011). The report also makes some interesting revelations regarding conditions in slum settlements in Accra. According to UN-HABITAT (2011), as much as 38 percent of the city's population reside in slums or informal settlements. Ironically, while slum residents form about 38 percent of Accra's population, they occupy only 16 percent of the total land area. This suggests the dense nature of the population in such areas. For instance, whereas the city has a population density of 251 persons per hectare, density in slum settlements is estimated at 608 persons per hectare (UN-HABITAT 2011). Therefore, it is not surprising to find that, in Accra, most slum residents live in appalling and dangerous

conditions. With climate change and its associated hazards, it can be predicted that such settlements are likely to bear the brunt of the impacts. In addition, the dangerous locations of such settlements expose them to a myriad of environmental hazards such as flooding, sea erosion, landslide, and fire outbreaks.

Land ownership or security of tenure is considered an important factor in promoting the well-being of slum residents. It has several implications for residents of slums whose livelihoods mostly tend to revolve around their settlements. Lack of secure tenure affects the ability of slum residents to undertake housing maintenance which can make their houses more susceptible to climate hazards. Although about 83 percent of Accra's slum population have tenure security and high tenability without any fear of eviction from the city authorities, there is still a sizable proportion (17 percent) without tenure security (UN-HABITAT 2011). These are squatter settlements whose residents constantly face threat of evictions from the city authorities and other land owners in Accra. This means that about 282,556 people living in slums or informal settlements in Accra do not have access to safe, secure and decent housing. This further heightens their vulnerability to climate change-related hazards.

The vulnerability of slum settlements is further heightened by the low-lying nature of Accra. Although Accra generally lies between 0 and 144 metres above sea level, its slum settlements generally lie below 48 metres (UN-HABITAT 2011). Closely related to this is the heightened vulnerability faced by such settlements because of their close proximity to railway lines, water bodies, the sea and major drains in the city (see Fig. 2.3). Indeed, it is estimated that 22 percent of the slum population of Accra live in flood prone areas (UN-HABITAT 2011).

Figure 2.3 A Map Showing the Topography, Flood and Drainage Vulnerability of Slums in Accra



Source: UN-HABITAT (2011, p. 10)

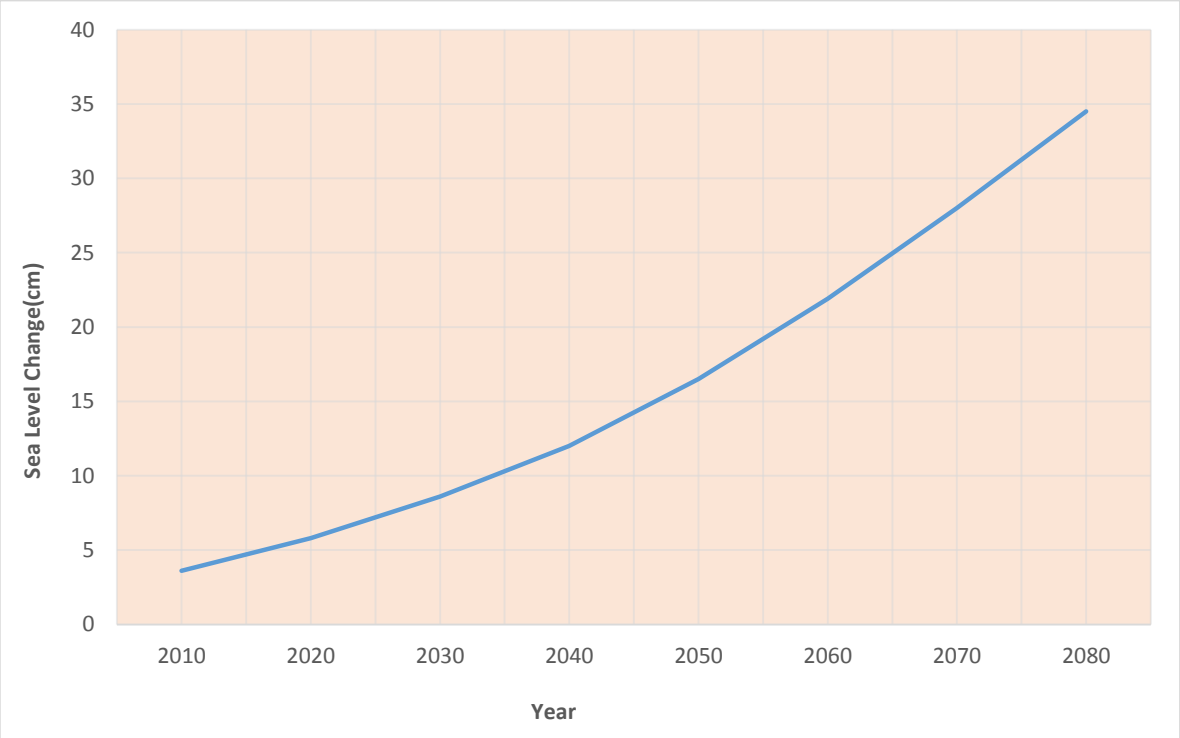
2.3 Climate Change Conditions, Institutional and Policy Architecture of Ghana

2.3.1 Climate Change and its Manifestations

Ghana, like any other country in the developing world, has been affected by global climate change and variability. In Ghana, climate change is manifested through rising temperatures, declining rainfall and increased variability, rising sea levels and a high incidence of weather extremes and disasters (MEST 2010). Data suggest that temperatures have been rising in all the ecological zones whereas rainfall levels and patterns have been generally reducing and increasingly becoming erratic (MEST 2010). Evidence further indicates a sea-level rise of about 2.1mm per year over the last 30 years are projected to rise to 5.8cm, 16.5cm and 34.5cm by 2020, 2050 and 2080 respectively (see Figure 2.4) (MEST 2010). Projections made by the Environmental Protection Agency (EPA) of Ghana indicate that a total of 1,110

square kilometres of land area may be lost as a consequence of a one-metre rise in sea level (Dankelman 2008).

Figure 2.4 Scenario for Mean Sea Level Rise (Taking Present Trends into Account)



Source: Constructed by Author based on data from the EPA (2011).

The above climate projections present an enormous development challenge to Ghana on many fronts. For example, it is suggested that the projected sea level rise will result in the displacement of about 132,000 people, mostly living within the east coast area, of which Accra is part (EPA 2004 cited in Dankelman 2008). Coupled with this is the fact that low lying and dry land areas in Ghana will suffer severe direct inundation and erosion. Other worrying effects will include an increase in salinity of estuaries and aquifers, raised coastal water tables and heightened coastal flooding and storm damage (EPA 2000). Ghana's economy is particularly vulnerable to climate change by virtue of its heavy dependence on climate-sensitive sectors. For instance, the agricultural sector, which is the mainstay of the Ghanaian economy, is projected to be hard hit by climate change because of its rain fed

nature. This is compounded by the low level of irrigation development in the country (World Bank 2010). In addition, with over 80 percent of the disasters in Ghana considered to be climate-related (MEST 2012), one can expect that human impacts of climate change will be enormous and costly to Ghana. The impact is also projected to fall disproportionately on the poorest, especially those occupying low-lying and flood-prone locations in cities and urban areas (MEST 2012) majority of whom are women.

2.3.2 Climate Change Institutional Framework

Ghana ratified the United Nations Framework Convention on Climate Change (UNFCCC) in September 1992 (Dzah 2011; MEST 2012). It is also a signatory to the Kyoto Protocol, the Copenhagen Accord and has consequently been participating in the Conference of the Parties (COP) over a number of years (Cameron 2011). Furthermore, the nation has signed all three of the Rio Conventions bordering on climate change, biodiversity and desertification (Cameron 2011). The endorsement of these international agreements means that the Government of Ghana is forced to make climate change a priority issue in its development agenda. Consequently, successive governments have taken measures to address the challenge of climate change in various forms. Policy and regulatory institutions have been established to oversee environmental issues generally and climate change specifically. These efforts by the government to address the climate change challenge has resulted in the development of fifty-five (55) Nationally Appropriate Mitigation Actions (NAMAs) which are now being prioritised to an expected five NAMAs (Cameron 2011).

The seriousness of the government to climate change is exemplified by the fact that the national development strategy document dubbed Ghana Shared Growth and Development Agenda (GSGDA) devotes a whole chapter to the issue of climate change. In addition, climate change has been accorded the necessary attention at the level of the Presidency through the establishment of the Environment and Natural Resource Advisory Council (ENRAC) chaired by the Vice-President. Five development partners including the European Commission, Department for International Development(DFID), French Development Agency(FDA), the World Bank and the Netherland Embassy are supporting the Natural

Resources and Environment Governance(NREG) mechanism, which began in 2008 with an initial four-year duration, in a form of Sector Budget Support (SBS) (Tutu and Nelson 2012). The NREG focuses on a number of policy and reforms in the forestry, mining and the environment sectors.

The establishment of the Ministry of Environment, Science and Technology (MEST) after the Earth Summit in 1992 is a further testimony to the government's attention to environmental issues including climate change. MEST is charged with the responsibility for leading the policy on climate change in Ghana. Specifically, MEST is responsible for coordination and harmonisation of climate change activities among the other sectors (MEST 2012a). These responsibilities are executed through the National Committee on Climate Change (NCCC) which is a multi-stakeholder committee of Ministries, Department and Agencies (MDAs), Donors, Parliament of Ghana, Civil Society Organisations (CSOs), research institutions and the private sector (Cameron 2011). The mandate of this committee is to review government policies and programmes to complement national priorities and contribute to reduction of greenhouse gas emissions and an increase in carbon sinks (Cameron 2011). Within MEST, the Environmental Protection Agency (EPA) has been established by the Environmental Protection Agency Act (Act 490) as a regulatory and enforcement agency (MEST 2012). EPA is charged with the responsibility for coordinating the implementation of technical activities on climate change. This is done through its Energy Resources and Climate Change Unit which is the focal point for UNFCCC and IPCC activities in Ghana. It is also the representative of Ghana on the adaptation fund and Article 6 and plays the leading role for the preparation of national communications to the UNFCCC (Tutu and Nelson 2012).

Apart from MEST, the Ministry of Finance and Economic Planning (MoFEP) also plays the convening role of planning and budgeting with respect to climate change and has been nominated as the National Operating Entity to the Adaptation Fund Board (MEST 2012). Furthermore, Ghana has produced and submitted its First and Second National Communications to the UNFCCC and has also developed a Climate Change Policy and

National Climate Change Adaptation Strategy (NCCAS). Other institutions are also involved in climate change activities in Ghana. One of such institutions is the National Development Planning Commission (NDPC). Created by articles 86 and 87 of the 1992 Constitution of the Republic of Ghana and established by Acts 479 and 480 (1994) of Parliament, NDPC is mandated to advise the President of Ghana on development planning policy and strategy; to prepare and ensure effective implementation of approved national development plans and strategies; and to coordinate economic and social activities countrywide (MEST 2012).

Working in collaboration with MEST, the EPA and MoFEP, NDPC has translated climate change issues into planning guidelines for the preparation of the Medium-Term Development Plans (MTDPs) by the Local Government Authorities in Ghana (MEST 2012). The local government authorities implement their MTDPs through funding from the National Budget, District Assembly Common Fund, Member of Parliament's Common Fund, and in some cases, donor funds (Tutu and Nelson 2012). Other institutions, organisations or actors whose activities are recognised to border directly and indirectly on climate change include the Ghana Meteorological Services Agency (GMSA), Ministry of Lands and Natural Resources, Ministry of Local Government and Rural Development, Ministry Health, Ministry of Water Resources, Works and Housing, Ministry of Food and Agriculture, Ministry of Energy, Ministry of Education, Ministry of Gender, Children and Social Protection, Ministry of Roads and Highways, Non-Governmental /Civil Society Organisation and the private sector (MEST 2012). Table 2.1 shows the list of actors and their associated roles in dealing with climate change in Ghana based on Section Three (Policy Implementation Arrangements) of the Ghana National Climate Change Policy. From the Table, it is evident that the Government of Ghana views the issue of climate change as critical for policy making and has demonstrated efforts in meeting both its national and international commitments.

Table 2.1 Roles of Main Institutions Dealing with Climate Change Issues

Institution	**Climate change- related activities**
Ministry of Environment, Science and Technology (MEST)	Mitigation, Adaptation and Policy development
Environmental Protection Agency (EPA)	Mitigation, Greenhouse Gas Inventory(GHGI), National Communication and Mitigation
Ministry of Food and Agriculture	Adaptation, GHGI
Ministry of Energy	Mitigation
National Development Planning Commission	Climate Change Policy
Research and academia	Assist with funding for climate change research for adaptation and mitigation
Forestry Commission	Reduced emissions from deforestation and degradation(REDD)
Water Resource Commission	Mitigation and Adaptation
Ministry of Finance and Economic Planning and other financial institutions	Climate finance
National Disaster Management Organisation	Adaptation
Ghana Meteorological Service Agency	Climate information and data
Parliament of Ghana	Laws and policies on climate change
Civil Society Organisations	Research and implementation of climate change adaptation and mitigation, advocacy
International Non- Governmental Organisation and Non-Governmental Organisations	Adaptation and mitigation
Metropolitan, Municipal and District Assemblies (Local Government Authorities)	Implementation of climate change activities at the local level.
National Climate Change Committee	Coordination of climate change activities at the policy level
Energy Commission	Mitigation

Ministry of Transport	Mitigation

Source: Adapted from MEST (2012, pp. 44-54)

2.3.3 Existing Climate Change Policies

National Climate Change Adaptation Strategy (NCCAS)

To fulfil its commitments under the UNFCCC and the Hyogo Framework for Action (HFA) and to reduce the economy's vulnerability to climate change, Ghana has prepared its National Climate Change Adaptation Strategy (NCCAS) (MEST 2012). The preparation of this policy was based on the outcome of an initial nationwide vulnerability assessment study conducted in 2006 by a group of national experts under the Netherlands Climate Change Study Assistance Programme (MEST 2010; Dzah 2011). The strategy is expected to cover a period of 10 years from 2010 to 2020 and to be used by all stakeholders involved in climate change activities. It is also to be reviewed (MEST 2010). The NCCAS recognises the peculiar challenge faced by the vulnerable groups to climate change. Therefore, to address this challenge, the NCCAS' overarching goal, *inter alia,* is to increase the resilience of vulnerable groups and protect property. In the formulation and implementation of this strategy, it is stated that the principle of gender sensitivity and reduction of vulnerability is to be adopted (MEST 2010, 2012). Thus, it is clear that the NCCAS considers vulnerable groups in Ghanaian society as a category of the population whose interests need to be prioritised and mainstreamed in the climate change policy making process to ensure effective adaptation and sustainable development.

National Climate Change Policy (NCCP)

The National Climate Change Policy was developed from the National Climate Change Policy Framework (NCCPF) titled *Ghana Goes for Green Growth* (G4) discussion document (MEST 2012). The NCCPF was developed by a 24-member National Climate Change Committee (NCCC) with the composition as follows: two (2) parliamentarians, four (4) representatives from Civil Society Organisations, two (2) representatives from research institutions, twelve (12) representatives from government ministries as well as two (2) donor agencies including the DFID and Dutch Embassy (Dzah 2011). The ministries and agencies

that participated in the development of the document included health, agriculture, foreign affairs, environment and science and finance. The three overarching objectives of the National Climate Change Policy are to promote effective adaptation, social development and mitigation (MEST 2012).

According to MEST (2012), the following are five policy areas prioritised for action in the policy:

- Agriculture and food security
- Disaster preparedness and response
- Natural resource management
- Equitable social development
- Energy, industrial and infrastructural development.

2.4 Gender Inequalities in the Ghanaian Society

In spite of the numerous efforts by the government, civil society groups and other development partners to narrow the lacuna between men and women, gender inequalities still persist in the Ghanaian society. These inequalities are manifested in several areas of society including employment, education, access to and control over productive resources, and in political decision-making. Although the national constitution and other legislations grant the same rights to men and women, there are still in existence a number of cultural and traditional practices that work to the detriment of women, particularly the poor and those most vulnerable. Consequently, poor women tend to face inequalities in many areas of national life.

Women make and continue to make an enormous contribution to many sectors of Ghana's economy. For instance, it is estimated that women produce about 70 percent of the country's crops; make up 52 percent of the labour force; and contribute 46 percent of the GDP (MEST 2012). In spite of this contribution, women are faced with a number of structural challenges. In urban Ghana, women are found predominantly in the self-employment sectors of the

informal economy in trading and other service activities, while men have the majority share of the public and private formal sector wage jobs (Dankelman 2008). Income and conditions of work within the informal sector are far less secure and stable compared to the formal sector employment (Dankelman 2008). In addition, workers in the informal sector, the majority of whom are women, are usually not protected by labour laws and conventions and have no basic rights such as a minimum wage or health cover (Dankelman 2008). Consequently, livelihoods of women working in the informal economy in vulnerable locations are frequently exposed to climate hazards such as flooding. For example, Aboagye (2012) found in two communities in Accra that females suffered disproportionately during flooding compared to males, and attributed this state of affair to two reasons; firstly, that most women are not able to compete favourably with men for available resources; and secondly, that most Ghanaian women are in retail trading in areas that are most vulnerable to flooding and thus, their income is usually the most affected. It is therefore not surprising that women are more likely to be unemployed in Ghana (6 percent compared to 5 percent of men) and that more females (18 percent compared to 9 percent of men) are mere homemakers (GSS 2010). Moreover, women in Ghana experience inequalities in access to and control over land and formal financial services (MEST 2012). These unequal rights tend to affect their economic, social and political status (Dankelman 2008). Table 2.2 gives some indicators of gender inequalities based on the fifth round of the Ghana Living Standards Survey (GLSS5) published in 2008 and it is apparent that there are stark differences between men and women in many sectors of social and economic lives. It is evident from the Table that whereas 38.3 percent of women have never been to school, the proportion was only 22.3 percent for men. In addition, about 60 percent of women were self-employed compared to only 34 percent of men. Similarly, in terms of performance of household duties, women were overburdened compared to men, with about 64 percent of women claiming to have collected water compared to 41 percent of men. Further, about 72 percent of women compared to only 18 percent of men were involved in cooking in the household.

Table 2.2 Some Indicators of Gender Inequality (in percentages)

Indicator	Males (%)	Females (%)
Never been to school	22.3	38.3
Self employed	33.8	60.3
Contributing family labour	4.1	11.0
Wage employment	25.0	8.2
Savings accounts	59.7	40.3
Agriculture	59.1	52.7
Unemployed	3.5	3.6
Household duties		
Collecting firewood	16.9	37.5
Fetching water	40.9	64.2
Washing dishes	30.4	65.1
Caring for children	13.7	35.6
Cooking	17.7	71.9

Source: GSS (2008 cited in EPA Policy Advisory Series 18, no date, p.1)

Although women have land usage rights, their access to the resource is very much determined by its availability and the goodwill of men who control them because of tenurial arrangements, inheritance and land use systems (UNECA 2004). Many national surveys have provided evidence of inequalities in all socio-economic indicators in favour of men (EPA no date).

Dankelman (2008) argues that the social situation of women in terms of social welfare, social security and human development issues have been relegated to the background as a result of the overriding preoccupation with macro-economic stability. Hence, there is no social policy

and no universal and equitable access to social services and public resources hindering the delivery of an acceptable minimum level of service to promote human security. Thus, in Ghana, the levels of poverty, disease and insecurity have increased particularly among women even in the midst of impressive economic growth (Dankelman 2008). Coupled with this is the fact that the privatisation agenda pursued by the government under the World Bank policy framework has had wide implications for women and girls in terms of access to services such as water and sanitation. This has increased the reproductive burden of women as they have to walk long distances to fetch water with consequences on their time available to engage in income generating activities (Dankelman 2008). She also argues that in spite of their role as users of water, women are conspicuously absent from critical decisions regarding water (Dankelman 2008).

Gender inequalities also manifest in the area of education. According to the Ghana Living Standards Survey 2, about 44 percent of women compared with 21 percent of men, have no formal education (Dankelman 2008). This finding is further confirmed by the 2010 National Population and Housing Census Report which found that of 23 percent of the population aged 3 years and older who have never been to school in Ghana, only 9 percent are males compared to 14 percent females (GSS 2010). This situation has been attributed to factors such as poverty, early marriage and teenage pregnancy which affect the ability of women to study up to higher levels (Dankelman 2008).

The participation of women in politics and other decision making processes is deemed critical not only in enhancing their ability to contribute to climate change discussions, but also to benefit from adaptation and mitigation measures (Dankelman 2008). Within the national and local governance systems, the participation of women has been variously described as low. For instance, in 2002, the National Association of Local Authorities in Ghana (NALAG) estimated that women composed of about 36 percent of appointed assembly members in 97 out of then 110 districts (Dankelman 2008). Moreover, in the 2004-2008 parliament of 230 legislators, only 25 (11 percent) were women. This level of

participation is abysmal when juxtaposed to the fact that women constitute 51 percent of Ghana's population.

Dankelman (2008) argued that the low political participation of women has tended to relegate the issue of gender relations to the background and that many public policy issues are handled from a gender-neutral perspective. This virtual neglect has also been extended to the climate change policy formulation and implementation process in Ghana as can be seen in Table 2.3 which shows a list of important policy documents and their consideration of climate change and gender.

Table 2.3 Some Policy Documents Relating to Climate Change and Gender

Policy Documents	**Consideration of gender**	**Consideration of climate change**
Environmental Policy (1992)	No	No
Environmental Policy (Draft)	Yes	Yes
Ghana Shared Growth Development Agenda (2010-2013)	Yes	Yes
National Climate Change Adaptation Plan (Draft)	Yes	Yes
National Environmental Action Plan (1992)	No	No
National Policy Framework for Climate Change (Draft)	Yes	Yes
National Gender and Children's Policy (2004)	Yes	No
National Gender Policy (Draft)	Yes	No

Source: EPA (no date, p.3)

What is most striking from the Table is that the impact of climate change on women, children and the vulnerable is not considered a priority issue in the National Gender and Children's Policy (2004). Yet, the Ministry of Gender, Children and Social Protection (MGCSP) is

considered an important actor in the National Climate Change Policy. Thus, in the view of EPA (no date), gender and affirmative action issues in Ghana are still treated as a marginal issue by the government. From the foregoing, it can be stated that climate change is likely to exacerbate the already precarious conditions of women, especially those living in slum communities in urban Ghana. This suggests that there is the need for gender issues to be consciously mainstreamed in climate change policy formulation and implementation processes. However, available evidence suggests that this is not the case in Ghana. Although gender appears ubiquitous in both the National Climate Change Policy and National Climate Change Adaptation Strategy, its conceptualisation and mainstreaming in the said documents has not been without challenges.

2.5 Mainstreaming Gender in the National Climate Change Institutional and Policy Frameworks

Gender is acknowledged as an important factor influencing individuals' vulnerability to climate change in the Ghana National Climate Change Policy (NCCP). This acknowledgement is succinctly stated in the NCCP as follows:

> "The evidence shows that climate change will hit women harder than men because of existing vulnerabilities and gender inequalities. While it is clear that climate change impacts all, the impact and degree of vulnerability is different for men and women. Women are more vulnerable to the effects of climate change than men- primarily as they constitute the majority of the poor and are more dependent on natural resources for their livelihood. Their limited adaptive capacities also arise from factors such as social inequalities that have been perpetuated for decades, ascribed social and economic roles that manifest themselves in unequal access to resources and to decision-making processes, reduced access to information, ineffective property rights and reduced mobility"(MEST 2012, p.32).

Moreover, the National Climate Change Adaptation Strategy (NCCAS) identifies women as one gender category particularly susceptible to the impacts of climate change. Based on this, one is tempted to conclude that this recognition has actually resulted in effective mainstreaming of gender in climate change policy formulation and implementation processes in Ghana. However, analysis of the gender-sensitivity of policy documents and the available literature suggests the contrary. Although the role of gender in influencing

women's vulnerability to climate change has been recognised, there still exists in the NCCP and NCCAS a number of weaknesses around their conceptual formulations and gender mainstreaming approaches. The following have been identified as the main weaknesses of the national climate change institutional and policy frameworks in relation to addressing inherent gender inequalities:

Firstly, while the climate change policy recognises the poor as most vulnerable to the impacts of climate change, it assumes a notion of homogeneity and thus fails to disaggregate the poor. This assumption, however, cannot be sustained in the face of current dynamics in Ghanaian society. Although it is true that the poor suffer mostly from climate change impacts, it is too simplistic to homogenise them without taking into account the differences between and among different categories of poor. For instance, it is widely established in the literature that some of these poor groups live in more vulnerable locations than others, and therefore need special attention with respect to the design and implementation of adaptation interventions (Satterthwaite *et al*. 2007).

Secondly, the current climate change policy assumes and perpetuates a notion of homogeneity for women in its analysis of impacts of climate change in the agricultural sector. It identifies women as one group whose activities in the agricultural sector are likely to be severely impacted by climate change. This assumption, however, is inherently flawed in the sense that it fails to acknowledge the differences between women in terms of variables, such as age, social status, occupation, income, ethnicity and geographical location and how these variables interact to produce differentiated vulnerabilities among different groups of women. Thus, in the view of Dzah (2011), attempts to tackle the climate change issue from a perspective which views women as sharing the same vulnerability is not likely to address their differential needs. The inability of the NCCP to appreciate the intersectional dynamics of gender in influencing the agency and adaptation among different classes of women masks the peculiar vulnerability of poor women and men living in slums or marginalised locations.

Furthermore, the intentions of the climate change policy are essentially biased towards rural women. This is because most of the policy areas outlined in NCCP for action tend to focus on building the resilience of rural women to the detriment of urban women. This approach seems to have been informed by the outcomes of the initial gender and vulnerability assessment study undertaken by national experts (see Damptey and Mensah 2005). The findings of this study were fed into the preparation of the climate change policy which tended to focus mainly on rural women and their livelihoods, especially agriculture, and virtually ignored the challenges faced by urban poor women and men. Closely related to the above is that the climate change policy conflates gender with women and therefore fails to recognise the relational nature of the former. Analytically, the policy oversimplifies the relational meanings of gender as exemplified by power relations between men and women, their socially constructed roles and responsibilities and how these intersect with other economic and institutional factors to shape women and men vulnerability to climate change in urban Ghana.

The national institutional framework for climate change policy formulation and implementation has also been described as inherently inadequate for addressing issues around gender inequalities in society. One criticism levelled against the climate change institutional framework is that women are generally under-represented on the institutions responsible for climate change policy activities. For instance, the Ministry of Gender, Children and Social Protection (MGCSP) responsible for gender mainstreaming is not represented on the all-important 24-member National Climate Change Committee. Dzah (2011) argues that the absence of this ministry on the committee raises a number of questions regarding the government's commitment to gender equality, especially in view of its acknowledgement of gender sensitivity in international climate change negotiations. The lack of involvement by the MGCSP in the national policy formulation process raises serious doubts about the government's commitment to ensure that the former approves all climate change policies to ensure gender sensitivity. The MGCSP cannot effectively ensure the approval of gender-sensitive climate change policies when it has not been involved in their formulations in the first place. Although gender-based civil society organisations are represented on the committee, their views cannot be said to substitute that of MGCSP in

terms of closing the gender lacuna. It has also been suggested that the MGCSP itself faces a lot of challenges with respect to mainstreaming of gender in its policies and programmes. Among these challenges is its lack of a climate change unit. Most of the responsibilities for gender mainstreaming are designated to Gender Desks Officers in other ministries, most of whom are not working on full-time basis (EPA no date). This makes the mainstreaming of gender issues in climate change policy difficult. Additionally, the large number of institutions or organisations involved in the implementation of climate change activities in Ghana tends to make coordination functions difficult. For instance, the NCCP identifies about thirteen (13) institutions/organisations or actors whose functions or activities border on climate change. With different mandates and areas of operations, it becomes difficult for the EPA to effectively monitor the implementation activities of these individual institutions. Added to this is that there is likely to be duplication of efforts among these organisations.

Lastly, while a lot of commitment has been shown by the government at both national and international levels to climate change agreements, this has not been effectively translated into action at the community level. Tutu and Nelson (2012) have argued that in spite of the critical role of decentralised structures in the implementation of development projects in Ghana, their roles and responsibilities in the implementation of climate change policies and programmes remain unclear and fuzzy, particularly where it interfaces with its development functions. Thus, the local governance structures which are considered agents for development at the community level and critical for addressing gender inequalities have not been effectively involved in the climate change policy planning and development process. This limits the ability of state and non-state actors in the climate change field in effectively conceptualising and mainstreaming gender concerns in their climate change activities and functions. It is not surprising that poor urban women continue to bear the brunt of the impact of climate change in Ghana.

2.6 Conclusion

Ghana has taken giant steps in addressing the climate change challenge. This is reflected in the establishment of its National Climate Change Policy (NCCP) and the National Climate

Change Adaptation Strategy (NCCAS) respectively. However, in spite of this, it is yet to translate these commitments into actions at the local or city level. Even though gender is recognised as an important factor that affects the ability of men and women to adapt to climate change, a number of gaps still exist in the climate change discourse with respect to how gender is conceptualised and mainstreamed in the policy formulation and implementation process.

Closely related to the above is that gender inequality continues to be a development challenge in Ghana despite the important strides made by the country on economic and democratic fronts. Although women make up the largest proportion of the national population (over 50 percent), they are under-represented in decision-making processes and are found mainly in the informal sector of the national economy where income levels are generally low and livelihood activities are highly vulnerable to climate change. The under-representation of women is also reflected in the climate change institutional and policy frameworks of the country whereby the ministry responsible for gender mainstreaming is conspicuously absent on the National Climate Change Committee. The absence of the Gender Ministry on this important decision making structure means that the priorities of women with respect to climate change are not adequately addressed in the policy formulation and implementation process. Consequently, women, especially poor urban women, continue to bear the greatest burden associated with the impacts of climate change in Ghana.

In conclusion, this chapter has sought to challenge the overtly biased approach towards rural sectors that currently exists within the national climate change discourse in Ghana by highlighting the gaps inherent therein. In order to address these gaps, this chapter has made a strong case for a context specific study to understand how gender intersects with socio-economic and institutional factors to shape the vulnerability of men and women to climate change in urban slums. The outcome of such a study will greatly contribute to the national climate change discourse and also enrich the content of the national climate change policy in Ghana.

3 CHAPTER THREE: CONCEPTUALISING GENDER, SLUM AND VULNERABILITY TO CLIMATE CHANGE

3.1 Introduction

This chapter frames the issue of gender vulnerability to climate change within the current theoretical debates and literature. It begins with the examination of the phenomenon of climate change, its causes and the actual and expected impacts on the livelihoods of people, especially the urban poor in Accra. It then critically examines the conceptual formulations on gender and their inherent assumptions and biases. This is followed by the examination of how the term slum has been conceptualised and operationally defined in the development literature. Moreover, the dominant theoretical formulations and approaches to the study of vulnerability to climate change are evaluated. The drivers or causes of gender vulnerability to climate change are further analysed drawing on social vulnerability theory. The last sections examine issues around gender and climate risk perceptions and adaptation to climate change respectively. It must be borne in mind that although attempts have been made to draw on studies conducted in the developed world, much of the literature is drawn from the developing world, especially Africa, Asia and Latin America. It should also be noted that even though the context of this study is urban, literature has been drawn from rural contexts to compare and contrast arguments where necessary.

3.2 Climate change: Definition, Causes and Some Potential Impacts on Cities in the Developing World

Climate change remains one of the development challenges confronting humanity in the 21st century. The Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC) (2012, p.29) defines climate change as:

> "an alteration in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer".

Climate change, in the view of this report, may be due to:

> "natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC 2012, p.29).

Although natural influences have always been responsible for climate variation, there is, however, strong evidence currently that human actions, mostly the burning of fossil fuels, are the main drivers of the recent increase in global temperatures which also affect precipitation patterns and extreme events (IPCC 2007). There is strong evidence that anthropogenic influences, including an increase in atmospheric concentrations of greenhouse gases (GHGs), have been responsible for the warming of extreme daily minimum and maximum temperatures at the global scale (IPCC 2007). The growth in greenhouse gas emissions as a result of human activities since the pre-industrial time has been observed increasing by about 70 percent between 1970 and 2004, much of which has come from energy supply, transport and industry (IPCC 2007).

Such climate extremes manifested through natural hazards, such as floods, cyclones, hurricanes and droughts, are already being felt by different regions and populations across the globe (IPCC 2012). It is estimated that the global mean temperature has increased by between 0.3 and 0.6 since the late 19th century. This increase in temperature has contributed to the rise in global sea level by between 10cm and 15cm over the past hundred years (IPCC 2007). It is widely observed that vulnerability and exposure usually differ between regions and among populations within regions (de Sherbinin *et al*. 2007). This further translates in differing vulnerability of communities and services affected by climate change (Denton 2002). For instance, Peduzzi (2006) argues that while a similar number of people in low and high human development countries may be exposed to hazards each year (11 and 15 percent respectively), the average numbers killed is very different (53 percent and 1 percent respectively). In general, developing countries are recognised as facing the brunt of the impacts of climate change and having the greatest number of people who are least able to adapt to climate change (de Sherbinin *et al*. 2007).

Although Africa's contribution to greenhouse gas emissions is negligible by global standards (Codjoe *et al*. 2012), it is recognised as the most vulnerable region in terms of the number of people who are least able to easily adapt to climate change (IPCC 2007). The continent has the greatest number of its populations who are least able to easily adapt to changes in

temperature, human health, water resources, agricultural production, and biodiversity (IPCC 2012). The continent's vulnerability has been attributed to its endemic poverty, limited access to capital, ecosystem degradation, complex disasters and conflicts (IPCC 2007). Projections made by the IPCC (2007) indicate that that by 2020, between 75 and 250 million people living in Africa will be exposed to increased water stress due to climate change. This report goes further to project that by the end of the same year, yields from rain-fed agriculture could be reduced by about 50 percent in some countries. Some of the direct consequences of this will include increased food insecurity and the exacerbation of malnutrition. The effects of this on the urban poor, particularly women living in marginalised communities, can be enormous. In addition, the projected rise in sea levels associated with climate change will affect many low-lying coastal cities with large populations, such as Accra. The cost of adaptation, according to the IPCC, could amount to at least 5 to 10 percent of GDP in these countries. Although these are projected impacts of climate change on Africa, it must be emphasised that this region is already experiencing the negative consequences of climate change. For instance, in 2000, a major earthquake and also rain, floods and cyclones occurred in Mozambique and affected 800,000 people, resulting in 700 deaths and 250,000 homeless; increased the incidence of malaria and impacted negatively on food production (Dankelman 2002). West Africa, particularly the Sahel region, has been identified as one of the most vulnerable areas to climate change because of its liability to drought and desertification, as well as its heavy dependence on subsistence agriculture (Denton 2002).

3.2.1 Social and Human Consequences of Climate Change on the Livelihoods of Urban Poor

It has been recognised that the increasing polarisation and spatial segregation which has become a dominant feature of cities tends to generate different degrees of vulnerability among city residents (Mitchell 1999b). For instance, in the United States, the factors found to consistently increase social vulnerability are density (urbanisation), race/ethnicity, socio-economic status with level of the built environment, age, race/ethnicity and gender, accounting for nearly half of the variability in social vulnerability across counties (Cutter and Finch 2008; Enarson 2012). This variability is particularly pronounced in cities of the developing world where decades of uncontrolled population growth has led to concentration

of large sections of their populations in informal settlements or slums, which are often found in hazardous locations. There has been an increase in the number and extent of such informal settlements and slums over recent decades (UN-HABITAT 2003a).

Climate change impacts are likely to fall disproportionately on residents of slums or marginalised communities mostly located in hazardous urban spaces and populated by the urban poor with the majority being women. The IPCC (2012, p.79) acknowledges that factors, such as poor health, livelihood insecurity, lack of access to service provision and basic needs, can contribute to elevate the vulnerability of slum settlements. This vulnerability is particularly heightened for women due to deep rooted gender inequalities, relative lack of productive assets and lower educational levels (Satterthwaite *et al*. 2007; Terry 2009; Alston 2015). Thus, while cities present opportunities for women, they also make life a perpetual struggle for those living in such locations without access to water, decent housing, sanitation, livelihood opportunities, and other vital basic amenities (Moser 1995). The WHO Report (2011) maintains that human health is likely to be affected by climate change through a number of mechanisms. These will include the direct effects of hazards, such as heatwaves, floods and storms, on human health as well as more complex pathways of altered infectious disease patterns, disruptions of agricultural and other supportive ecosystems (WHO 2011). The health of the urban poor will be greatly impacted by climate change thus putting the well-being of millions of people at risk in cities of the developing world. Urban populations, particularly women, have heightened vulnerabilities because their limited access to land in rural areas, conflict, divorce and unemployment, forces an increasing number of them into living in marginalised urban and peri-urban areas and slums.

The rapidly growing urban populations may affect the capacity of developing nations to cope with the effects of extreme events due to the inability of governments to provide the required urban infrastructure and services for residents (UN-HABITAT 2003a). Closely related to this issue is the general concern that there has been insufficient attention to both existing needs for infrastructure maintenance and appropriate ongoing adaptation of infrastructure to

meet potential climate extremes (Auld 2008). In addition, factors such as poor health, livelihood insecurity, lack of access to service provision and basic needs, and a reduction in the capacity of formal actors to design development and adaptation interventions in a comprehensive, preventive and inclusive way, have contributed to exacerbate vulnerability in informal settlements or slums (Kantor and Nair 2005; Sclar *et al*. 2005).

3.3 The Concept of Gender

Gender refers to the socially constructed roles, identities, norms, relations, responsibilities and opportunities associated with being a man or woman in a given society (West and Zimmerman 1987; WHO 2011). Alston (2013a) also defines gender as socially constructed behaviours, customs and attitudes that shape what it is to be female and male in various cultural contexts. Based on the above definitions, it is clear that gender is a social construction and it is also culturally specific. A distinction must also be made between gender and sex as both concepts are not synonymous. The latter refers to biological differences between women and men. Thus, while gender is socially constructed and culturally specific, sex, on the other hand, is biologically determined. In the same vein, a clear distinction must be made between women and gender. Gender is not synonymous with women. Indeed, it is not uncommon to find many studies conflating gender with women. Gender must be understood as a relational concept because it is structured in the context of female and male interactions (Alston 2013a). Therefore any conceptualisation that conflates gender with women is bound to underrate the historical, social, cultural and contextual variables that interact to shape power roles and influence the relationships between men and women in a given society. To this end, Bennett (2005) suggests that gender must be seen as a means of comprehending how society operates through the study of the negotiating of power roles and influence between men and women. Bennett (2005, pp.451-459) identifies three approaches to examining gender. The first two approaches examine gender as a binary subject: gender that represents the separate spheres inhabited by men and women; and gender that represents the difference between power and marginalisation. The third approach goes beyond conceptualising gender as a binary divider of society, as a means of stratification (thus seeing differentiation in society as a function of wealth, class, religion etc.) to seeing gender as simply the definition of the spheres around which society operates.

Alston (2013a) also argues that gendered identities, roles and norms are not static but are constantly renegotiated across time and space. She also notes

> "gender practices are socially constructed, and culturally and contextually embedded resulting in a gender order that supports and reinforces unequal power relations between women and men"(Alston 2013a, p.224)

In the same vein, Esplen and Brody (2007, p. 2) have argued that

> "abstracting women from their social realities eclipses the relational nature of gendered power and the interdependency of women and men, and paints a distorted picture of women's vulnerabilities, choices and possibilities".

There is also the tendency by scholars in the gender and climate change field to conceptualise women everywhere as a homogenous, subjugated group most vulnerable to impacts of climate change (Demetriades and Esplen 2008). Demetriades and Esplen (2008) argue that this approach to conceptualise women is problematic on multiple accounts, as it results in failure to account for the complex interactions between gender and other forms of disadvantages based on class, age, race, ethnicity or sexuality. They further maintain that intersecting inequalities result in differing experiences of power and powerlessness between and among different categories of women and men, in turn, enable or deny them certain choices. Another challenge with this conceptualisation is that it fails to recognise the context-specific impacts of climate change on women. For instance, women in Ghana may face a different set of challenges and articulate different priorities to women in Bangladesh or other developing countries. Even within Ghana women in urban areas may face different set of challenges with respect to impacts of climate change to women in rural areas. In addition, within urban Ghana, women living in first class residential neighbourhoods may face a different set of challenges with respect to climate change compared to those living in hazardous or vulnerable locations. This means that context-specific factors need to be taken into consideration in vulnerability studies in order to facilitate the development and implementation of adaptation strategies. Demetriades and Esplen (2008, p. 25) add a caveat by stating that:

> "premising advocacy messages on sweeping generalisations neither makes a concrete case for the need for gender mainstreaming in climate change processes, nor does it help to identify practical steps to reduce gendered vulnerability and build adaptive capacity at household and community levels".

In the context of this thesis, the author does not assume the notion of homogeneity in the use of the term 'women'. He recognises that there are differences among women in terms of wealth, class, age and other social and economic categories. These differences act to influence the vulnerability of different categories of women to climate change. It is against this backdrop that this study specifically focuses on women and men living in three slums or marginalised communities in Accra to understand how gender intersects with social, economic and institutional factors to shape their vulnerability to climate change. These communities are different from other neighbourhoods in the city because of their vulnerable locations along water bodies or transportation routes, which expose them to a myriad of climate change-related hazards, especially flooding, sea erosion and salinity intrusion. The residents of these communities are categorised as low income earners with limited access to socio-economic opportunities.

3.4 The Concept of Slum

There is no consensus in the development literature regarding what constitutes a universally accepted definition of slum. This lack of consensus is attributable to the divergent views among scholars regarding the key determinants of slums as well as their multidimensional characteristics (UN-HABITAT 2003a). Some features of slums, such as density and access to physical services can be clearly defined or measured, however others, such as social capital, cannot (UN-HABITAT 2003a). Nonetheless, the definition provided by the UN-HABITAT is the most widely used. In the view of the UN-HABITAT (2003a, p. 12), a slum is:

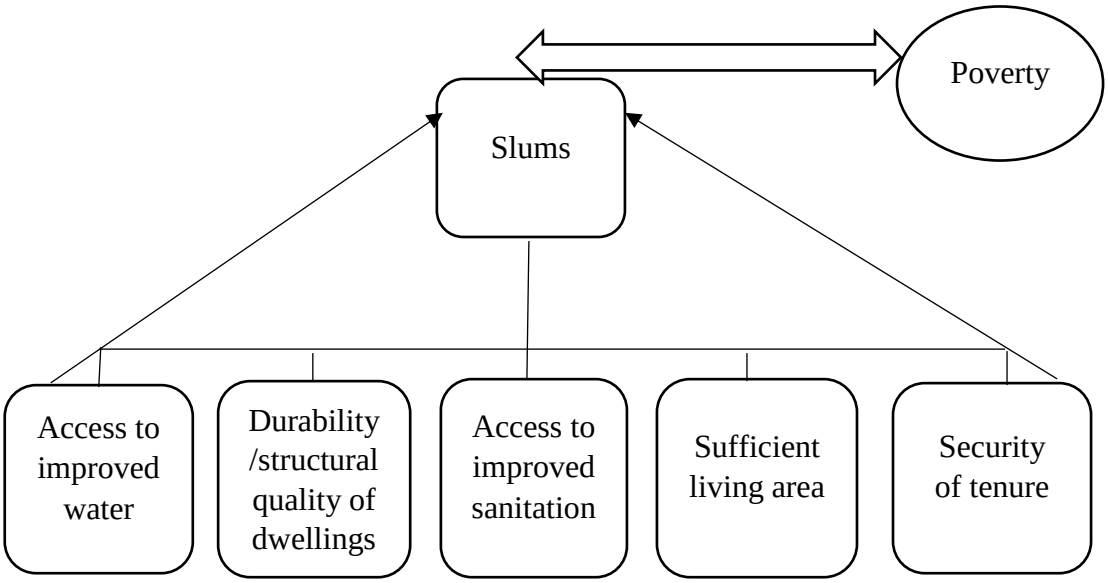
> "an area that combines, to various extents, the following characteristics: inadequate access to safe water; inadequate access to sanitation and other infrastructure; poor structural quality of housing; overcrowding; and insecure residential status".

UN-HABITAT (2003b, p. 7) further notes that:

> "the term slum has come to include the vast informal settlements that are quickly becoming the most visible expression of urban poverty in developing world cities, including squatter settlements and illegal subdivisions. The quality of dwellings in such settlements varies from the simplest shack to permanent structures, while access to water, electricity, sanitation and other basic services and infrastructure is usually limited. Such settlements are referred to by a wide range of names and include a variety of tenure arrangements".

It is apparent that while the first definition focuses on the physical features of slums, the second emphasises their socio-economic or behavioural dimensions. Slums have also been considered as the manifestations of poverty in cities of the developing world (Ovenseri-Ogbomo *et al*. 2013). As such, the relationships between poverty and slums have often been conceptualised as closely related and mutually reinforcing. However, available evidence suggests that these relationships are not always direct and simple (UN-HABITAT 2003b; Obeng-Odoom 2011), in the sense that not all poor people live in slums and not all those who reside in slums are poor (UN-HABITAT 2003b; Ovenseri-Ogbomo *et al*. 2013). Indeed, it has been argued that many people who have risen out of income poverty choose to continue living in slums for many reasons, such as lack of affordable housing in affluent parts of the city, as well as closeness to family and social networks (UN-HABITAT 2006). The relationship between slum and poverty is represented diagrammatically in Figure 3.1

Figure 3.1 UN-Model Depicting the Poverty-Slum Nexus



Source: UN-HABITAT (2004 cited in Obeng-Odoom 2011, p.359).

Even though slums have become a permanent feature of cities in both the developed and the developing countries, the challenge is acute in the latter as a consequence of rapid urbanisation and globalization (UN-HABITAT 2003b; Ovenseri-Ogbomo *et al*. 2013). For example, in 2001, it was estimated that more than 920 million people or slightly less than

a third of the world's total population resided in slums and that, by 2005, this had risen to 998 million (UN-HABITAT 2006). Based on current projections, it is predicted that the global slum population will reach 1.4 billion by 2020 (UN-HABITAT 2006). In Ghana, estimates suggest that more than 5.5 million Ghanaians reside in slums and the majority live in the Greater Accra Region (Paller 2012). Indeed, it has been predicted that how developing countries, such as Ghana manage their urbanisation challenge over the next fifteen years will be crucial to reducing poverty and environmental sustainability, and ultimately, determine their ability to achieve most Sustainable Development Goals(SDGs)(Lucci and Lynch 2016).

3.5 The Concept of Vulnerability

Like slum, there is no consensus in the climate change literature regarding the conceptual meanings and approaches to the study of vulnerability. The concept of vulnerability is interpreted by various scholars based on their disciplinary backgrounds, as well as the vulnerability situations being studied (Füssel 2007). This has consequently resulted in the development of different, and sometimes varied, definitions and assessment methodologies. For instance, Moser and Ekstrom (2010, p.2) define vulnerability as:

> "the degree to which systems are susceptible to loss, damage, suffering and death in the event of a natural disaster or hazards".

In this sense, systems can be represented as households, communities or organisations. Wisner *et al*. (2004, pp. 4-11) also define vulnerability as

> "the characteristics of a person or group and their situation influencing their capacity to anticipate, cope with, resist and recover from the impact of natural hazard".

Wisner *et al*. (2004, pp. 4-11) further suggest that a vulnerability approach to the study of natural disasters is needed, as

> "the risks involved in disasters must be connected with the vulnerability created for many people through their normal existence".

In this respect, Cutter *et al*. (2003, p. 7) have argued for the need

> "to identify, delineate, and understand those driving forces that increase or decrease vulnerability at all scales".

The most prominent definition is the one contained in the IPCC Fourth Assessment Report, which defines vulnerability to climate change as:

> "the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change" (IPCC 2007, p. 21).

This report views vulnerability as a function of exposure, sensitivity, and adaptive capacity. Thus vulnerability, in the context of climate change, is related to the

> "susceptibility, sensitivity, and lack of resilience or capacities of the exposed system to cope with and adapt to extremes and non-extremes" (IPCC 2012, p. 70).

Viewing vulnerability from a disaster risk management perspective, the United Nations Office for Disaster Risk Reduction (UNISDR) (2009) also defines vulnerability as the conditions shaped by physical, social, economic and environmental factors or processes, which accentuate the susceptibility of a community to the impacts of hazards. This definition differs from that of the IPCC's in the sense that it takes into account external environmental factors of shock or stress, and also considers the magnitude and frequency of potential hazards.

The lack of a common definition or conceptual model in the literature presents an enormous challenge to the study of vulnerability. According to Cardona (2004), the lack of a comprehensive conceptual framework that facilitates a common multidisciplinary risk evaluation hinders the effectiveness of disaster risk management and adaptation to climate change. Similarly, Dasgupta and Baschieri (2010) make the case that carrying out vulnerability assessment can be complicated because of the multiple definitions of vulnerability and the scarcity of data to measure vulnerability. Moreover, lack of terminological compatibility has been identified as one challenge in the vulnerability literature. For instance, while Füssel (2007) recognises that each of the conceptual frameworks for vulnerability offers an important classification of factors that shape the vulnerability of a system to specific hazard, he maintains that the terminologies are clearly incompatible with each other, and none of them are comprehensive enough to consistently integrate the other. According to Füssel (2007), the failure to differentiate between the sphere (and scale) and knowledge domain as two largely independent dimensions of vulnerability

factors is seen as the source of this confusion. The sphere (scale) or internal vulnerability factors represent the properties of the vulnerable system or community itself, whereas external vulnerability factors deal with something outside of the vulnerable system. The knowledge domain, on the other hand, refers to vulnerability factors that relate to economic resources, the distribution of power, social institutions, cultural practices and other features of social groups which is typically the domain of investigation for social sciences and humanities.

In spite of the differing conceptual formulations for the study of vulnerability, two dimensions of vulnerability are widely acknowledged in the literature. Vulnerability is viewed broadly as a function of both physical and social variables. The physical dimension involves exposure to risks or hazards such as floods, hurricanes, cyclones or storm surges. The social side, on the other hand, involves socio-economic and political arrangements that either limit or enhance the capacity of individuals or social groups to cope with, and adapt to, hazards and external stress placed on their livelihoods and well-being (Adger and Kelly 1999).

3.6 Classical Approaches to Vulnerability Research

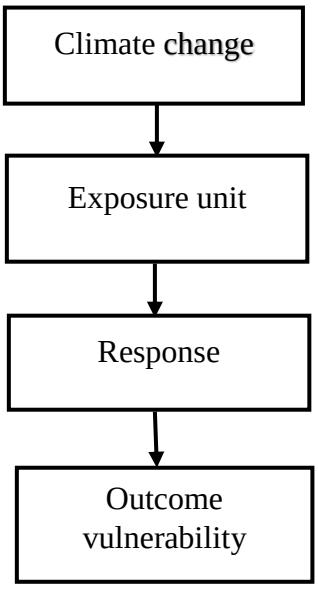
Little consensus has been reached among scholars with respect to the conceptual meanings and implications of vulnerability, which differs significantly across research fields and has also evolved over time (Füssel 2007). For instance, Adger (2006) summarises three main vulnerability drivers as resource availability, resource distribution and regulatory institutions. In the same vein, other scholars (Sen 1981; Davies 1993; Watts and Bohle 1993) have argued that entitlement and endowment, empowerment and political economy drive vulnerability. Notwithstanding, attempts at conceptualising vulnerability and its causes or drivers have crystallised into a number of broad approaches rooted in the risk-hazard approach, the political economy approach (the pressure and release model), the social-ecology, the vulnerability and disaster risk assessment (holistic perspective), as well as adaptation to climate change (de Sherbinin *et al*. 2007; Füssel 2007). This section of the

chapter examines these broad approaches and evaluates their strengths and limitations within the context of this study.

3.6.1 Risk-Hazard Perspective

This approach also known as outcome vulnerability (O'Brien *et al*. 2007) is widely used by engineers and economists in the technical literature on disasters. It is also applied in epidemiological studies. Under this approach, the focus is primarily on physical systems, including built infrastructure, and it also tends to be descriptive rather than explanatory (Füssel 2007). Traditionally, the risk-hazard approach assumes that hazards events are real, and that the hazard is known and stationary (Hulme *et al*. 1999). This approach clearly distinguishes between two factors that shape the risk to a particular system namely: the hazard and the vulnerability. In this context, the hazard refers to a potentially damaging physical event, or human activity that is characterised by its location, frequency and probability, whereas vulnerability shows the relationship between the severity of hazard and the degree of damage caused (Füssel 2007). In the context of the city or urban area, the risk-hazard approach focuses on the impact of hazards. Therefore it addresses issues such as urban exposure or sensitivity to changes in hazards by exploring the nature, intensity, frequency and duration (Lankao and Qin 2011). In the view of Lankao and Qin (2011), the basic aim of this approach is normally to help address a fundamental research and policy question: taking into consideration policy response, what are the likely avoidable or unavoidable impacts of hazards, such as changes in temperature and concentration of pollutants on urban population, infrastructures and activities? Biophysical vulnerability is often used to characterise the vulnerability concept in the hazard-risk framework. Moreover, the terms sensitivity and susceptibility are used to connote this concept (Lankao and Qin 2011). Figure 3.2 illustrates the multiple factors and processes associated with the risk-hazard perspective.

Figure 3.2 Framework Depicting Risk-Hazard/Outcome Vulnerability



Source: O'Brien *et al*. (2007, p. 75)

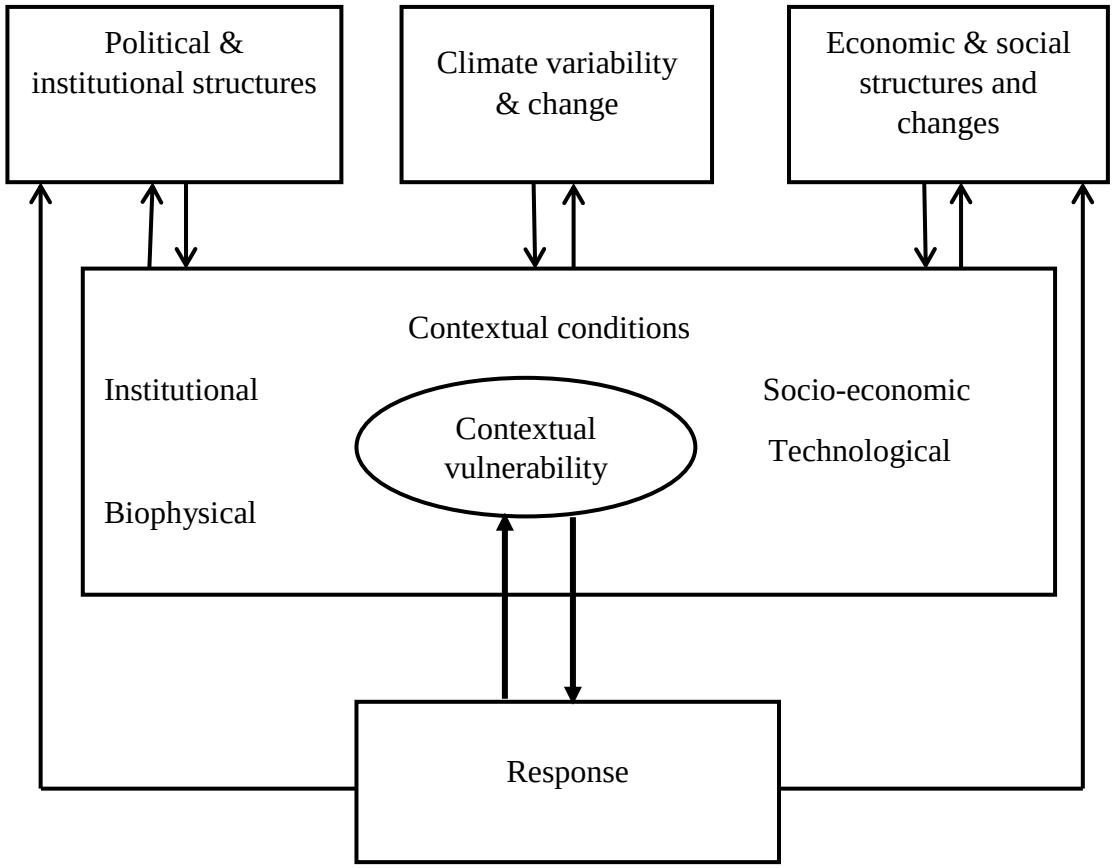
This approach to vulnerability has however, been criticized by several scholars as being too hazard centred. The approach becomes difficult to apply to study a category of people whose exposure to climate hazards largely depends on their behaviour, which is determined by a myriad of social, economic, political, cultural and institutional factors. Consequently, the vulnerability of people under this approach has sometimes been conceptualised as 'exposure to hazard' (Hewitt 1998) or 'being in the wrong place at the wrong time' (Liverman 1990). Similarly, Lankao and Qin (2011) have also argued that this approach considers only part of the significant attributes and dimensions involved. For instance, these authors have maintained that the approach ignores the following critical issues: how and why specific urban centres, or populations and sectors within the cities are differently affected; whether local stakeholders and populations are receptive to adaptation options and motivated to make the necessary changes; whether they possess the necessary skills, awareness and resources to be able to adapt; and how their potential adaptation choices are constrained by the social, economic, political and environmental circumstances in which they live and operate. Thus this approach exhibits weak analytical prowess in terms of its ability to explain why certain sections of the population are more affected by climate hazards than others. In simple terms, it neglects the role of gender and its relationship to economic, political, social and

institutional factors at the household, community, national and global levels in determining the vulnerabilities of different social groups and sectors of society. To address the weaknesses associated with this approach, a number of scholars have turned to the political economy approach to understand the inherent or contextual vulnerability.

3.6.2 Political Economy Perspective

This approach also known in some sections of the literature as the pressure and release model (PAR)(Wisner *et al*. 2004), contextual vulnerability (O'Brien *et al*. 2007) or inherent vulnerability (Lankao and Qin 2011), is the most dominant approach in social science-related vulnerability research, especially in the poverty and development literature. This approach is concerned with the "processual and multidimensional view of climate-society interactions" (O'Brien *et al*. 2007, p. 76), and posits that climate variability and change occur in the context of political, institutional, economic and social structures and changes, which interact dynamically with contextual conditions associated with particular exposure unit (O'Brien *et al*. 2007). These contextual conditions, as depicted in Figure 3.3 determine the exposure to climate variability and change, as well as potential response. Response can in turn affect both the process and contextual conditions and within this context, climate change is important because it modifies biophysical conditions, which affect the context for responding to other processes of change (e.g. economic liberalisation, political decentralisation). These other processes, in turn, affect the context in which climate change occurs. Therefore reducing vulnerability, from the perspective of political economy/social vulnerability perspective, involves modifying the context in which climate change occurs so as to enable individuals and groups to better respond to changing conditions. Thus, while the hazard-risk approach is concerned primarily with hazard and exposure, the political economy perspective concentrates on the social conditions and root causes of exposure in society (de Sherbinin *et al*. 2007).

Figure 3.3 Framework Depicting Political Economy/Contextual Vulnerability



Source: O'Brien *et al*. (2007, p. 75)

In simple terms, instead of asking what and where in vulnerability analysis, the political economy approach concerns itself with people, by asking questions such as who is most vulnerable and why (Füssel 2007). Under this approach, vulnerability is seen as:

> "the state of individuals, groups or communities in terms of their ability to cope with and adapt to any external stress placed on their livelihoods and well-being" (Fussel 2007, p.160).

One important feature of this perspective is that it links vulnerability to unsafe conditions in a continuum that connects local vulnerability to wider national and global shifts in the political economy of resources and political power. In addition, rather than being descriptive, this perspective provides an explanatory framework to analyse people's socio-economic

vulnerability to multiple stresses. In terms of terminology, this perspective is characterised as social vulnerability or cross-scale social vulnerability. Therefore the terms response capacity, coping capacity and resilience are used to denote this concept.

3.6.3 Integrated Perspective

This approach is a combination of the political economy and the risk-hazard approaches. These two approaches have been combined and expanded in various integrated approaches, notably in the hazard-of–the place model, and the coupled vulnerability framework (Füssel 2007). The key feature of this approach is that it combines the internal factors of a vulnerable system with its exposure to external hazards. From the perspective of the integrated approach, Cutter (1993) defines vulnerability as the likelihood that an individual or group will be exposed to, and adversely affected by, a hazard. Thus, it is the interaction of the hazards of place with the social circumstances of communities. The application of this approach is usually found in the context of global environmental and climate change with reference to regions, communities or other social units (Füssel 2007). This approach is also used in risk or vulnerability mapping which is multidisciplinary approach for identifying particularly vulnerable regions. A core feature of this approach is the emphasis on a feedback loop where vulnerability is dynamic and acts as the main driver and determinant of current or future risk (de Sherbinin *et al*. 2007).

3.7 Interpretation of Vulnerability to Climate Change

The framing of climate change issue has been approached from two distinct points based on different discourses on global environmental change (Lankao and Qin 2011). Füssel (2007, p.163) refers to these two points in the interpretation of vulnerability as 'End-point interpretation and Starting-point interpretation' of vulnerability. With respect to the former, vulnerability is interpreted as the expected or net impacts of a given level of global climate change, taking into consideration feasible adaptation. This interpretation is commonly found in the context of mitigation and compensation policy, for the prioritisation of international assistance and for technical adaptation. It takes its roots from the integrated framework or the risk-hazard framework of vulnerability research.

The Starting-point interpretation, on the other hand, focuses on reducing internal socio-economic vulnerability to any climatic hazard. In terms of policy orientation, this interpretation addresses the needs of adaptation policy and of the broader social development. It is rooted in the political economy approach. For instance, although the end-point interpretation concerns itself with climate change mitigation, compensation and technical adaptation in its approach to policy, the starting-point interpretation is concerned with social adaptation and sustainable development. Another point of divergence between the two interpretations is their conceptualisation of the relationship between vulnerability and adaptive capacity. End-point scholars tend to view adaptive capacity as a determinant of vulnerability, adherents of the starting-point interpretation consider vulnerability as a function of adaptive capacity. Füssel (2007) summarises the differences between the two streams of interpretations as shown in Table 3.1, which is based on the issues they consider in terms of policy context, policy question, meaning of vulnerability and the relationship between vulnerability and adaptive capacity. For example, while issues relating to mitigation, compensation and technical adaptation are the preoccupation of the end-point interpretation in climate change policy development, adherent of starting-point interpretation are predominantly concerned with the promotion of social adaptation and sustainable development. Additionally, the two interpretations also differ in relation to analytical focus. Adherents of the end-point interpretation often adopt the positivist approach in vulnerability assessment which tend to be descriptive rather than explanatory. This is in contrast to the constructivist approach of the scholars of starting point interpretation which views individuals' or groups' vulnerability to climate change to be a function of social, economic and institutional factors.

Table 3.1 Two Interpretations of Vulnerability in Climate Change Research

Issue	End-point interpretation	Starting- point interpretation
Root problem	Climate change	Social vulnerability
Policy context	Climate change mitigation, compensation, technical adaptation	Social adaptation, sustainable development.
Illustrative policy question	What are the benefits of climate change mitigation?	How can the vulnerability of societies to climate hazards be reduced?
Illustrative research question	What are the expected net impacts of climate change in different regions?	Why are some groups more affected by climate hazards than others?
Vulnerability and adaptive capacity	Adaptive capacity determines vulnerability	Vulnerability determines adaptive capacity
Reference for adaptive capacity	Adaptation to future climate hazards	Vulnerability to current climate variability
Starting point of analysis	Scenarios of future climate hazards	Current vulnerability to climate stimuli.
Analytical function	Descriptive, positivist	Explanatory, normative
Main discipline	Natural sciences	Social science
Meaning of vulnerability	Expected net damage for a given level of global climate change	Susceptibility to climate change and variability as determined by socio economic factors
Qualification according to terminology	Dynamic cross-scale integrated vulnerability (of a particular system) to global climate change.	Current internal socioeconomic vulnerability (of a particular social unit) to all climate stresses.
Vulnerability approach	Integrated, risk-hazard	Political economy.

Source: Füssel (2007, p. 163)

3.8 Gender and Vulnerability to Climate Change

Gender remains an important social factor that influences people's ability to mitigate and adapt to the impacts of climate change and variability. Indeed, the IPCC confirms this in its Second Working Group Report which concludes that:

> "climate change impacts will be differently distributed among regions, generations, ages, classes, income groups, occupations and genders" (IPCC 2007, p. 786).

Inherent in the IPCC's statement is the recognition that there is certainly a gender dimension to climate change as the impacts are felt differently by women and men and adaptation interventions need to be gendered. The gender dimension of climate change has similarly been identified as an issue requiring greater attention by the Commission on the Status of Women (WHO 2011). Indeed, a number of scholars have highlighted the gender implications of climate-related disasters in terms of preparedness and impacts (Enarson *et al*. 2007; Anderson *et al*. 2009); division of labour (Enarson and Fordham 2001), and post-disaster reconstruction and recovery (Bradshaw 2010). Apart from the gender dimensions of climate change, the international community adopted a set of Sustainable Development Goals (SDGs) in 2015 as a resolution on 2030 and sustainable development. This agenda encapsulates a number of commitments to achieving gender equality (Koehler 2016). This section of the chapter examines the factors that have been adduced in the literature to explain the linkages between gender and vulnerability to climate change, particularly in the developing world.

3.8.1 Gender and Participation in Decision-Making

Even though the high dependence of women on natural resources (land, forest, water) is widely acknowledged in the literature, their control is socially restricted across societies and cultures (Buechler 2009). To appreciate the important role of resources or assets in climate change adaptation, it is critical to analyse differences in land rights held by men and women, and how such rights are acquired and transferred, particularly across countries in the developing world. In spite of the difficulty in making generalisations across cultures and societies with respect to these rights (Meinzen-Dick *et al*. 1997), many studies agree that the

participation of women in decision-making over resource use and management is limited. For instance, Buechler (2009) and Alston 2015 have argued that women and other socially marginalised groups are likely to be most vulnerable to climate change because of the socially and politically driven lack of participation in decision making and access to power. In the same way, Tompkins and Adger (2004) have suggested that women's lack of participation in decision making can lead to the questioning of the sustainability of programmes and projects and their implementation. The near absence of women in the decision-making process on climate change adaptation also manifests at the global level. For instance, at the 2007 Thirteen Session of the Conference of the Parties (COP-13) in Bali, women comprised only 28 percent of the delegation parties and 12 percent of the heads of delegations (Demetriades and Esplen 2008). It is therefore not surprising that in the lead-up to the Copenhagen Climate Change forum, the UN Secretary-General Ban Kin-Moon entreated world to ensure adequate representation of women in climate change decision-making and to view them as agents of change and custodians of knowledge critical to local natural resource management (Alston 2015). These gender inequalities in decision-making continue to exist against the backdrop of the recognition by some scholars that achieving a gender balance in participation in climate change negotiations and representation at decision-making tables is a good starting point and key to successful interventions (Demetriades and Esplen 2008).

3.8.2 Gender Division of Labour and Cultural Patterns

Climate change is expected to have different implications on gender groups in cities of the developing world in areas related to livelihoods, household and caring responsibilities. In times of climate-related disaster and environmental stress, women and girls are generally expected to care for the sick (Brody *et al*. 2008).This burden limits the time they have available for income generation and education. Increased household burden means that women have less time to contribute to community level decision-making processes on climate change and disaster risk reduction (Demetriades and Esplen 2008; WHO 2011). Coupled with the interrupted nature of women's work due to childcare and other domestic responsibilities, their capacity to accumulate savings is severely constrained, reducing their means for coping with insecurity associated with climate crises (Demetriades and Esplen

2008). In times of disasters the ability of women to seek safety is impeded by their responsibilities to the very young and the very old, both of whom require help and supervision during such times (Babugura *et al*. 2010). Moreover, women generally tend to bear the task of finding solutions to the socio-economic instability and food situation following natural disasters (Ariyabandu 2003). These gendered roles interact with local and global economic and political factors to create inequalities in society, thereby accentuating women's vulnerability to climate change.

3.8.3 Gender Differentials in Income and Assets

The economic situation of individuals, which is greatly determined by the level of formal education, has a great influence on their vulnerability and coping capacity (Alber 2011). Indeed, education remains an important human asset for coping with, and recovering from, climate-related disasters. Yet, it has been suggested that, in developing countries, women and men do not enjoy equal access to educational opportunities by virtue of cultural norms and increased household responsibilities (Alber 2011). The increased household burden placed on women and girls, such as collecting water and firewood in times of climate drought, means a decrease in time available for education. A lower educational status implies more constraints for women to access health information or early warning systems as they are developed (WHO 2011). Low educational status also has severe implications on the human and financial capital development of women and girls. This is because with lower education status, women and girls have decreased access and opportunities in the formal labour market, increased health risks associated with pregnancy and childbirth, and less control over their personal lives. Consequently, women continue to be restricted mostly to low status and poorly paid jobs, and also dominate in the urban informal economy which is often hard hit by climate-related disasters and other shocks (Azevedo *et al*. 2007). Furthermore, a lower level of education could affect the ability of women to diversify their livelihood capabilities or increase their resilience against climate-related shocks, such as floods or droughts. For instance, in rural Africa, women make up over 70 percent of the workforce in the low wage agricultural sector (Babugura *et al*. 2010). This trend repeats itself in urban areas in the developing world. In urban India, it is estimated that nearly 90 percent of women employed outside the agricultural sector are in informal employment with

over 70 percent working as street vendors, garment makers, and construction workers (Ajibade *et al*. 2013).

Institutional factors are also implicated in women's exacerbated vulnerability in cities of the developing world. For instance, it has been argued by Sadasivam (1997) and Zack-Williams (2000) that the neoliberal Structural Adjustment Programmes (SAPs) sponsored by the Bretton Wood Institutions in developing countries have contributed to worsening conditions for poor urban women. According to these authors, the policies promoted under SAPs, such as the deregulation of the local economy, privatisation of public services, and reduction in spending on social services greatly affected women by reducing their standard of living, general health, and increasing their paid and unpaid workloads. In addition, some policies of SAPs are considered to have spurred rapid urbanisation and population growth in many cities in the developing world and caused the concentration of low-income populations in hazardous urban spaces where environmental hazards, such as floods, landslides, storm surges, air pollution, are often inescapable (Cutter 1995). Based on this situation, Adger (2003) argues that gender inequalities and associated vulnerabilities will likely be exacerbated under conditions of climate change. Added to this is the impact of economic globalisation on communities and populations in gender-specific ways. It is suggested that this has directly affected women as consumers, care givers, social service users and economic actors. Studies have attributed losses to women in particular, as they are caught in the shift to part-time and contingent work, cutbacks in the public sector and in human and social services, exploitative working conditions in export manufacturing and tourism and the emergence of home-based enterprises (Ward 1990).

Land is the most productive asset or resource, particularly for individuals or households dependent on agriculture in the developing world. Yet, in many cultures or societies in the developing world, women's land rights tend to be restricted by statutory and or customary laws making it difficult for women farmers to access credit from both formal and non-formal financial institutions. A study by Sexton *et al*. (2004) suggested that women received less than 10 percent of the credit granted to small farmers in Africa, and they it difficult to

purchase the required inputs to enable them to adapt to environmental stress. This finding is further confirmed by Codjoe *et al*. (2012) in their study in rural communities in the Afram Plains of Ghana. These authors found that even though women in these communities devote a high proportion of their energy and time to food crop production, male members of the households often have better access to equipment, technology and information. Similarly, Smucker and Wangui (2016) found that men in the Mwanga District of Tanzania had better access to the land-allocation process compared to women due to their enhanced ability to travel to the village office where they were likely to interact with members of the village council, most of whom were men. In cities and urban areas, land also becomes a critical asset for both housing and income generation for poor and vulnerable women. Lack of tenure rights or constant fear of evictions from city authorities, for instance, tends to make conditions extremely difficult for women to improve the condition of their housing. The inability of women to undertake housing maintenance due to fear of eviction can severely affect the resilience of their housing structures to climate-related hazards including flooding and fire outbreaks.

3.8.4 Sex-Related Factors

In addition to gender-related factors, there are sex-related factors emanating from biological differences which can have an influence on vulnerability. Reproductive roles can add an additional specific burden on women in terms of mobility and nutritional needs. For instance, the need for sanitation during menstruation and after giving birth, tend to constrain mobility during pregnancy and higher nutritional needs during lactation, can contribute to make women more vulnerable in times of climate events (Alber 2011). Despite this, it is argued that except in very particular circumstances, vulnerability of women or other marginalised groups is determined less by biology but largely by societal structures and roles (IPCC 2012).

3.9 Case Studies of Gender Differentiated Impacts of Climate Change

3.9.1 Health Impacts of Climate Change

Although there is limited research and gender analysis on the health outcomes of flooding, sea level rise, heavy rain, and temperature rises, changes associated with climate change

and variability are likely to impact on men and women differently (WHO 2011). It is acknowledged that vulnerability to flooding, for instance, is differentiated by social dimensions (Nelson *et al.* 2002). Few *et al*. (2004) claim that the health and other impacts of flooding may fall disproportionately on women, children, people with disabilities and the elderly in both developing and industrialised countries. Analysis of census information on the effects of natural disasters across 141 countries shows that although disasters affect everyone, on average, more women are killed than men (WHO 2011). For example, in the cyclone disasters that killed 140,000 people in Bangladesh in 1991, ninety percent of victims were women (Aguilar *et al*. 2007). According to the Women's Environment and Development Organisation (WEDO 2003), the death rate among people aged 20-44 years was 71 per 1000 women compared to 15 per 1000 men. Similarly, in May 2008, Cyclone Nargis affected Myanmar and among the 130,000 people reported dead or missing in the aftermath, 61 percent were women (CARE 2010). In the aftermath of the 1998 Hurricane Mitch in Honduras and Nicaragua more than 2 million people were affected in both countries and damages were estimated at nearly US$5billion. Those most affected were the most marginalised to include small producers, street children and female-headed households (Delaney and Shrader 2000). In spite of these revealing cases, the gender dimensions of disasters are little acknowledged or comprehended in the disaster literature (Pittaway *et al*. 2007; Enarson 2012).

It is important to emphasise that it is not only women who are affected by negative consequences of flooding. In the United Kingdom, published reviews have demonstrated that men are much more at risk of drowning than women perhaps due to undertaking more risky or "heroic" behaviours (Kovats 2008). Socially constructed roles also influence the individual disaster response of men; within certain cultures, for instance, expectations of male "heroism" require men to act courageously, thus forcing them to embark on risky behaviour patterns in the face of danger and making them more likely to die in an event. In contrast, it has been suggested that women's relative lack of decision-making power may pose a serious setback itself, especially when it prevents them from leaving their homes in spite of rising water levels, where they may wait for male authority to grant them permission or to assist them in leaving (Bradshaw 2010; Alston 2015). Coupled with this is the fact that

gender norms or expectations around behaviours deemed 'appropriate' in certain cultures may also act to decrease women and girls access to important life skills. For example, in Latin America and Asian countries, women and girls are often not taught to swim, for reasons of modesty (Aguilar *et al*. 2007).

Women are often the last people to receive assistance during and after disasters due to gender norms and behaviours in certain societies. For instance, in flooded areas of Bangladesh, women who have lost clothing in the flood are often pushed out by men in the way in the rush for supplies (Neumayer and Plümper 2007). In addition, the loss of culturally appropriate clothing inhibits women from leaving temporary shelters to seek medical care or to obtain essential resources (Neumayer and Plümper 2007). Similarly, Ariyabandu (2012) found that in the aftermath of the 2010 floods in Pakistan, more women than men experienced difficulties coping because they were either overlooked in the distribution of relief items or were unable to reach places of relief distribution due to social norms that restricted their mobility.

Climate change may further exacerbate the health impacts of drought and their gender dimensions, especially in the developing world. Increased rates of evaporation, shifting rainfall patterns and melting of glaciers coupled with population and economic growth are expected to increase the number of people living in water-stressed water basins from about 1.5 billion in 1990 to 3.6 billion in 2050 (Arnell 2004). Almost 90 percent of the burden of diarrhoeal morbidity is attributable to lack of access to safe water and sanitation (WHO 2011). Reduction in the availability and reliability of fresh water supplies due to climate change is expected to increase this hazard. Even though a few studies are available on the effects of droughts for human health, those that are available suggest differing impacts on men and women (WHO 2011). In times of water scarcity women and children suffer more than men. This is because in most developing countries, women are intrinsically linked to water. The responsibility for collecting, storing, protecting and distributing water falls heavily on them. This means that when water is scarce, hygienic practices are commonly sacrificed for more pressing needs for water, such as drinking and cooking. The lack of

hygiene can be followed by diseases such as trachoma and scabies (WaterAid 2007). Indeed, it is estimated that almost half of all urban residents in Africa, Asia and Latin America are already victims of diseases associated with poor water and sanitation facilities (UNICEF 2006).

The dependence of women on contaminated water sources in times of water scarcity can lead to water-related diseases such as diarrhoeal disease, which is a leading cause of death among children under 5 years of age in developing countries (WHO 2009). A study by Nguyen and Shaw (2011) on drought management in Ninh Thuan, Vietnam showed that 64 percent of respondents agreed that recurring diseases have differential impacts on men and women, and 74 percent believed that women were more severely affected than men by drought, due to differing needs for water. Similarly, in Australia, research in the Murray-Darling Basin reveals that drought and water insecurity has resulted in significant vulnerability for women arising out of their relative lack of ownership of land and inequitable decision making (Alston 2013a). The aftermath of Black Saturday fires in Australia in 2009 also reveals gendered vulnerabilities. Alston (2013a) reported that 173 people died and 2133 homes were lost during these fires, and maintains that a number of social consequences associated with these fires were mental health issues, post-traumatic stress disorders, long-term displacement, and high levels of gender-based violence (GBV). In contrast, drought can have serious health consequences for men. The stress associated with lost incomes and its attendant indebtedness can spill over into mental health problems, despair and suicide among men. Nicholls *et al*. (2006) suggest that there is some empirical evidence linking drought and suicide among rural men in Australia. This negative health outcome among Australian rural farmers has been linked to stoicism and poor health-seeking behaviour, which is an intrinsic feature of rural masculinity (Alston and Kent 2008; Alston 2010). Taken together, these findings suggest that the impacts of climate change and variability present different challenges for men and women not only in the developing world but also in the developed world.

Other social vulnerability scholars have also examined the specific vulnerability of girls and women with respect to mortality from natural disasters and their aftermaths, and it is found that natural disasters tend to lower the life expectancy in women more than in men (WHO 2011). However, these differences in mortality are persistently found to be influenced by the severity of disasters and the relative socio-economic status of women in the affected country. According to Neumayer and Plümper (2007), this effect is strongest in countries where women have very low social, economic and political status. In countries where women have comparable status to men, natural disasters affect men and women almost equally. Examining the relationship between vulnerability and sex with respect to the 2003 European heatwave, Kovats and Hajat (2008) found that women are more at risk, in both relative and absolute terms, of dying in such events.

Gender differences also play out with respect to vulnerability to malaria morbidity and mortality, particularly in the developing world. The relationship between rising temperatures and the transmission of malaria is well established in the climate change literature. Already malaria causes 300 million people with acute illnesses and kills almost 1 million people every year (WHO 2009). Pregnant women are particularly susceptible to malaria as they are twice as "appealing" as non-pregnant women, to malaria carrying mosquitoes. Although immunity and nutrition play a critical role in malaria infection, it is suggested that physiological and behaviour changes that occur during pregnancy could partly explain this increased risk of infection (Lindsay *et al*. 2000). Malaria is reputed to contribute to an increased risk of spontaneous abortion, premature delivery and low birth weight (WHO 2011).

3.9.2 Impact on Food Security

Climate extremes, such as droughts, may cause food insecurity and malnutrition in households with different human capital outcomes for women, men, people with disabilities, children, and elderly people. Goh (2012) attributes these impacts to different user characteristics and how they interact with socio-cultural norms in the vulnerability context. For instance, Hoddinott and Kinsey (2000) found in rural Zimbabwe that the 1994-95

droughts had adverse effects on the body mass of women, but not men. However, Hoddinott and Kinsey (2000) argued that this effect was not borne equally by all women, as wives and daughters experienced adverse effects, but daughters-in-law of the household head experienced no effect. Hoddinott and Kinsey (2000) suggested that daughters-in-law may have access to resources outside the household, such as remittance income that offsets the impacts of drought. It is further indicated that the accumulation of livestock may protect women against the negative consequences of a climate crisis, as household holdings of livestock were found to be associated with a higher measure of body mass index for wives of the household head (Hoddinott and Kinsey 2000). These findings suggest the critical role that access to and control over productive resources or assets play in individuals' and households' ability to adapt to, and recover from, crises associated with climate change. It also suggests that cultural differences and roles of women produce different power relationships.

It is widely acknowledged in the literature that women bear the greatest burden of food insecurity when climate events occur as they are the main providers of food and meals for their families and also come last when there is little to eat. Jungehülsing (2010) examined the impacts of Hurricane Mitch and Stan leading to flooding in Chiapas, Mexico, and found that whereas men lost income from remunerated work on farms, women, on the other hand, lost fruits, vegetables, chicken and ducks from their home yards, which affected their ability to feed their families, since they previously obtained a significant portion of their daily food from their own yards. Similarly, Angula (2010) found in Namibia that during droughts, out of their submissiveness to their husbands, women first explore other means of ensuring food security before discussing the matters of food shortage with their husbands. Women are also the first to diversify their livelihoods by engaging in activities such as basketry, processing of nuts and oils, or through sales of their livestock. This finding supports the argument in the adaptation literature that women are not passive agents in climate change adaptation. Thus, rather than considering women as victims of environmental change, scholars should view them as important actors who hold critical knowledge that can enhance climate change adaptation and assist the development of new technologies to address climate change in areas

related to water, energy, food security, agriculture, and health and disaster risk management (Lane *et al*. 2009).

3.10 Gender and Climate Risk Perceptions

An individuals' adaptation and response to environmental risks/hazards are to a large extent shaped jointly by aspects of the risk situation itself and the characteristic ways in which they (i.e. individuals) approach, think about, and interpret these kinds of situation (Vaughan and Nordenstam 1991). Similarly, Campbell *et al*. (2013) have identified the complexity in the characteristics that shape the way people evaluate, cope with, and respond to threats. According to Campbell *et al*. (2013), these characteristics interact and relate to circumstances surrounding the threat itself. Just as women and men are vulnerable in different ways to the effects of climate change, their views regarding risks associated with climate change also vary. There is evidence to suggest that the opinions and priorities of women and men living in the same community with respect to climate change are gendered (Terry 2009). For instance, in a study conducted by Ishaya and Abaje (2008) of 225 indigenous people in selected villages in Kaduna, Nigeria, it was found that males are more likely to perceive climate change because, compared with females, they have better education and awareness regarding climate change. In this same study they found that educated indigenous people are more likely to perceive the changes in climate than uneducated indigenous people. They explained these observations in terms of the fact that they are educated and are able to access mass media, such as radio, television and newspapers (Ishaya and Abaje 2008). Based on these findings, it can be concluded that access to climate-related information and levels of education of individuals play a significant role in making decisions on how to adapt to climate change. Hence socio-cultural, economic and institutional factors that produce gender inequalities in education and access to information have the higher propensity to make women more vulnerable to climate change in comparison to men.

In a study of Chakma indigenous communities in Bangladesh, Huda (2013) also identified two factors as significantly related to perceptions on climate change namely: exposure to

mass media and monthly household income. In this study, Huda (2013) found that indigenous people with a higher degree of access to mass media and higher levels of monthly household income are more likely to perceive the changes in climate. This finding is confirmed in a study conducted by Hasan and Akhter (2011) on the people of Dhaka city in Bangladesh. Although their study was not gender-related, it revealed that generally people who have access to mass media are more likely to perceive climate change as an issue. A number of studies have also been conducted on the perceptions of men and women of prominent environmental facilities and the findings suggest that these perceptions are gendered. For example, McClelland *et al*. (1990) observed that females were more anxious about a nearby landfill in Los Angeles than males. Stallen and Tomas (1988) also surveyed 600 residents of the Rijnmond district of Rotterdam and found that women were more concerned than men about industrial waste. Furthermore, Campbell *et al*. (2013) evaluated the determinants of perceptions about toxic exposure among populations recovering from Hurricane Katrina, and found that gender and race influenced the way people perceived and evaluated environmental toxins. Their findings indicate that on average, women tended to be more concerned about environmental toxins than men, and blacks tended to express greater concern than whites. The observed differences in perception among gender and racial groups in this study were attributed to the broader inequalities that disproportionately placed women and minorities in the path of the storm which situated them disproportionately close to toxic and other environmental hazards (Roberts and Toffolon-Weiss 2001; Morse 2008).

Several studies of environmental risks have consistently confirmed this concern among women. A survey by Kraus *et al*. (1992) of 1,100 Portland households revealed that women were consistently more concerned about chemical risks than men, and were also less favourably disposed to the benefits of chemicals. Similarly, Flynn *et al*. (1994) assessed white and non-white Americans on their perceptions of 25 environmental risks. Their findings indicated that white women were more concerned than white men about all the 25 risks measured; and non-white women were more concerned than non-white men about 18 of the 25 risks. Although differences between women and men in all these studies are small, the consistency of gender differences cannot be ignored.

Although many studies have demonstrated gender differences in risk perceptions, a few, however, have adduced evidence to the contrary. Greenberg and Schneider (1995), for example, have argued that gender differences in risk perception do not exist among males and females who actually live in stressed neighbourhoods with multiple hazards, such as landfills and hazardous waste sites, incinerators, and chemical plants. They hypothesise that males and females who actually confront these hazards, not on their television screens or newspapers, but in their neighbourhoods, will have the same level of concern. Greenberg and Schneider (1995) express the view that if males' psychological responses and physical symptoms to actual traumas are about the same as females, then the reasons used to explain women's greater concern about environmental risks should not hold in neighbourhoods chronically traumatised by chemical releases, gang murder, and burning of derelict buildings. In the context of these stressed neighbourhoods, Greenberg and Schneider (1995) reason that men and women would be equally personally threatened and concerned about risks. The argument by Greenberg and Schneider (1995) is supported by Douglas *et al*. (2008). In their study on the perceptions of the urban poor on the causes of flooding in low income communities in Accra, they contended that there were no differences among men and women with respect to factors responsbile for flooding in their community. It can then be inferred that if female-male perceptions of risks are changed by the presence of multiple hazards, then it is reasonable to assume that perceptions attributed to people because of their age, education, economic status, and other personal characteristics may change in stressed neighbourhoods. This study seeks to ascertain the validity of this finding in the context of the three selected slums or marginalised communities in Accra.

Besides the perception of risks, other earlier studies have also linked perceived concern to action among women. In a study of Orange County (CA) adults, Baldassare and Katz (1992) found that women were more likely than men to be engaged in solving environmental problems by driving less, recycling more, conserving water, and purchasing environmentally safer products. In the same vein, Steger and Witt (1989) observed that women are more involved than men in protecting the environments of Canada and the United States.

3.11 Gender and Adaptation to Climate Change

Houghton *et al*. (2001) define adaptation to climate change as the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harms or exploit beneficial opportunities. Building further on this, the IPCC (2012, p. 36) defines adaptation as:

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

Ahmed and Fajber (2009, p. 35) also conceptualise adaptation as:

> "The capacity of actors to shift livelihood strategies under stress, and to develop supporting systems that are resilient and flexible to absorb and respond to the impact of [climate] change".

A more encompassing definition is offered by Moser and Ekstrom (2010, p. 1) who view adaptation as:

> "Involving changes in socio-ecological systems in response to actual and expected impacts of climate change in the context of interacting non-climatic changes".

Moser and Ekstrom's definition considers the social side of adaptation in the sense that it links the environment with social systems. Alston (2013c) argues that this definition explicitly highlights the significance of factors other than climate change that shape the capacity of people to adapt in socially desirable ways. Therefore, it is imperative to stress that adaptation should not focus only on biophysical dimensions, but also on social factors that either facilitate or hinder the capacity of individuals, households, and communities to modify or adjust their social, economic and ecological systems in the face of changing climate. Another point worth stressing is that approaches to adaptation have evolved from an initial preoccupation with interventions and infrastructure, to a more "development oriented" approach which focuses on tackling the underlying drivers of vulnerability, rather than responding to symptoms (WHO 2011).

It should be noted that adaptation can be embarked on by public or private actors, and can be anticipatory (planned) or reactive (autonomous), and incremental or transformative (Adger *et al* 2007; Ahmed and Fajber 2009). Ahmed and Fajber (2009), however, emphasise that in practice these two strategies are interconnected. They posit that autonomous

adaptation depends on underlying systems that enable people and organisations to take advantage of opportunities present in the new environment, or constrain their ability to shift livelihood strategies as conditions evolve. Planned adaptation, on the other hand, depends on the ability of people and organisations to proactively identify, and respond to, emerging constraints and opportunities. In this respect, Ahmed and Fajber (2009) suggest that planned adaptation enables autonomous adaptation processes in two ways. Firstly, it supports the development of flexible, resilient, and accessible social and physical infrastructure systems; and secondly, it establishes social protection systems capable of reducing the impact of climate change on vulnerable groups. Adaptation, in principle and practice, must not be construed as a set of separate measures designed to tackle climate change. Rather it must be viewed as a continuous process that includes responses to many factors, including evolving experiences with both vulnerabilities and vulnerability reduction planning and actions, as well as risk perception (Tschakert and Dietrich 2010).

The capacity of individuals to undertake both planned and autonomous adaptation is shaped by a number of factors. These include communication, public infrastructure, and transport and finance or economic resources, technology, information and skills, the degree of equity in a society as well as the quality of governance (Moench and Dixit 2004; Barnett and Campbell 2010). Underlying these systems are social and power relations that facilitate access to different socio-economic groups, men and women, including rights and entitlements to productive resources or asset, social networks, capacity building and the transfer of new knowledge to assist livelihood diversification. In addition, Moench and Dixit (2004) argue that governance issues, such as accountability, transparency, and the informed participation of vulnerable women and men in community decision-making on disaster management, are equally important in ensuring that those directly affected can negotiate access to discussions and decisions, and in the long run build their capacity to adapt.

Research studies from the Developing World have documented the distinct roles played by men and women in preparing for disasters. For example, regional studies carried out in four Pacific Island countries in the Pacific South Disaster Risk Programme in 2002 found that while women were likely to perform certain tasks related to the practical preparation of households, such as informing family members, storing food and water, and protecting

family belongings, men, on the other hand, were found to be responsible for liaising with government officials, making decisions about evacuation sites and timing, managing water sources, distributing emergency relief, and receiving and disseminating early warnings to the wider community (Lane and McNaught 2009, pp. 71-72).

It is clear that participation in decision-making on disaster risk management is critical to adaptation and yet evidence exists in the literature to suggest that women do not have the same opportunity as men in the community level decision-making processes in most countries in the developing world. In a study undertaken by Lane and McNaught (2009) in two communities on Ambae Island, Vauata, women raised concerns about the fact that the bulk of decision-making in regard to resource allocation following disasters was being carried out by men. Coupled with this concern was the fact that the decisions made by men at the household and community levels were not always fair, and most commonly did not involve women. In Nepal, "mountain women" compared to women in the lowlands, also have a greater say in decisions and have a greater overall autonomy. Even though their knowledge proves useful in the survival and care of their families and permits adaptation in extreme situations, such as conflicts, natural disasters and displacement, their knowledge and skills are still not acknowledged and valued in adaptation planning (WHO 2011). The above cases clearly demonstrate that gender roles in disasters often lead to gendered effects. These roles are functions of relationships of power and influence between men and women in both the household and the community. The cases also reveal the inherent danger in the assumption that distinct and separate gender roles are always beneficial to all sectors of the community. Although gender roles may complement each other and also enable communities to adapt more efficiently and effectively to climate risks, there are cases where these roles may produce inequality in access to essential resources, early warning information and unequal decision making (Lane and McNaught 2009). For example, in a study by Cohen *et al*.(2016) in Solomon Islands, women and youth reported that limits to education, physical mobility and agency constrained their ability to establish relations with essential agencies to access technical support or new information essential for adapting to climate change.

Human capital in the form of education is considered pivotal in household adaptation to climate change. Evidence abounds in the literature suggesting a positive correlation between the educational level of household head and the adoption of improved technology (Igodan *et al*. 1988), and access to information on improved technologies and higher productivity (Norris and Batie 1987). Asfaw and Admassie (2004) argue that male-headed households are more likely to get information about new technologies and undertake risky businesses than female-headed households. Further, Tenge *et al*. (2004) suggest that having a female head of household may have negative effects on the adoption of soil and water conservation measures, because women may have limited access to information, land and other resources by virtue of traditional social obstacles. However, this argument is one-sided in that it omits the critical role of female household heads in climate change adaptation methods. A study by Nhemachena and Hassan (2007) concluded that women are more likely to adapt because they are responsible for much of the agricultural work and, therefore, have greater experience and access to information on various management and farming practices. Furthermore, in a participatory research project by ActionAid and Institute of Development Studies (IDS) in the Ganga river in Bangladesh, India and Nepal, women who participated mentioned that in the face of changes in the frequency, intensity and duration of floods they adopted various adaptation strategies, such as changing cultivation to flood- and drought resistant crops, to crops that can be harvested prior to the flood season in order to secure their livelihoods (Demetriades and Esplen 2008). These cases reaffirm the argument made repeatedly in the literature, that women and men have distinct and valuable knowledge and skills about how to adapt to the negative impacts of environmental degradation (Pearl 2003). It is therefore imperative that this kind of context-specific knowledge and experience be documented through participatory research to highlight specific challenges and strategies adopted by women and men in urban contexts, particularly in sub-Saharan Africa where there has been little or no documented research that specifically asks women and men what they want (Demetriades and Esplen 2008).

In addition, gender differentials in access to resources and decision making processes at both household and community levels often mean that adaptation strategies tend to be gendered. Codjoe *et al*. (2012) studied and ranked the preferred adaptation strategies for drought and flood by male and female farmers in the Afram Plains of Ghana, and found that while female

farmers ranked wells and boreholes, bushfire control and water harvesting as the three most preferred strategies, male farmers, by contrast, scored irrigation, wells and boreholes and drought tolerant crops as their most preferred adaptation strategies. The females in this study contended that they were the ones who are responsible for providing water for their families and, they spent significant amount of time daily carrying water from distant sources. Consequently, wells and boreholes, and water harvesting were considered to be essential adaptation strategies during periods of drought. In this same study, irrigation was ranked as the topmost adaptation strategy among male farmers. Codjoe *et al*. (2012) have attributed these differences to the socially ascribed expectation that males should provide infrastructure and income for the household. Access to irrigation will also enable them to cultivate crops all year round thus facilitating provision of more stable income for their families. In addition, male farmers expressed the view that they have relatively easy access to drought tolerant crop seed which were not ranked the same by women. These findings confirm the hypothesis in the literature that men often have better access to technology and information than women. Similarly, a study conducted by the Food and Agriculture Organisation (FAO) in conjunction with local Indian institutions on preferred strategies for coping with long-term weather shifts, found that the preference to migrate was higher in men (47 percent of men versus 18 percent of women), whereas more women would opt to go for wage labour (58 percent of women versus 38 percent of men) (WHO 2011). Therefore, it can be concluded that women and men often prefer different adaptation or coping strategies, and different factors interact to influence their choice of adaptation strategies. This underscores the need for a more gender-focused study to assess the various adaptation mechanisms preferred by men and women, particularly in cities and to ascertain the reasons underpinning their choices.

3.12 Conclusion

This chapter demonstrates how the issues of gender and vulnerability to climate change are framed within the current theoretical discourses. It also reviews the literature related to the conceptual meanings of climate change, its causes and the actual and expected impacts on the livelihoods of people, especially the poor living in cities of the developing world. It shows that the impacts of climate change are felt differently by men and women due mainly to socially and politically driven inequalities in society. These inequalities are underpinned by gender differences in access to resources, decision making power, as well as the division

of labour. The chapter also highlights the point that the overemphasis on the binary categorisation of men and women in vulnerability research often masks the other important dynamics that contribute to gender-differentiated vulnerabilities to climate change, such as age, income, education and ethnicity. The chapter further examines the various definitions of the concept of vulnerability and evaluates the various approaches for studying it. It emerges that the social dimensions (i.e. gender) of climate change has been understudied in the developing world. To address this shortcoming, it is suggested that adaptation research should move beyond the preoccupation with biophysical vulnerability and incorporate social vulnerability theory to address the gender dimensions of vulnerability to climate change.

4 CHAPTER FOUR: METHODOLOGY

4.1 Introduction

This chapter focuses on the general approach and specific techniques that were employed to investigate the research questions and provides information on the communities where the study was carried out. It begins by presenting the theoretical framework on which the study is based. This is followed by a critical overview of the epistemological and ontological positions of the study. It then evaluates the arguments for and against quantitative and qualitative approaches to social research and provides a justification for combining the two approaches in the form of a mixed methods approach. A brief theoretical background to focus group discussion as a method of qualitative research is also provided, with an elaboration of the purpose and justification for its adoption in this study. The process of conducting and documenting the outcomes of the FGDs is then described. A brief overview of quantitative research methods and the process used to select the participants for the survey is also provided. The issue of data management and analysis is presented with emphasis on qualitative and quantitative data analysis. The last sections provide information about the ethical principles underpinning the study, as well as the socio-economic and environmental conditions of the study areas.

4.2 Theoretical Framework

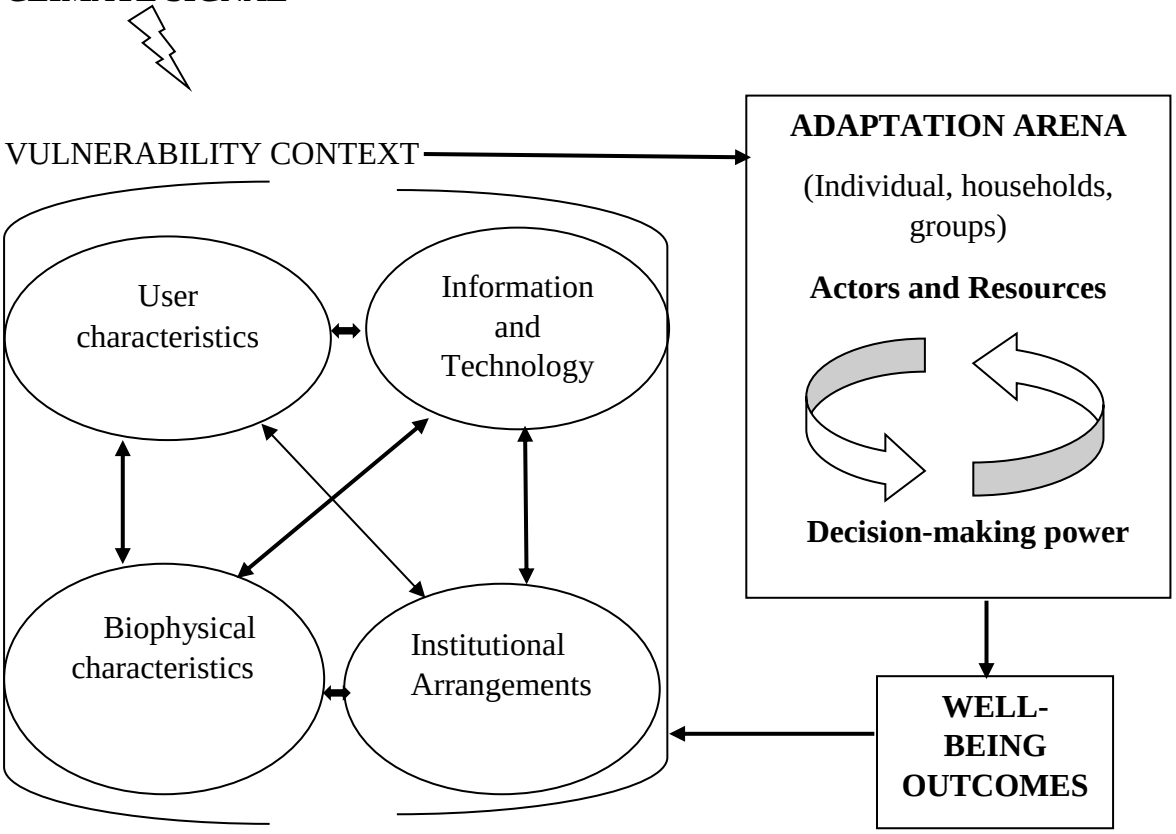
Adaptation to climate change is a complex, multidimensional, and multi-scale process (Bryant *et al*. 2000). The literature on climate change adaptation is extensive, however, this study seeks to conceptually and empirically integrate a number of other social issues and factors—such as gender, resources or assets, and institutions—that are likely to play a role in adaptation. In this regard, the study, adopts the framework developed by the International Food Policy Research Institute (IFPRI) to examine the differential impacts and responses of men and women to climate change as indicated in Figure 4.1. Although this framework was developed to study the relationships between gender, assets and climate change adaptation in a rural settings, it is useful to understand gender dimensions of climate change in an urban context as it considers the implications of gender in the vulnerability context and adaptation arena. The framework further helps in understanding the importance of information, livelihood resilience,

institutions, and asset accumulation in shaping men's and women's vulnerability to climate change and adaptation responses.

Climate signal

The first element of the framework is the climate signal which comprises long-term changes in average climate conditions, as well as changes in climate variability—such as changes in the timing, intensity, and duration of precipitation and the frequency of extreme weather events, such floods and rainstorm. The response of actors and systems is viewed as a function of the characteristics of the climate stimulus, including the degree of exposure to the stress and the scale and magnitude of the event (Aberman *et al*. 2015).

Figure 4.1 Gender-Climate Change Framework



Source: Bryan and Behrman (2013, p. 5)

Vulnerability Context

The impact of climate change on the well-being of individuals, households, and communities and their ability to respond to those changes is determined by the context in which climate change occurs (Adger *et al*. 2009). The context includes all factors that determine an individual's, household's, group's, or community's vulnerability to climate change, including user characteristics, access to information and technology, biophysical characteristics, and institutional arrangements (Bryan and Behrman 2013). Some actors or groups can be considered more vulnerable to climate change impacts given their social characteristics, store of assets, livelihood activities, and cognitive ability. Other constraining factors include lack of access to or control over financial resources or assets needed to adopt practices that would minimize the risks of climate change. Other actors may face challenges in pursuing particular adaptation options due to social status. Gender is considered an important user characteristic that may have considerable influence on individuals' access to assets and thus ability to cope with climate change (Aberman *et al.* 2015). Assets may include the following categories of tangible and intangible capital: natural resource, physical, human, financial, social, and political (Meinzen–Dick *et al*. 2010; Bryan and Behrman 2013).

The ability and nature of individual's, household's or community's adaptation responses depends upon access to information about climate risks and the appropriate responses. This relates to the information and technology element of the framework (Aberman *et al.* 2015).The biophysical characteristics describe the sensitivity of physical or ecological systems that individuals, households or communities depend on for livelihoods.

The way individuals or groups are effected by and respond to climate change is also influenced by the institutional environment. This includes the ongoing development process and the broader policy environment (Smit and Wandel 2006). Specifically, the institutional context comprise the markets, laws, policies, and sociocultural norms that shape how different actors are affected by and respond to climate change (Goh 2012). For instance, institutions affect the roles governing access to, and control over, resources and assets for

adaptation, and local institutions influence how climate risks and impacts are distributed across different social groups and populations (Agarwal and Perrin 2008; Jones *et al*. 2010). Social and cultural norms, and other rules governing behaviour, influence the extent to which individuals and groups within a community are able to participate in, and benefit from, collective action (Eriksen and Lind 2009; Patt *et al*. 2009). The institutional capacity of the community also determines the ability of individuals or groups to adapt to climate change impacts. The institutional capacity refers to the degree of social capital in the community, the ability of community members to work collectively, and their ability to access resources, and information from higher-level institutions such as government agencies and nongovernmental organisations (Aberman *et al.* 2015). Many factors will influence the effectiveness of collective efforts to adapt to climate change, among which are: characteristics of the community or group, the ways in which members of the community organise, and the relationships with higher level institutions (Ostrom 1990; Rasmussen and Meinzen–Dick 1995; Tompkins and Adger 2004; Bryan and Behrman 2013).

Adaptation Arena

In respect to the adaptation arena, individuals or groups with a large asset base, access to information or technology, or institutional support (institutional arrangements in the framework), may be able to diversify their livelihoods to better cope with the impacts of climate change. Actors at multiple scales, from the individual to the community, have different perceptions, needs, and preferences. These actors make adaptation decisions based on their access to and control over resources (such as assets, time, and habits) and decision-making power (Ostrom 2005). Gender norms often exclude women from participating in decision-making and rule setting at various levels. Men's and women's priorities for adaptation will also be shaped by the existing norms, roles, and responsibilities and how adaptation strategies strengthen, ameliorate, or distort these (Aberman *et al.* 2015). Moreover, evidence suggests that men and women may actually perceive climate risks differently; a fact that may further contribute to the development of gender-differentiated priorities for adaptation (Bryan and Behrman 2013).

In the context of this framework, the adaptation arena is considered dynamic. The resources to which individuals, households, and communities have access to implement adaptation strategies change over time. Well-being improvements resulting from adaptation decisions made today may reduce future vulnerability to climate change and variability and give actors more freedom to implement additional adaptation decisions in the future. On the other hand, inability to take protective measures against future climate change and extreme climate-related events may reduce well-being and increase vulnerability to future climate change, leaving actors with more limited adaptive capacity (Bryan and Behrman 2013). Specifically, this study considers the implications of gender on perceptions of climate change hazards, vulnerability factors, adaptation approaches, and institutional response and constraints to adaptation. Even though it is recognised as being important to gender and adaptation, this study does not focus on the implications of biophysical characteristics.

4.3 Epistemological and Ontological Underpinnings of the Study

Over the years, questions have been asked about how the social world should be studied and whether a scientific approach or method is an appropriate framework to adopt (Garner *et al*. 2009; Bryman 2012). These questions, bordering on epistemological issues, have tended to influence the way social research is conducted (Bryman 2012). Simply, epistemology is the philosophy of knowledge or how we come to know (Crotty 1998; Krauss 2005). On the other hand, the questions of the nature of social entities or phenomena are ontological considerations. The central thesis in epistemological philosophy is concerned with the question of whether the social world can and should be studied based on the same principles, procedures and norms as the natural sciences (Bryman 2012). Ontology, on the other hand, involves the philosophy of reality. According to Bryman (2012), the key issue in social ontology involves the question of whether social entities can and should be recognised as objective entities that have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and creations of social actors.

Based on the above, it is clear that there is an intimate relationship between epistemology, ontology and methodology in social science research. This is because the claim about what exists in reality almost inevitably leads to the question about how what exists can be known or studied. As Krauss (2005), argues, ontological thought is concerned with the philosophy of reality, while epistemology addresses how we come to know that reality; methodology identifies the particular practices used to attain knowledge of it. Kitchin and Tate (2000) define methodology as a coherent set of rules and procedures which can be employed to investigate a phenomenon or situation, usually within the framework directed by epistemological and ontological considerations. Thus, a methodology is basically about how a particular research project should be undertaken and can best be conceptualised as the critical study of research methods and their uses. This means that the methodological approach a researcher adopts in acquiring knowledge, the procedures used in acquiring it, the data collection and the sources from which they are collected, have a direct relationship with ontological and epistemological assumptions and views that the researcher holds about the social world (Grix 2004; Bryman 2012)

Positivism, interpretivism and critical theory are three dominant epistemological positions that have influenced the conduct of social research in the past century (Crotty 1998; Bryman 2001; Kincheloe and McLaren 2002; Glicken 2003; Lincoln *et al.* 2011; Kincheloe *et al*. 2011). Although the doctrine of positivism is difficult to explain in a precise manner due to the number of different ways in which is it articulated (Bryman 2012), it is generally viewed as an epistemological formulation that advances the position that the methods of natural sciences should be applied to the study of social reality and beyond (Bryman 2001). Scholars who subscribe to the positivist orthodoxy view the object of study or reality to exist independent of our knowledge of it, and look at the social world as something that is not constructed by us but rather revealed to us (Crotty 1998; Grix 2004). Thus, positivism is based on the assumption that scientific judgements are objective and that social research must be carried out in a way that is value free (i.e. objective) (Bryman 2001; Garner *et al*. 2009). However, later Bryman (2012) provides a caveat that it is a mistake to consider positivism as synonymous with science and the scientific in the sense that philosophers of science and of the social sciences differ on the issue of how best to characterise scientific

practice. Closely related to this is the fact that since the early 1960s there has been a shift away from viewing science and the scientific in a positivist term (Bryman 2012). In spite of this caveat, it is difficult to disassociate the natural science paradigm from positivism (Bryman 2012).

The ontological claim in support of the positivism paradigm is objectivism, which advances the position that social phenomena or realities confront us as external facts that are beyond our reach or influence (Crotty 1998; Bryman 2012). Objectivists hold the view that the object of study or social reality is independent of researchers and that knowledge is discovered and verified through direct observations or measurements of phenomena (Krauss 2005).The positivist ontological assumption is based on the premise that scientific knowledge can be achieved because through research one can uncover knowledge that is fixed. As a result, positivists advocate the use of scientific methods and practices within the natural sciences in social research (Grix 2004; Krauss 2005). Thus, positivists hold the view that the world and the universe are fixed; they operate by laws of cause and effect that are detectable by employing the scientific method. Deductive reasoning is used to formulate theories that enable us to generate hypotheses. These hypotheses can then be tested and thereby allow explanations of laws to be assessed (Bryman 2001; Krauss 2005). Empiricism (i.e. the idea that observation and measurement are at the core of the scientific endeavour) is the central orthodoxy of positivists (Krauss 2005).

Interpretivism has emerged as an opposing epistemology to positivism (Garner *et al*. 2009; Bryman 2012). The interpretivist epistemology holds the view that knowledge is established through meanings attached to the phenomena being studied (Krauss 2005). In other words, interpretivism subscribes to the notion that reality does not exist independently of our knowledge of it and that reality is a complex social construction of meaning, values, human awareness, experience and understanding (Kitchin and Tate 2000; Grix 2004). The main argument of the interpretivists is that the subject matter of the social sciences (i.e. people and their institutions) is fundamentally different from that of the natural sciences (Bryman 2012). This fundamental difference, in the view of interpretivists, means that the study of

the social world requires a different logic or research approach that emphasises the uniqueness of humans as against the natural order (Bryman 2001). In simple terms, interpretivists hold the view that reality can best be understood through people's interpretive capacities instead of mere sensory observations as believed by the positivists.

Constructionism or constructivism is the main ontological claim in line with the interpretivism epistemology. Constructivism postulates that social phenomena and their meanings are continually being accomplished by social actors (Bryman 2001). This means that social phenomena are not only produced through social interaction but that they are in a constant state of revision (Bryman 2012). Data often obtained by constructionists are known as soft data and is normally verbal, seeking to reveal and describe social phenomena by the attribution of words (Bryman 2004; Grix 2004). Constructionists often employ data collection techniques such as in-depth interviews, semi-structured interviews, participant observations, documents, audio-visual materials, photography and life histories, all of which generate data mostly in the form of words (Kitchin and Tate 2000; Bryman 2004). One intellectual tradition linked to the constructionist paradigm is phenomenology (Bryman 2012). This tradition is concerned with the question of how individuals make sense of the world around them and how the researcher should block out perceptions in his or her grasp of that world (Bryman 2012).

Critical theory or inquiry focuses on how issues of power and justice interact dynamically with other variables, such as economy, race, class, gender, ideology, discourses, education, religion and other social institutions to construct a social system (Kincheloe and McLaren 2002). The primary concerns of critical theory are dominative relationships; it seeks to keep the spotlight on power relationships within society in order to expose the forces of hegemony and injustice (Crotty 1998, p.157). Subjectivism is the main ontological claim in line with the critical inquiry epistemology. Subjectivism asserts that meaning does not come out of an interplay between subject and object but is imposed on the object by the subject. In this sense, it is argued that the object makes no contribution to the generation of meaning (Crotty 1998). The criticalists hold the view that in qualitative research there is only interpretation

which involves making sense of what has been observed in a way that communicates understanding (Kincheloe and McLaren 2002). Thus, not only is all research merely an act of interpretation, but, to the criticalists, perception itself is an act of interpretation.

The different epistemological traditions explained above are linked to the different emphases, interpretations and approaches adopted by researchers in resilience and vulnerability research (Miller *et al*. 2010). Generally speaking, there is an epistemological dichotomy between positivist, constructionist and subjectivist approaches in vulnerability research. Even though this dichotomy is not absolute, resilience research has generally been more strongly influenced by a positivist epistemology, stating that phenomena can be objectively defined and measured (Miller *et al*. 2010). In the field of vulnerability research, considerable work has been done by the constructionist paradigm in which the subjective world of different human perceptions, values, cultures, agency and ontologies are explored (McLaughlin and Dietz 2008; Miller *et al*. 2010). The biophysical vulnerability literature generally emphasises the norms of positivist paradigm (McLaughlin and Dietz 2008). This is so because the biophysical vulnerability literature highlights the role that environmental variability plays in shaping the extent and patterning of human vulnerability (McLaughlin and Dietz 2008). Closely related to this is biophysical vulnerability research which tends to be associated with quantification as biophysical factors are more easily measured than social factors (McLaughlin and Dietz 2008). However, pre-occupation with biophysical factors means that the social, economic and political factors that shape the exposure to, and impacts from, environmental threats are often neglected (Adger 1996; Wisner *et al*. 2004). In addition, the biophysical perspective does little in addressing the role played by individuals and corporate actors in producing vulnerability, as well as the various livelihood and coping mechanisms employed to mitigate it (Lambert 1994).

The above shortcomings of the biophysical perspective under the positivist paradigm have led human ecologists and political economists to turn to the constructionist perspective to explain how the dynamics of social structure contribute to shape vulnerability. In contrast to the positivist approach, the constructionist approach to vulnerability research highlights the

role that human agency and culture play in shaping the definitions of and exposure to risk (McLaughlin and Dietz 2008). For instance, a feminist political ecologist using the constructionist perspective is interested in knowing how beliefs about gender shape women's access to, and exclusion from, certain physical, social and economic spaces. The constructionists have critiqued the unqualified realism (i.e. taking the world as simply objectively out there) a stance taken by risk analysts by maintaining that both lay and professional conceptualisations of risk are predicated on socially constructed categories that are wrongly assumed as natural (McLaughlin and Dietz 2008). In addition, constructionists contend that risk analysts should not treat risk as straightforwardly objective science in the sense that such analyses themselves are considered as:

> "value-laden rhetorical strategies used by opposing actors in struggles to legitimate and thereby obtain for alternative social, economic and political or scientific projects" (McLaughlin and Dietz 2008, p.103).

Within the context of this study, the constructionist approach is considered the appropriate epistemological model for conceptualising the risks about, and transforming our understanding of, the role played by social, institutional, economic and political factors in producing differential vulnerability among men and women even when they confront seemingly identical climate risks or hazards in the urban environment. Specifically, the focus of this study is on the examination of phenomena and human experience, that is, changing climatic conditions and their differential impacts on men and women from the perspectives of those under the influence of such phenomena; hence it is phenomenological in orientation (Somekh and Lewin 2005). To this end, this study employed methodological techniques to analyse vulnerability from the perspectives of men and women in order to understand how their perceptions of climate hazards and their vulnerabilities are the product of their interpretation of the world.

4.4 The Research Strategy: The Quantitative–Qualitative Debate

The epistemological and ontological assumptions about the nature of reality are crucial to understanding the overall research methodology adopted by a researcher in carrying out

research (Bryman 2001; Grix 2004; Krauss 2005). Bryman (2001) for example, claimed that ontological assumptions and commitments influence the ways in which research questions are formulated and the methods adopted to carry out a particular study. The different theoretical positions of positivism and interpretivism have given rise to a clear distinction between quantitative and qualitative research applications (Robson 1993; Bryman 2004). Many writers often distinguish quantitative research from qualitative research on the basis of epistemological foundations, the relationship between theory and research and ontological consideration (Krauss 2005; Bryman 2012). Bryman (2012, p. 35) defines quantitative research as a

> "research strategy that emphasises quantification in the collection and analysis of data and that (a) entails a deductive approach to the relationship between theory and research, in which the accent is placed on the testing of theories, (b) has incorporated the practices and norms of positivism in particular, and (c) embodies a view of social reality as an external, objective reality".

On the other hand, qualitative research has been defined by Bryman (2012, p.36) as:

> "research strategy that usually emphasises words rather than quantification in the collection and analysis of data and that (a) predominantly emphasises an inductive approach to the relationship between theory and research, in which the emphasis is placed on the generation of theories, (b) has rejected the practices and norms of the natural scientific model and of positivism in particular preference for an emphasis on the ways in which individuals interpret their social world, and (c) embodies a view of social reality as a constantly shifting emergent property of individuals' creation".

Neuman and Kreuger (2003, p.145) summarise the fundamental differences between quantitative and qualitative research strategies as shown in Table 4.1 which indicates that quantitative research tends to focus on hypothesis testing, while qualitative research seeks to unearth the meanings hidden in data.

Table 4.1 Fundamental Differences between Quantitative and Qualitative Research Strategies

Quantitative Research	**Qualitative Research**
Test hypothesis that the researcher begins with	Capture and discover meaning once the researcher becomes immersed in the data
Concepts are in the form of distinct variables	Concepts are in the form of themes, motifs, generalisations, and taxonomies
Measures are systematically created before data collection and are standardised	Measures are created in an ad hoc manner and are often specific to the individual setting or researcher
Data are in the form of numbers from precise measurement	Data are in the form of words and images from documents, observations, and transcripts
Theory is largely causal and is deductive	Theory can be causal or non- causal and is often inductive
Procedures are standard, and replication is assumed	Research procedures are particular, and replication is very rare.
Analysis proceeds by using statistics, tables, or charts and discussing how what they show relates to hypotheses	Analysis proceeds by extracting themes or generalisations from evidence and organizing data to present a coherent, consistent picture

Source: Neuman and Kreuger (2003, p. 145)

Similarly, Krauss (2005) maintains that many qualitative researchers operate under different epistemological assumptions from the quantitative researchers, and that many qualitative researchers believe that the best way to understand any phenomenon is to view it in its context. They see all quantification as limited in nature, looking only at one small portion of a reality that cannot be separated or unitised without losing the importance of the whole phenomenon (Krauss 2005). In the same vein, many qualitative researchers also work under different ontological assumptions about the world (Krauss 2005). They do not assume that there is a single unitary reality apart from our perceptions. Since each of us experiences from our own point of view, a different reality this suggests that there exists 'multiple realities' (Krauss 2005). Therefore, conducting social inquiry without taking this into account violates the fundamental view of the individual (Krauss 2005). Additionally, Trochim (2000) argues

that the researcher is a unique individual and that all research is basically biased by each researcher's individual perception. Therefore, the notion of trying to establish validity in any objective or external sense, as pertains in the objectivist epistemology, is pointless (Trochim 2000). It is on this basis that Krauss (2005) has associated qualitative research with the constructionist ontology and quantitative research with the objectivist ontology respectively.

Notwithstanding the observed dichotomies between quantitative and qualitative epistemologies, Bryman (2012) however, suggests that these differences are not as straightforward as often presented. Similarly, Krauss (2005) asserts that the heart of the quantitative-qualitative debate is philosophical rather than methodological. Bryman (2012) advances the argument that while it is ubiquitous for some writers to describe qualitative research as preoccupied with the generation rather than the testing of theories, there are examples of studies in which qualitative research has been utilised to test theories. Based on this argument, Bryman (2012) firmly concludes that the distinction between quantitative and qualitative research is not a hard-and-fast one in the sense that studies that have the broad characteristics of one research strategy may have a characteristic of the other. It is in the context of advancing this argument further that some researchers in the social sciences have advocated the need to combine the two approaches in a single study in the form of methodological triangulation (Denzin 2012) or mixed methods research (Clark and Creswell 2011).

4.5 The Mixed-Methods Research Approach

Mixed methods approaches to research involve the use of two or more different kinds of data collection and analysis techniques within the same study or project (Greene *et al*. 2005). In a similar vein, Johnson *et al*.(2007, p.123) define mixed methods research 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 viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration".

Historically, the roots of the mixed methods research has been linked to the notion of triangulation which involves the use of multiple methods to assess a given phenomenon in order to enhance confidence in the validity of the findings (Greene *et al*. 2005).

The mixed methods approach to research has gained currency in the social sciences due to strong arguments that have been advanced by a number of writers to support its use. For example, Grix (2004) and Bryman (2012) have advanced convincing arguments to support the use of methodological triangulation in spite of the different epistemological orientations of quantitative and qualitative research strategies. For instance, Bryman (2012) has argued that the connection between epistemology and ontology, on the one hand, and research methods, on the other hand, are best considered as tendencies rather than as definitive connections. Therefore, within each of the two research strategies (i.e. quantitative and qualitative) there is a unique mix of epistemology, ontology, and research methods (Bryman 2012). Per Bryman's (2012) argument, one cannot conclusively say that the use of a structured interview or self-administered questionnaire, for instance, necessarily entails a commitment to a natural scientific model, or that ethnographic research must mean an interpretivist epistemology. Additionally, Bryman (2012) advances the position that research methods are much more 'free-floating' than is sometimes assumed which means that a method of data collection, such as participant observation, can be used in such a way that it is in line with the principles of constructionism, but equally it can be employed in a manner that demonstrates an objectivist orientation. Following up on Bryman's arguments, other writers such as Grix (2004) and Denzin (2012) have articulated the view that the world is never fixed; that that there are multiple constructions of reality and as such there is much to be gained in fusing qualitative and quantitative methods in a single research of social phenomenon.

Robson (1993) has also asserted that there is no single rule that dictates that only one method must be employed in conducting social research, and has argued for the use of more than one method in a single study due to the considerable advantages it brings. In a similar vein, other writers such as Neuman and Kreuger (2003) have advocated the use of mixed methods research in a single study to ensure complementarity of methods and to enhance data validity.

For instance, Neuman and Kreuger (2003, p.16) have highlighted how the two methods complement each as follows:

> "The key feature common to all qualitative methods can be seen when they are contrasted with quantitative method. They condense the data in order to see the big picture….. Qualitative methods, by contrast, are best understood as data enhancers. When data are enhanced, it is possible to see key aspects of cases more clearly".

However, in spite of the cogent arguments in support of mixed methods research, some scholars are of the view that the epistemological and ontological orientations of quantitative and qualitative research strategies make it imprudent to combine them in a single study. According to Bryman (2012), the views against the use of the mixed methods approach tend to revolve around two kinds of arguments namely the 'embedded methods argument' and the 'paradigm argument'. The proponents of the embedded methods maintain that research methods are inextricably ingrained in epistemological and ontological commitments. Therefore, the researcher's decision to employ a particular research instrument, for example, participant observation, is not simply about how to go about data collection, but a commitment to an epistemological position that is inconsistent with the tenets of positivism, and that is consistent with interpretivism (Bryman 2012). The paradigm argument, which is closely related to the embedded argument, conceptualises quantitative and qualitative research as paradigms in which epistemological assumptions, values, and methods are inextricably linked and are incompatible between paradigms (Howe 1988; Bryman 2012). Therefore, proponents of this argument hold the view that when researchers combine two data collection instruments, for instance, participant observation with a questionnaire, they are not combining quantitative and qualitative research since the two paradigms are incompatible.

This study adopted a mixed methods approach based on the varied nature of data collected for this study, as well as the different sources from which it was gathered. Since this study sought to understand how vulnerability to climate change is shaped by the interactions between gender and socio-economic and institutional factors, it was considered appropriate to use the mixed methods strategy to collect and analyse both quantitative and qualitative

data to answer the research questions. In line with this, research tools associated with both quantitative and qualitative approaches were combined to collect data. These included structured interviews, focus group discussions, field observations, key informant interviews and documentary analysis. The justification for the adoption of the mixed methods approach for this study is discussed in the next section.

4.5.1 Justification for the Choice of Mixed-Methods Research Strategy

It is evident from the quantitative-qualitative debate that both approaches have their strengths and weaknesses in conducting social research. This presupposes that it is imperative to combine methods in a single research project so that the weakness of one could be checked or ameliorated by the alternative method. The choice of the mixed methods approach for this research project was based on the following reasons. First, it was meant to achieve the 'logic of triangulation' (Denzin 1989, p. 13) since no single method could completely capture all the relevant characteristics of the study. Second, adoption of both quantitative and qualitative methods also enabled the researcher to crosscheck data gathered from the field by different methods thereby strengthening the validity and credibility of the study results. Combining different methodologies in a single study enhances the researcher's claim for the validity of his or her conclusions if they can be shown to provide mutual confirmation (Bryman 2004).

The use of the mixed methods approach can be justified on the grounds that it enabled the researcher to explore the research questions from different perspectives, which enabled a broader appreciation of the issues connected with gender and vulnerability to climate change in slum communities. Quantitative research is associated with the researcher's perspective, while qualitative research is concerned with seeing the object of study through the eyes of the people being studied (Bryman 2004). Thus, combining the two methods in this research project made it possible to accurately capture factors influencing vulnerability to climate change from the perspectives of men and women, as well as from that of the researcher. Lastly, the use of the mixed methods approach afforded the researcher the opportunity to obtain in-depth information from the different categories of participants, including men and

women in the selected slum communities, and other stakeholders or actors (both state and non-state) whose activities border on climate change adaptation policy development and implementation in Ghana.

4.6 The Choice of Qualitative Research Methods

In qualitative research, the focus of the research strategy is on the collection and analysis of data in the form of words or pictures (Neuman and Kreuger 2003; Bryman 2012). In other words, the emphasis is placed on words rather than quantification. Qualitative research exhibits the following characteristics:

- Predominant emphasis on inductive approach to the relationship between theory and research, in which emphasis is placed on the generation of theories
- Its emphasis is on the ways in which individuals interpret their social world; thus rejecting the epistemological norms of the natural scientific framework and positivism.
- Ontologically, it considers social reality as a construction or creation of individuals (Bryman 2012, p.36).

This study adopted the following qualitative research instruments to complement data gathered from the quantitative sources.

4.6.1 Review of secondary sources

To ensure the conformity of this study to the existing literature on gender and social vulnerability, over two-hundred secondary sources were consulted in addition to the primary sources of data. In this regard, the researcher reviewed relevant literature around gender and vulnerability to climate change in Ghana, official reports (both published and unpublished) on climate change, journal articles, policy documents and publications from city authorities, national ministries, agencies and civil society organisations whose activities border on climate change. These comprised social and demographic survey reports, National Communications to the UNFCCC, National Climate Change Policy, National Climate Change Adaptation Strategy, as well as reports of climate change-related studies carried out both within and outside of Ghana. The review of secondary sources enabled the researcher

to determine the following issues: to find out what is already known in the field; to know the concepts and theories that are relevant to the field; to identify the research methods and strategies that have been employed in studying this field; to become familiar with the significant controversies; to uncover the inconsistencies in findings relating to this field of study; and to ascertain the unanswered questions in this field (Bryman 2012). It must be noted that in reviewing secondary sources, much emphasis was placed on literature from the developing world given that Ghana is considered a developing country.

4.6.2 Reconnaissance Survey/Neighbourhood Visits

At the commencement of the data collection exercise, the researcher visited the leaders of the three slum communities to explain the purpose of the study. This approach afforded the researcher the opportunity to interact with relevant stakeholders in the communities and to seek their participation in the study. With assistance of the local community leaders, transect walks were undertaken through the communities to scan the physical environment, as well as the social fabric of the area. This exercise provided useful information on the environment and the socio-economic backgrounds of the study communities. The reconnaissance visits also afforded the researcher the opportunity to identify prospective participants for both the survey and the FGDs.

4.6.3 Focus Group Discussions (FGDs)

Focus groups are defined as a form of interview in which several individuals (i.e. participants), discuss a particular defined topic and construct meanings under the direction of a moderator or facilitator (Stewart *et al*. 2007; Bryman 2012). One peculiar feature that distinguishes focus groups from individual interviews is that in focus groups, there is a moderator or facilitator who promotes interaction and ensures that the discussions focus on the defined topic (Stewart *et al*. 2007). In this study, focus group sessions were conducted with participants to elicit qualitative information on perceptions, attitudes, and behaviour regarding how gender interacts with social, economic and institutional factors to shape the vulnerability of men and women to climate change, and how this in turn affects livelihood

security in the three slum communities. This approach was chosen in order to afford the researcher the opportunity to understand the ways in which men and women living in the study communities collectively make sense of and construct meanings around their vulnerability to climate variability and change. To achieve the above objective, interview guides (see Appendices 3 and 4) were developed to facilitate the focus group discussions. To develop the interview guide, the researcher initially conducted a review of the relevant literature and developed appropriate research questions and objectives. Since the study draws on social vulnerability theory to answer the research questions, the areas of discussion in the focus groups were identified to reflect the elements within these theoretical perspective. Questions were also formulated around the theme of institutional role and commitment to ascertain how the selected slum communities perceive the formal actors charged with the responsibility for the development and implementation of climate change adaptation interventions at the community, city and national levels.

4.6.4 Selection of FGD Participants, Follow-up and Logistical Arrangements

This study specifically sought to elicit information on gender vulnerability to climate change and livelihood security in urban slum communities, and the participants for the focus group discussions were comprised mainly of men and women who were knowledgeable and were willing to provide the desired information (Barbour 2005). Focus group discussions were organised separately for men and women to ensure that no gender group felt intimidated by the presence of the other. To ensure that information provided by focus group participants represented the views and concerns of the entire population, individuals were purposively selected from different areas and occupational groups within the study communities to participate in the FGDs. This was done in consultation with the community leadership and participants for each focus group session numbered no more than seven. The choice of smaller focus groups is in line with the suggestion by Morgan (1998a cited in Bryman 2012) that a typical focus group should range from six to ten members in order to facilitate an in-depth discussion on the topic of interest. In all, six (two per community) focus group sessions were held for men and women in the three communities. There were two reasons for the choice of two focus group sessions per community. First, the kind and range of views expressed by respondents in each group were not affected by socio-demographic variables

(Bryman 2012). Second, this was to reduce the complexity of data analysis associated with a large number of groups (Bryman 2012). Thus, in all forty-two men and women from the three communities took part in the FGDs. Each FGD did not exceed more than one hour.

The participants were briefed on the nature of the research in order to encourage them to freely share their views on the themes that were covered in the discussions. As an initial step, opinion leaders or key persons in the communities were identified to assist with securing meeting places within, or in close proximity to, the communities for the FGDs as well as other logistics, such as chairs and arrangements for refreshment with the costs borne by the researcher. The decision to hold FGDs within, or in close proximity to, the communities was informed by the suggestion by Stewart *et al*. (2007) that the closer the meeting venue is to the participants' homes the more likely they are to participate. The researcher made initial telephone calls to individuals to confirm their participation in the FGDs. This call indicated the time and directions to the venue for the FGD. Participants were contacted again by telephone 24 hours prior to the focus group meetings to remind them of their earlier agreement and to ensure that they had accurate directions.

4.6.5 FGD Protocol

Each FGD commenced with an introduction by the researcher, the field assistants and the participants. To ensure orderliness during FGDs, participants were encouraged to wait patiently for others to end their contributions before presenting their views. Any disagreements that occurred among participants were noted by the researcher, who facilitated and took notes of the discussions to ensure smooth guidance and to tease out the key issues. The researcher did not encounter any problems with the performance of this role as he was conversant with the questions and the language used by the participants. Nonetheless, the field assistants assisted with interpretation of some local languages, whenever necessary. All participants in the FGD were encouraged to speak. To ensure participation, each participant was asked to express his or her opinion on a topic in turn (Stewart *et al*. 2007). At the end of each FGD, participants were encouraged to raise concerns they considered relevant to the discussion, but may not have been discussed. The researcher

ended each FGD session by expressing appreciation to the participants and informing them about follow-up investigations in the form of a survey. Reflection was conducted by the researcher after each FGD by noting general impressions in the form of detailed memos.

4.6.6 Key Informant Interviews

Key organisations or institutions whose works or activities border on climate change at the community, city and national levels were considered key stakeholders in this study. These included Non-Governmental Organisations (NGOs) and key government ministries and agencies with the responsibility for sectors including climate change, gender, infrastructure and services, environment, and disaster risk management. Specifically, key informant interviews were held with seven organisations whose mandates revolve around climate change adaptation. These organisations and the role they play in climate change adaptation are shown in Table 4.2

Table 4.2 Organisations Selected for Key Informant Interviews and Their Role in Climate Change Adaptation

Organisation	**Role in climate change adaptation**
Environmental Protection Agency(EPA)	Research, enforcement and regulation
Ministry of Gender, Children and Social Protection(MGCSP)	Policy formulation, research
National Disaster Management Organisation(NADMO)	Implementation and relief services, education.
Ghana Meteorological Service Agency(GMSA)	Research and communication
Accra Metropolitan Assembly(AMA)	Implementation, enforcement, education
Ga South Municipal Assembly(GSMA)	Implementation, enforcement, education
People's Dialogue on Human Settlements(PDHS)	Implementation, education, relief services

Source: Author's own Construct 2014.

Meetings were held with key informants within these organisations, specifically either the head of units or departments within the organisations in charge of climate change activities,

or any person deemed by the organisation as knowledgeable in climate change issues. The issues discussed during the key informant interviews included *inter alia* gender considerations in climate change policy formulation and implementation; gender and participation in climate change governance, factors militating against effective gender-sensitive climate change policy making and implementation, and gender considerations in disaster risks prevention and management activities (see Appendices 5, 6, 7, 8, 9, and 10 for samples of interview guide).

4.7 The Choice of Quantitative Research Methods

Quantitative research can be defined as a research strategy that focusses on the collection and analysis of data in the form of values (Bryman 2012). The following are the inherent characteristics of quantitative research:

- It involves the use of deductive approach to the relationship between theory and research in which importance is placed on the testing of theories.
- Its epistemological orientation is rooted in the norms of the natural scientific model and positivism
- Ontologically, it embodies a view of social reality as an external, objective reality (Bryman 2012, p.36).

Quantitative research is useful when data in the form of values or numbers are needed for particular characteristics or variables. It is particularly essential when a researcher is interested in generating data to answer research questions relating to how much, how many, what size, what weight, what volume, how long etc. In addition, when the researcher is interested in ranking data, quantitative research becomes essential. In the context of this study, data relating to the socio-economic characteristics of respondents such as age, income, assets, as well as other characteristics were needed for analysis in order to answer the research questions. Since individuals' opinions were also needed for analysis in this study, some constructs relating to the perceptions, attitudes and experiences of men and women regarding vulnerability to climate change were formulated from the focus group analysis. Therefore, it was imperative that a quantitative method, in the form of a structured questionnaire, was employed to enable the researcher to collect the required data to answer the research questions according to specific characteristics.

In quantitative research, data can be collected through survey methods in the form of structured or semi-structured questionnaires. It is claimed that the nature of the inquiry, the objectives of the study and the literacy of respondents determine how the questionnaires are to be completed in quantitative research (Spratt *et al*. 2004; McGiven 2006). In the context of this study, interviews were conducted with the respondents using structured questionnaires (see Appendix 2). The aim was to give the respondents exactly the same context of questioning in order to ensure aggregation of responses. As argued by Bryman (2012), aggregation can be achieved reliably if only respondents' replies are in response to identical cues. In addition, the structured interview technique was chosen here to ensure that both the asking of questions and the recording of responses were standardised. This strategy presented two advantages. First, it helped to minimize error due to 'interviewer variability' in the asking of questions and promoted greater accuracy and ease of processing of respondent responses (Bryman 2012).

4.7.1 Survey

Men and women living in the three slum communities in urban Accra formed the basic unit of inquiry for this study. Consequently, data from men and women above the age of 18 years were collected through the utilisation of structured questionnaire (see Appendix 2). The questionnaire was developed based on the key issues or themes that emerged from the focus group discussions. The design of the questionnaires was also informed by the objectives of the study. In this regard, the questionnaire comprised aspects of the study objectives in order to elicit information from participants regarding their perceptions and knowledge about environmental hazards linked to climate change, attitude and practices towards adaptation, gender preferences in the choice of adaptation mechanisms, gender relations around access to and utilisation of assets, gender consideration in disaster risks prevention and management activities, as well as the participation of women and women in adaptation decision making processes.

The questionnaire design was guided by the two cardinal principles recommended by Neuman and Kreuger (2003, p. 268) namely "avoid confusion and keep the respondent's

perspective in mind". To this end, the questionnaire was designed in such a way that it was devoid of jargon, ambiguity, emotions, double-barrelled questions, false premises, and leading questions (Neuman and Kreuger 2003; Lewin 2005). The questionnaires were also divided logically into sections and subsections with filter questions which made it easier for respondents to only respond to relevant questions (Lewin 2005). The sections reflected the main objectives of the study. Moreover, the questionnaire was composed of closed questions, partially open questions and open-ended questions. Combining closed questions and open-ended questions in a questionnaire was considered appropriate for this study as it enabled the researcher to change the pace of the interviewing and to establish rapport with the respondents. The researcher was able to probe further by asking respondents follow-up questions with open-ended questions, which often revealed respondents' reasoning for providing certain answers (Lewin 2005). The closed questions were pre-coded and required respondents to make choices from alternative responses. However, partially open responses in the form of 'Others' were provided so that respondents had the option of providing answers that may not have been included on the list of pre-coded answers. For the open-ended questions, space was provided for respondents to provide their own answers to questions so as to ensure greater variety in responses and to avoid biases associated with pre-coded answers.

To ensure adequate community participation in this study, community members who were literate in English and also familiar with the local language were recruited as field assistants (i.e. translators) to assist in the administration of the questionnaires. One-day training was organised for the field assistants to ensure that they all have a common understanding of how to conduct the interviews. The field assistants were supervised by the researcher during the interviews, which is in line with a suggestion by Bryman (2012, p. 226) that:

> "wherever people other than the researcher are involved in the interviewing, they will need training and supervision in the areas such as contacting prospective respondents and providing introduction to the study, reading out questions as written and following instructions in the interview schedule, employing appropriate styles of probing, recording interviews, and maintaining an interview style that does not bias respondent's answers".

4.7.2 Sampling Strategy

A multi-stage sampling strategy was adopted for this study. In the first stage, proportionate samples were allocated to the study communities because of the variations in their populations. Based on the population for each community, the following samples were allocated proportionally to the communities as indicated in Table 4.3. Of the total 350 respondents surveyed, 150 representing 43 percent lived in Old Fadama, with the rest of the respondents shared equally between Glefe and Faana (29 percent).

Table 4.3 Allocated Samples for Study Communities

Community	Allocated sample size	Percentage of sample (%)
Glefe	100	28.6
Faana	100	28.6
Old Fadama	150	42.8
Total sample	350	100.0

Source: Owusu 2015.

In the second stage, each community was divided into wards or sections based on the existing boundaries or lanes, and where such wards or sections already existed, the researchers made use of them. This was to ensure that each section or ward was included in the survey in order to get a representative sample of the community. Houses in each section or ward were then numbered and houses were systematically selected for interviews. In cases where a numbering system already existed, the researcher made use of them. In each ward or section, the researchers selected every 2nd house to administer the questionnaires, and then a male and a female were purposively selected for the interview. In a situation where the researcher was unable to get a respondent (s) or a respondent refused to participate, the next house was selected as a replacement. To qualify for the interview a respondent was expected to be at least 18 years of age and a resident of the community. The selection of respondents in each house was informed by the following criteria: age, sex, willingness to give consent, and knowledge of the language being communicated. This process was carried out systematically

from one section or ward to the other in the three study communities. It is important to note that individuals rather than households were selected for the survey. This decision was in line with the study's overall aim of understanding how men and women differently experience and perceive the impacts of climate change on their well-being and livelihoods. Given that males generally tend to be the heads of most households in Ghanaian society, the researcher considered it imperative to collect information from individuals rather than households in order to ensure that women's were represented. This strategy was to prevent the likelihood of males dominating the interviewing process. Moreover, there was no secondary data available on the number, composition and types of households in the study communities from which the researcher could draw samples for male-headed and female-headed households.

With respect to the key informant interviews, the researcher contacted gatekeepers or representatives of the climate change-related organisations to solicit their interests in contributing to the study; explained the benefits, time requirements and ethical concerns. If their interest was confirmed, they were then asked to sign a consent form for the organisation to participate, and nominate potential participants from their organisation. The researchers then contacted these potential participants, discussed the study with them and assured them that they did not feel unduly pressured to participate. These individuals were informed that despite the fact that their organisations signed consent to participate, their individual participation was voluntary and they were free to withdraw from the interview at any time, refuse to answer any particular questions, or retract responses. If their interest in contributing to the study was confirmed, a meeting time and place was then determined by the participant. Both gatekeepers and potential participants were contacted using contact details (phone or email address) publicly available on their websites.

4.8 Data Management and Analysis

This section describes the techniques that were employed to analyse both quantitative and qualitative data gathered from the study**.**

4.8.1 Analysing Qualitative Data

Grounded theory is the most preferred way of doing qualitative research (Cresswell 2013). It provides the theoretical roots for the qualitative approaches to studying knowledge, attitudes practices and perceptions about social phenomena such as social vulnerability. As such, it was used to organise the concepts and themes that emerged from the qualitative data. However, the idea of referring to grounded theory does not mean that its complexity and detailed analysis was followed in this study. Rather, in this study, concepts and themes were allowed to emerge from the qualitative data through systematic and rigorous analysis in order to develop sets of explanations from the data.

In line with this, the notes from the focus group discussions were written up and synthesised for two different discussions (i.e. males and females) in each community. Responses were then analysed to identify ideas or patterns and then similar ideas were grouped into coherent concepts and themes to interpret the text. The issues which emerged from this analysis are presented in chapters five, six and seven respectively. The notes from the key informant interviews were first read through several times to appreciate what was happening in each organisation as far as working with slums or marginalised communities in climate change adaptation was concerned. Based on the themes for the interviews, key messages or ideas were summarised in tables. This process was repeated for all the organisational interviews. The summaries from the various organisations were compared and linked with statements of relationships to understand how the activities of these organisations contributed in either reducing or accentuating the vulnerability of women and men to climate change in the study communities.

4.8.2 Analysing Quantitative Data

Quality checks were conducted on all administered questionnaires through editing and data cleaning to ensure that the standard procedures had been followed. Data were then coded and entered into a spread sheet in the Statistical Package for Social Sciences (SPSS) Version 21. Quality checks were again carried out on the spreadsheet to ensure that data had been entered correctly. A number of computer analytical procedures were utilised to analyse the data including frequency counts and relationships between variables by cross tabulation and

testing using chi-square and the Mann Whitney U-Test. The Mann Whitney U-test was used to determine the differences in the coping practices of men and women.

4.8.3 Ensuring Data Validity and Reliability.

To ensure data validity and reliability, the researcher used the triangulation technique to cross-check information gathered from the different sources using the various methods. In this regard, data collected through the survey were cross-checked with those gathered from the key informant interviews and focus group discussions and vice-versa to ensure that it was consistent and valid.

4.9 Ethical Considerations

This study was conducted in line with the Australian Code for the Responsible Conduct of Research. Ethics approval for this study was obtained from the Human Research Ethics Committee (HREC) of the University of Adelaide (see Appendix 1). After obtaining ethical approval, the researcher formally met with the leadership of study communities and heads of the seven selected organisations to explain the rationale and purpose of the research project to seek their consent (Piper and Simons 2005). In addition, participants were informed that their participation in the study was voluntary and that they could withdraw at any time. In situations where a participant withdrew, the interview was stopped and another participant who met the inclusion criteria became a replacement.

Confidentiality in the process of conducting research, as well as the anonymisation of individuals in reporting, are two important assumptions in ethical social science practice (Neuman and Kreuger 2003; Piper and Simons 2005). Therefore, to ensure conformity to these ethical principles, the names of participants were not obtained by the researcher. Moreover, the study adopted a larger sample size in order to ensure that individual participants would remain anonymous in the final report, and , findings have been reported in such a way that they are aggregated so no individual responses could be identified. Personal records of participants have been kept confidential, and an assurance was provided to participants during the data collection phase. All participants signed the consent form and

were taken through the information sheet before commencement of the survey and key informant interview. The researcher also sought participants' permission in cases where audio/video recordings and photos were taken. A separate permission form was created for this purpose which participants signed, if their image was used. No monetary rewards were offered to participants. However, participants were provided with refreshment and snacks during focus group discussions. It must be noted that no imminent risks were encountered by the researcher in this study. However, when recounting their experiences of climate change-related disasters, some participants did become emotional but were not visibly upset.

4.10 Limitations of Study

The key limitation of this study was the lack of secondary empirical data because studies dealing with gender and climate change adaptation in slums or marginalised communities are still rare in the literature, particularly in Ghana. Another limitation was that the approach adopted in this study focused mainly on understanding the experiences and perceptions of individuals (i.e. men and women) regarding climate change. As such, the approach does not adequately yield data on households. Data could not be disaggregated to determine the differences in vulnerability between male-headed and female-headed households and how other demographic characteristics of respondents, such as marital status, relationship to the head of household and family situation may have contributed to influence vulnerability.

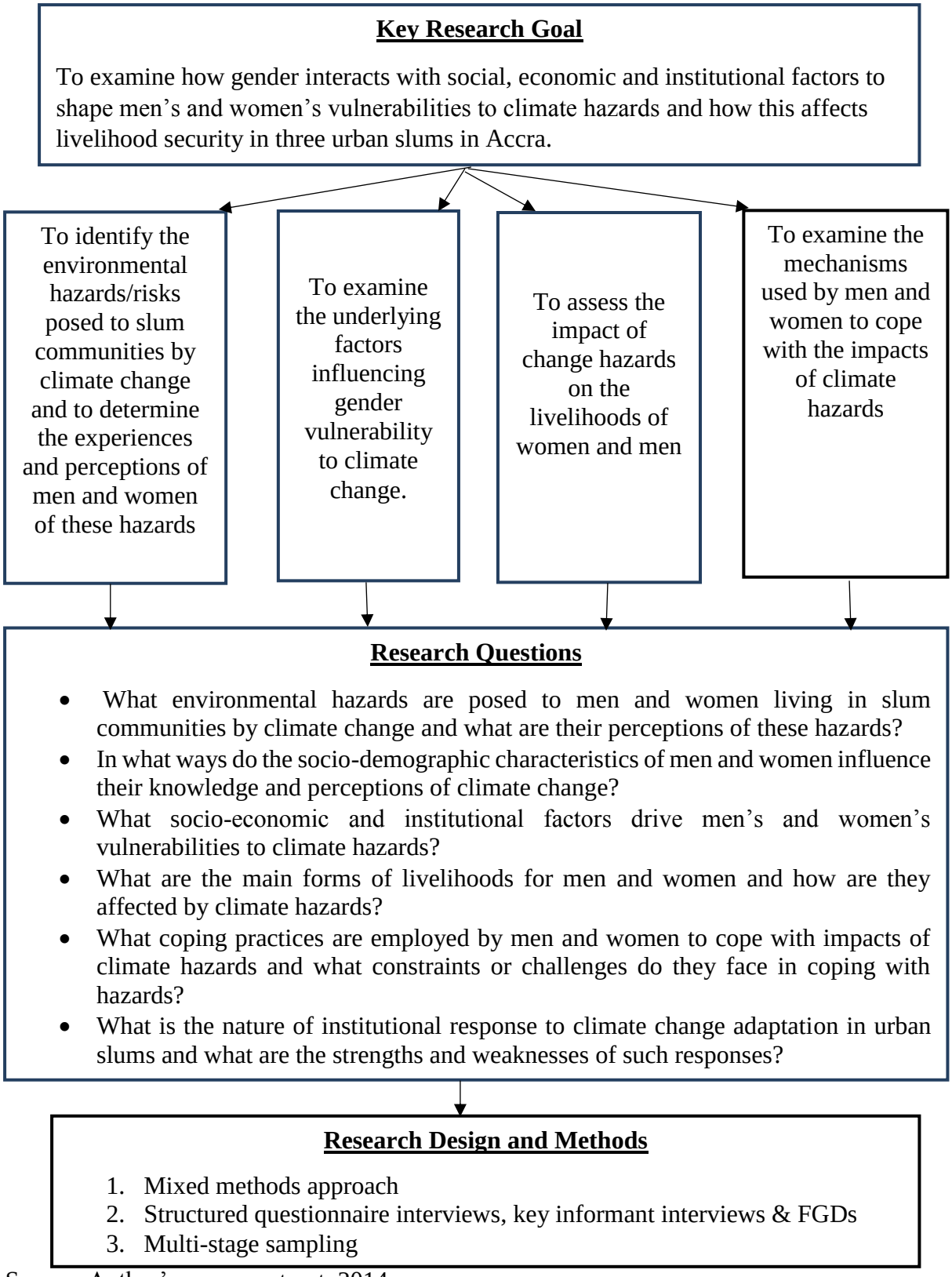
The reluctance of slum residents to share sensitive information is also a limitation, which made it difficult in collecting information on income, assets and expenditure patterns in slum communities because many hide their wealth from "outsiders". The reluctance of slum residents to share such information is underpinned by their "illegal" status in Accra, as well as the social stigma attached to living in slums. This limitation was addressed to some extent by assuring the respondents about the confidentiality and anonymity of their information. In addition, some language barriers were encountered by the researcher, and also some difficulties in translating climate change terminologies or concepts into local languages or dialects, which was addressed by employing interpreters. Nonetheless, it is acknowledged that nuances could be lost in translation.

The effectiveness of focus group discussions largely depends on the ability of participants to recollect and share knowledge on the issues being discussed. This is particularly so in cases where people have to recollect their experience regarding climate change-related disasters. Therefore it is possible that the participants may have been unable to recollect their experiences or in some cases exaggerated them. This limitation was addressed by comparing information with other communities and climate change-related stakeholders. In this respect, the mixed methods approach was very useful as it assisted the researcher to measure some of the issues which emerged from the qualitative study. Moreover, some key informants in climate change-related organisations had only been with them for a short period of time and could therefore not respond to some of the issues raised in the interviews. The researcher overcame this limitation by allowing the key informants to choose other officers considered to be knowledgeable in the issues concerned to respond to the interview questions.

4.11 Justification for the Selection of Study Communities

Overall, this study sought to understand how gender interacts with other socio-economic and institutional factors to shape men's and women's vulnerability to climate change in slum communities in urban Accra. The study population comprised men and women of eighteen years and older living in three communities- Glefe, Faana and Old Fadama- as well as seven organisations (both state and non-state) whose activities include climate change in Accra. The three communities have a combined population of about 87,062 which is broken down as follows: Old Fadama-78,684 (PDG 2009), Glefe-7,178 (AMA 2010) and Faana- 1,200 (Oteng-Ababio *et al*. 2011). Although a number of slum or marginalised communities exist in Accra, these three were selected because of the peculiar environmental and socio-economic vulnerabilities they face. These communities have been classified by the city authorities as low-income settlements whose vulnerable locations make them more vulnerable to climate hazards, especially flooding, sea erosion, salinity intrusion, heatwaves/excessive heat, and fire outbreaks. In addition, access to socio-economic infrastructure is a major challenge for these communities, which made them ideal cases for the study of social vulnerability to climate change in urban areas. Figure 4.2 summarises the sequence of methodology and structure adopted in carrying out this research.

Figure 4.2 Research Methodology and Structure



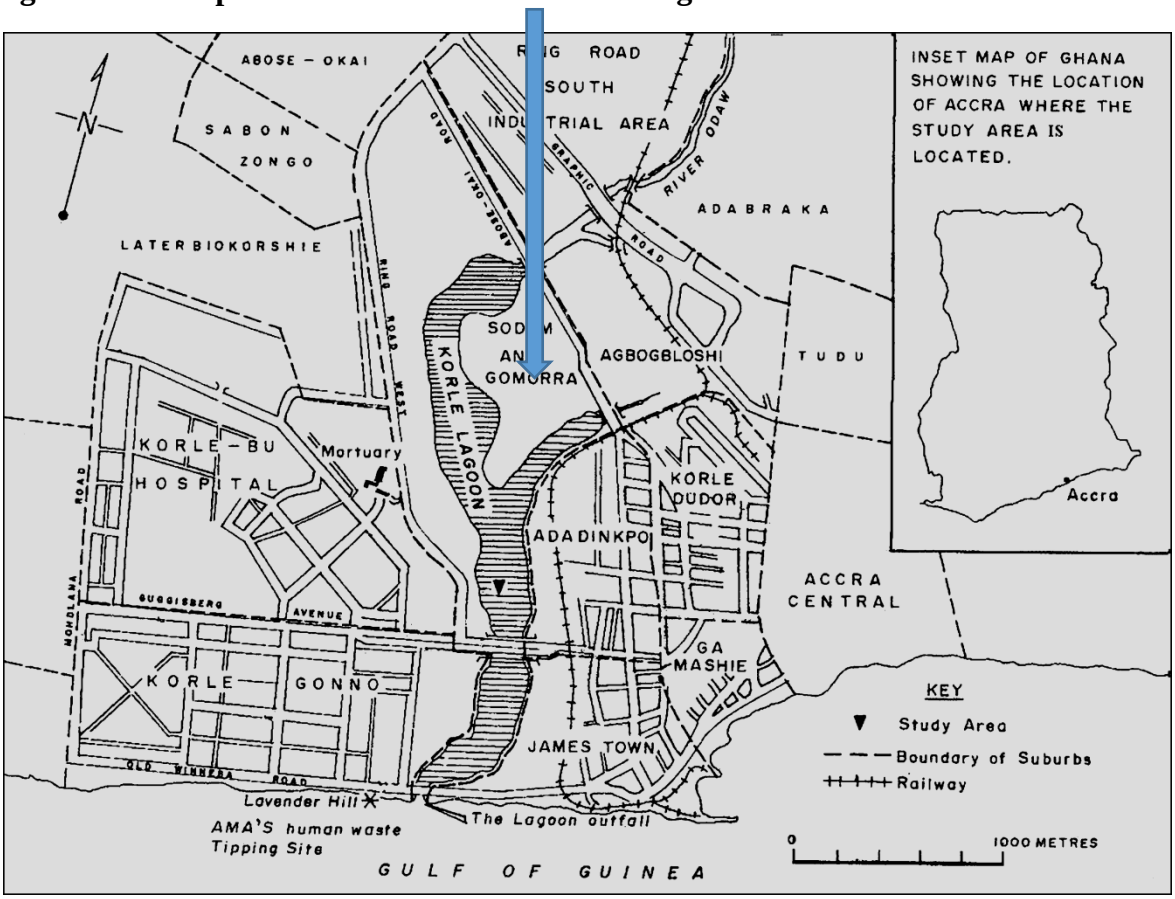
Source: Author's own construct, 2014

4.12 Socio-Economic and Environmental Profiles of Study Communities

4.12.1 Old Fadama

The Old Fadama community derogatively called "Sodom and Gomorrah" is undoubtedly Ghana's largest slum/informal settlement. It is located in the northwest of Accra's Central Business District (CBD). According to People's Dialogue Ghana (PDG 2009), the settlement occupies 31.3hectares of land along the Odaw River and the Korle Lagoon (see Figure 4.3) and most of the residents do not hold official legal title to the land they occupy. The settlement's population is estimated to be 78,684 with equal proportion of males and females (PDG 2009). This gives a population density of about 2424 persons per hectare which makes Old Fadama one of Accra's highly densely populated neighbourhoods. It is also estimated that over 72 percent of the settlement's current residents come from one of Ghana's three northern regions (Afenah 2012). A mix of residential and commercial self-built structures characterises the housing situation of the community. According to PDG (2009), about 95 percent of households in Old Fadama have only one sleeping room, with 3 percent having two sleeping rooms. These living arrangements make residents susceptible to communicable diseases. The majority of the settlement's population (85 percent) is estimated to be employed in the informal sector of Accra's economy of which 56 percent operate their business activities within the settlement (Afenah 2012). Most of these businesses are home-based enterprises (HBEs) and are therefore susceptible to climate hazards, such as flooding.

Figure 4.3 A Map of Accra with an Arrow Showing the Location of Old Fadama



Source: Boadi and Kuitunen (2002, p. 303)

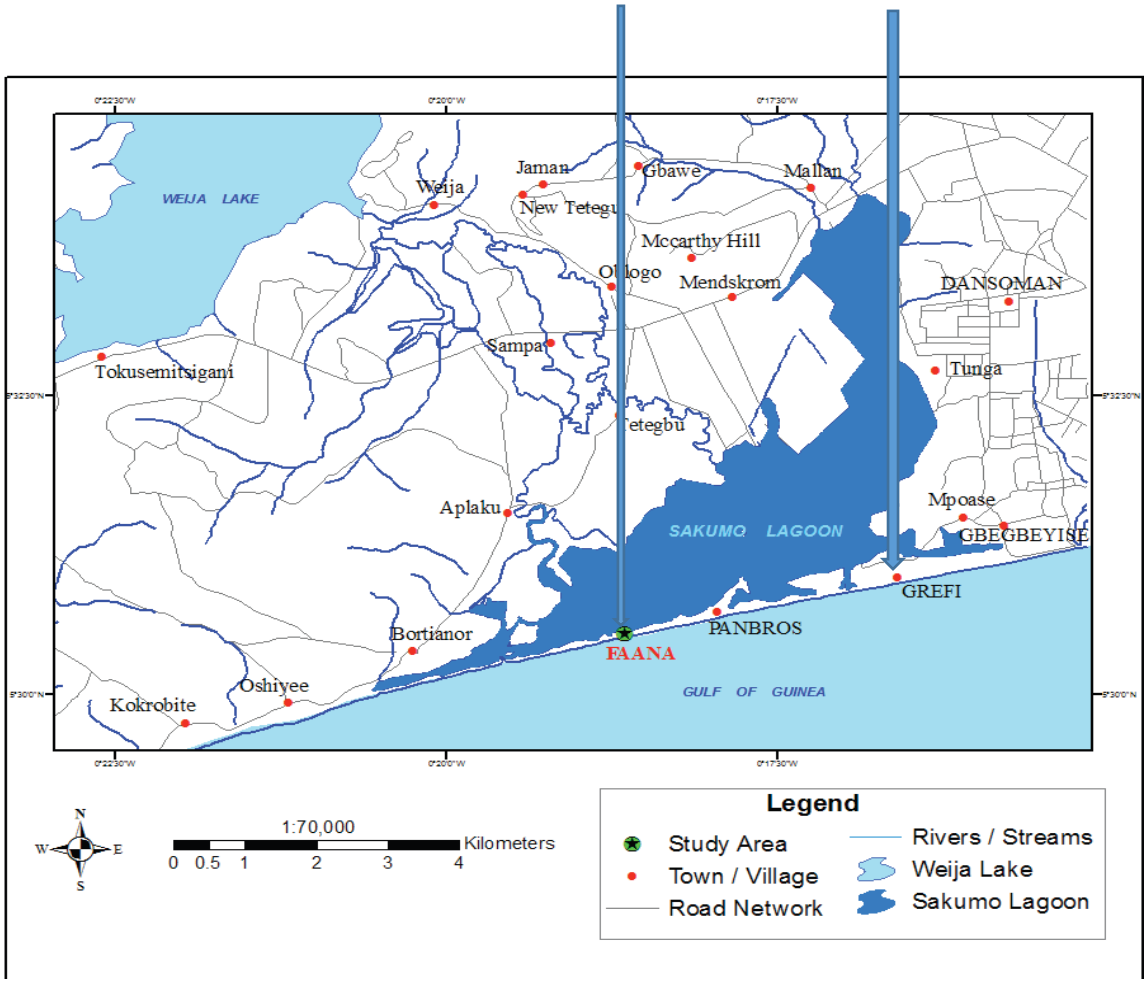
The precarious location of Old Fadama between the Korle Lagoon and banks of the Odaw River exposes residents to a number of environmental hazards including frequent flooding (Afenah 2012). Moreover, Old Fadama's residents have been facing the continuous threat of forced eviction by the local authorities since 2002, due to their illegal occupation of the land; health risks for residents; and the settlement's proximity to the Korle Lagoon (PDG 2009; Afenah 2012). Consequently, the Accra Metropolitan Authority has identified Old Fadama residents as squatters and their homes as illegal structures constructed on land earmarked for alternative use. Therefore, the community lacks basic infrastructure, such as access roads, water and sanitation facilities, schools, waste management among others. The settlement has no arrangement for solid waste collection and disposal, which means that all solid waste generated from the community is either used to fill depressions in the area as a way of reclaiming more land, or is disposed of indiscriminately or at worse into the lagoon. Some

of the solid waste is also burnt thus polluting the air. In simple terms, Old Fadama as a settlement does not exist in the development schemes of the local authorities of Accra. It is not surprising therefore that Afenah (2012, p. 528) describes Old Fadama's residents as "physically situated within but conceptually outside of the boundaries of Ghanaian societies".

4.12.2 Glefe

Glefe, also known as Grefe, is a coastal suburb which lies in the south-western corner of Accra. Figure 4.4 shows that it is locked in between a lagoon and the ocean. It is located at latitude 5°19′5″N and longitude 0°6′0″W along the Gulf of Guinea (Appeaning-Addo *et al*. 2008). Glefe is characterised by relatively open coastline that enables considerably strong, unimpeded swell waves to reach the coast. A significant wave height for 50 percent of the time is estimated to be 1.4m which lasts a period of between 10-15seconds. The spring tide is recorded to be about 1.26m (Amoani *at al*. 2012). The population of the settlement is estimated to be around 7,178 (Accra Metropolitan Assembly 2010). The community is considered one of Accra's most densely populated and hardest hit flood areas. It can be accessed by cars through a narrow road across the lagoon. The area has been occupied by different fishing communities for the past 15 to 20 years, and it is also close to major holiday destinations in Accra. The area is low-lying and consequently faces rising sea levels and stagnant water pools in many parts. Erosion is evident on the entire beach, although its significance is seen on the eastern section, where the width of the sand bar is generally reduced. The community gets flooded whenever it rains thus rendering the area impassable. This often leads to suspension of school activities in the community for a number of weeks while school children are kept indoors (Andoh 2013). Some residents have built walls to protect their lands from the harsh conditions of the rising sea levels. The community is almost cut off from the rest of the Accra Metropolis by Lake Bebu. Consequently, it lacks basic infrastructure and amenities such as proper drainage, access roads, potable water, and sanitation (Kudiator 2012; Andoh 2013). Most residents defecate on the beach posing public health risks such as outbreaks of communicable diseases. There is only one access point for cars: a narrow road across the lagoon. Artisanal fishing and salt production are two major sources of livelihood for residents of Glefe, and beach is used by the community as a land site and canoe dock.

Figure 4.4 A Map of Accra with Blue Arrow Showing Locations of Faana and Glefe



Source: Oteng-Ababio *et al*. (2011, p. 433)

4.12.3 Faana

Faana is a small fishing community in Accra located at latitude 5.3180°N and longitude 0.10010°W along the Gulf of Guinea. Figure 4.4 shows that the community is bounded on the north by the Sakumo Lagoon and on the south by the Gulf of Guinea (Oteng-Ababio *et al*. 2011). The population of Faana is estimated to be between 800 and 1,200 of which two-thirds are made up of women and children (Oteng-Ababio *et al*. 2011). Artisanal fishing is the dominant economic activity and provides the main source of livelihood for residents of this community. The men in the community are mainly engaged in group fishing, while the women work as fishmongers and provide other retail support services, and most of the

children assist their parents in fishing. The coastline of Faana is characterised by a gently sloping shoreline. According to Oteng-Ababio *et al*. (2011), the significant wave height for 50 percent of the time in Faana is about 1.4m, the period is between 10 to 15 seconds and spring high tide is about 1.26m. In terms of infrastructure, Faana is deprived of all forms of basic economic infrastructure such as electricity, potable drinking water, waste management services, educational and health facilities. The residents access such facilities and services from close immediate settlement called Bortianor.

4.13 Socio-Demographic Characteristics of Respondents

Table 4.4 shows the socio-demographic characteristics of the survey respondents. It is evident that they are predominantly a youthful population with 72 percent aged below 40 years, with the majority (43 percent) aged 18-29 years, comprised of equal proportions of men and women. Overall, 69 percent of the respondents had lived in their communities for more than 6 years, while 63 percent of respondents had attained some formal education up to the secondary or middle school level, and 36 percent had not attained any formal education at all. For the respondents with no formal education, about 46 percent were women compared to 26 percent of men.

The respondents can be described as deeply religious, with a cumulative percentage of 98 percent professing to be believers, 54 percent were Christians, 40 percent Moslems and 4 percent traditionalists. Specifically, a higher proportion of the respondents who claimed to be Christians were women (57 percent compared to 50 percent of men). By contrast, 42 percent of men professed to be Moslems and 37 percent of women did so. In relation to ethnic affiliations, the majority of respondents (31 percent) are Dagombas, 36 percent of men and 27 percent of women respectively. In addition, income levels in the communities appeared to be low, with about 49 percent of the respondents earning between AUD 37-180 every month, made up of 63 percent of women and 54 percent of men. However, a higher proportion of men than women constituted the respondents who earned AUD 180 and above (28 percent compared to 20 percent).

Table 4.4 Socio-Demographic Characteristics of Survey Respondents

Variable	Male (%)	Female (%)	Total (%)
Age			
18-29	39	47	43
30-39	31	27	29
40-49	14	18	16
50+	16	8	12
Education			
Basic	19	28	23
JHS/MSLC	31	19	25
Secondary	23	6	15
Tertiary	1	1	1
None	26	46	36
Religion			
Christianity	50	57	54
Islam	42	37	40
Traditional	5	4	4
others	2	1	2
Ethnicity			
Akan	15	17	16
Ga-Adangbe	8	15	13
Ewe	29	30	30
Dagomba	36	27	31
Others	8	11	10
Income(Monthly)			
<AU$ 36	18	17	14
AU$ 37-180	54	63	49
> AU$180	28	20	20
No income	14	21	17
Duration of residence			
1-5 yrs.	26	36	31
6-13 yrs.	42	30	36
>14 yrs.	32	34	33

Source: Gender and Climate Change Vulnerability Survey, 2015

4.14 Conclusion

This chapter has presented a description of the methodology employed to carry out investigation into factors underlying gender vulnerability to climate change and its consequent effects on the livelihood security in Accra's slums. It provided the conceptual model underpinning the study as well as the justification for the selection of the three study communities as case studies. A critical review of the various epistemological and ontological perspectives, relating to quantitative and qualitative approaches to social research, led to a justification of the application of a mixed method approach for this project. The methods used include focus groups, interviews and a structured questionnaire, thematic, documentary and literary analysis. It was clearly demonstrated that a mixed methodology was the most viable and appropriate approach to achieve the goals, objectives and research questions outlined in this study.

5 CHAPTER FIVE: PERCEPTIONS AND VULNERABILITY

5.1 Introduction

This chapter presents the survey findings relating to the study participants' knowledge and perception of climate change, as well as the socio-economic drivers of vulnerability to climate change in slum communities. It begins by examining the common climate hazards prevalent in the study communities. This is followed by the exploration of the respondents' knowledge and perceptions regarding climate hazards and how these perceptions were influenced or shaped by their socio-demographic characteristics. The chapter further examines the socio-economic drivers of vulnerability to climate change in slum communities by focussing on the intersection of gender with social, economic and institutional factors in producing different vulnerabilities for men and women living there. This discussion of survey findings are disaggregated by gender, age, income, religion and study area where necessary. The results of the focus group discussions which are structured around the major themes and concepts are also integrated throughout.

Key Findings on Perceptions and Vulnerability

- ✓ Exposure to climate hazards was not significantly different for men and women but it was for study areas, with flooding emerging as the major hazard in Faana and Glefe while fire outbreaks predominated in Old Fadama.
- ✓ Socio-demographic variables of respondents greatly influenced their perceptions and knowledge of climate change, with men, younger groups and respondents with higher levels of education demonstrating a high level of climate change knowledge.
- ✓ Synergies existed between local climate change knowledge and existing scientific data.
- ✓ Men and women experienced different vulnerabilities, with women suffering more negatively because of their poor housing conditions, limited access to productive resources and basic infrastructure, as well as their heavy involvement in domestic duties or roles.

5.2 Types of Climate Hazards/Risks Experienced in Sums

By nature of their vulnerable locations, slum residents in Ghana are exposed to a myriad of environmental hazards often associated with climate change. The respondents were asked to indicate the types of climate hazards they have been exposed to in recent years. Table 5.1

shows that flooding, heatwaves, fire outbreaks, windstorm/rainstorm, sea erosion and salinity intrusion emerged as the most common hazards. Flooding was experienced by both men and women, with heatwaves ranked as the second most common hazard by three quarters of respondents. In addition, 62 percent of men and 56 percent of women mentioned fire outbreak as being a hazard. The fourth common hazard was windstorm/rainstorm which was mentioned by over half of men and women. It is interesting that sea erosion was mentioned by 53 percent of women compared to 43 percent of men. Similarly, 39 percent of women compared to 33 percent of men indicated salinity intrusion to be a climate hazard. The reasons for the higher ranking of salinity intrusion and sea erosion by women may be attributed to the nature of their domestic roles. The women in these communities are responsible for collecting and storing water for domestic use. They often walk farther to collect water due to contamination of local water sources from sea erosion and salinity intrusion. It is therefore reasonable to say that women are more likely to be exposed to the impacts of salinity intrusion and sea erosion compared to their male counterparts.

Table 5.1 Type of Climate Hazards Experienced by Male and Female Survey Respondents (Multiple Response)

Hazard	Male (% Yes)	Female (% Yes)	N	Total (% Yes)
Flooding	77.7	77.1	271	77.4
Heatwaves	75.4	77.7	268	76.6
Rainstorm	56.6	51.4	189	54.0
Sea erosion	43.4	53.1	169	48.3
Salt water intrusion	32.6	39.4	126	36.0
Fire outbreaks	62.3	49.1	195	55.7

Source: Gender and climate change vulnerability survey, 2015

The results of the survey also revealed some differences between the study areas in terms of their exposure to the above-mentioned hazards. It is evident from Table 5.2 that the majority of the respondents in Glefe and Faana reported flooding as the most common hazard whereas those in Old Fadama reported fire outbreaks. It is also evident that overall, there were no differences between the responses of men and women in Faana and Glefe regarding exposure to flooding. However, the difference was significant in Old Fadama where 85 percent of men and 72 percent of women ranked fire outbreak as the topmost climate hazard they have been

exposed to. The reason for the high ranking of flooding among the respondents in Glefe and Faana is attributable to tidal waves and the overflow of the Weija Dam. The two communities are located in the downstream side of the Weija Dam in Accra which makes them more vulnerable to dam spillage in times of heavy rainfall at the upstream side of the Densu River. Closely related to this is that these two low-lying communities along the coast are also exposed to severe flooding from tidal waves. This problem is further compounded by the lack of basic drainage infrastructure and indiscriminate siting of structures or building along waterways, which interact to make flooding from heavy rainfall and dam spilling a perennial challenge in these communities. Indeed, the Accra Metropolitan Assembly acknowledges the flooding challenge in these communities in the final draft of its 2014-2017 Medium Term Development Plan

> "Flooding is common along the 8km of the Densu River below the Weija dam whenever there is overtopping or deliberate release of water over the spillway. Flooding is also prevalent in Dansoman area and along the Lafa stream where it crosses the Winneba and Tema Motorway extension roads. Few of the drainage channels in the catchments are constructed. As a result, there is heavy erosion of drainage channels - many of which flow down existing tracks and roads. Access to this area is often cut off and roads become impassable during heavy rains" (AMA 2014, p.57).

The situation is different in Old Fadama which is located inland, and it is not surprising that fire outbreaks emerged as the most common climate hazard given that the community lacks access roads, is densely populated and most of the structures are built of temporary (and inflammable) building materials. These factors further aggravate the situation in times of fire outbreaks, and the lack of access routes hinders emergency evacuation. One major fire outbreaks occurred in 2012 which affected about 3,500 men, women and children and also destroyed homes, valuable documents and other assets (Owusu 2013). These results highlight the point that vulnerability differs not only between genders, but also across space or between places (Cutter *et al.* 2003), thus further suggesting the need to accord gender and place important considerations in risk perception studies. Even though the three communities are located in the same city and are classified as low income areas, they were exposed to different hazards and thus faced different vulnerabilities. The pattern of differentiation in exposure may have contributed to the varied perceptions expressed by respondents regarding their experience of climate hazards.

Table 5.2 Type of Climate Hazards Experienced by Male and Female Survey Respondents by Study Area (Multiple Response)

Community	Climate hazard	Male (% Yes)	Female (% Yes)	Total (% Yes)
Glefe	Flooding	95.6	96.4	96.0
	Heatwaves	71.1	85.5	79.0
	Fire outbreaks	4.4	7.3	6.0
	Sea erosion	68.9	76.4	73.0
	Salinity intrusion	53.3	60.0	57.0
	Windstorm/rainstorm	60.0	70.9	66.0
Faana	Flooding	100.0	96.2	98.0
	Heatwaves	81.3	86.5	84.0
	Fire outbreaks	71.1	63.5	70.0
	Sea erosion	91.7	96.2	94.0
	Salinity intrusion	64.6	67.3	66.0
	Windstorm/rainstorm	75.0	67.3	71.0
Old Fadama	Flooding	54.9	47.1	51.3
	Heatwaves	74.4	64.7	70.0
	Fire outbreaks	85.4	72.1	79.3
	Sea erosion	1.2	1.2	1.3
	Salinity intrusion	2.4	1.5	2.0
	Windstorm/rainstorm	43.9	23.5	34.7

Source: Gender and climate change vulnerability survey, 2015

The results again demonstrated that flooding was a major concern across ages, albeit with some slight differences between the responses of men and women. Table 5.3 shows that, except for respondents aged 30-39 and 40-49 years, men and women did not differ significantly in terms of their exposure to flooding. However, in terms of exposure to heatwaves, there were some significant differences between the responses of men and women aged 40-49 years, with 94 percent of women compared to 79 percent of men indicating that they were exposed to heatwaves. It is also apparent that the proportion of men who were exposed to fire outbreaks outnumbered women in all age groups. This further confirms the finding in Table 5.1 where a higher proportion of men than women indicated that they were exposed to fire outbreaks. The high exposure of men to fire outbreaks may be explained in terms of the "protective role" they perform with respect to fire emergency. The lack of emergency response from the officialdom in time of fire outbreaks has meant that men living in these communities have often been compelled to handle fire emergencies by

organising evacuation and reconstruction processes. This situation is further underpinned by the traditional male "heroic" role in Ghanaian society which views men as 'protectors' of families in times of disaster emergencies.

Table 5.3 Type of Climate Hazards Experienced by Male and Female Survey Respondents by Age (Multiple Response)

Age	Climate hazards	Male (% Yes)	Female (% Yes)	N	Total (%)
18-29	Flooding	69.6	64.6	101	66.9
	Heatwaves	72.5	69.5	107	70.9
	Fire outbreaks	75.4	54.9	97	64.2
30-39	Flooding	74.1	83.3	80	78.4
	Heatwaves	74.1	79.2	78	76.5
	Fire outbreaks	59.3	47.9	55	53.9
40-49	Flooding	87.5	93.5	50	90.9
	Heatwaves	79.2	93.5	48	87.3
	Fire outbreaks	41.7	38.7	22	40.0
50+	Flooding	96.4	92.9	40	95.2
	Heatwaves	82.1	85.7	35	83.3
	Fire outbreaks	53.6	42.9	21	50.0

Source: Gender and climate change vulnerability survey, 2015

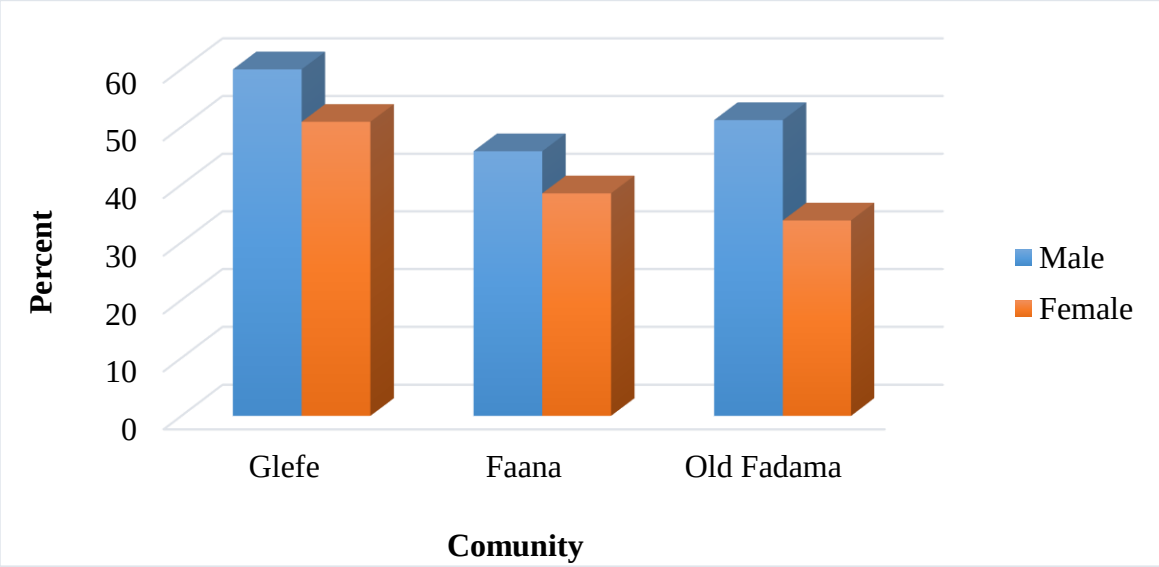
5.3 Knowledge and Perception of Climate Change

This section explores how both men and women participants perceived climate change and how socio-demographic factors, such as age, education, and religion contributed to shape their perceptions. It also examines how the participants' knowledge and perception either match with, or differ from, the existing scientific knowledge on climate change.

5.3.1 Differences in Climate Change Knowledge between Study Communities.

The survey results shown in Figure 5.1 demonstrate that generally men were more knowledgeable about climate change than women across the three study communities. Overall, Glefe recorded the highest proportion of men and women with knowledge about climate change (55 percent).

Figure 5.1 Percentage of Male and Female Survey Respondents who have Knowledge of Climate Change by Study Area



Source: Gender and climate change vulnerability survey, 2015

(Glefe, n=100; Faana, n=100; Old Fadama, n=150)

The low awareness about climate change among women may be explained in terms of the fact that men in these communities had much better access to information sources, such as radio, the media and information technology. Men often attended both formal and informal community meetings where climate change issues were discussed and hence were better informed about climate change relative to women. The above finding means that men and women have different access to information and technology (human capital), which are considered critical in adapting to climate risks. As such, it establishes connections between three components in the vulnerability context of the conceptual framework described in Chapter Four (Figure 4.1): user characteristics, biophysical characteristics and information and technology. This finding is consistent with other studies carried out in slums and marginalised communities in parts of Africa and Asia. For example, Roy and Sharma (2015) reported low levels of awareness among the residents of Jamnagar in India. Similarly, among the indigenous people of Kaduna, Nigeria males have been found to be more likely to perceive climate change compared with females, because they have better education and awareness regarding climate change (Ishaya and Abaje 2008).

The low awareness about climate change among the women respondents in this study raises serious doubts regarding the effectiveness of gender-mainstreaming in climate change education and awareness programme in Ghana. Although gender-mainstreaming in Ghana has been accorded much consideration in climate change education at the national level, it appears that more work needs to be done to translate it into programme implementation at the local level.

5.3.2 Influence of Gender, Age and Education on Climate Change Knowledge

The study also sought to ascertain how gender, age and education influenced respondents' understanding of climate change in terms of its meaning. Analysis of the survey results indicated that overall, 46 percent of the respondents claimed to have knowledge of climate change. Nevertheless, the study found that women in comparison to men were less aware of climate change, with 52 percent of men compared to 41 percent of women claiming that they had knowledge of climate change. In terms of age, the results shown in Table 5.4 indicate that 61 percent of men and 34 percent of women aged 18-29 years claimed to have knowledge of climate change. Overall, a high and equal level of awareness about climate change was found among men and women aged 30-39 years (48 percent). Interestingly, a higher proportion of women aged 50 years and above had knowledge of climate change than men in the same age group. The higher level of awareness among the younger men can be attributed to their exposure to the mass media and other modern communication technologies where information about climate was mostly disseminated.

Table 5.4 Percentage of Male and Female Survey Respondents who have Knowledge of Climate Change by Age

Age	Male (% Yes)	Female (% Yes)	N	Total (% Yes)
18-29	60.9	34.1	70	46.4
30-39	48.1	47.9	49	48.0
40-49	41.7	41.9	23	41.8
50+	46.4	50.1	20	47.6

Source: Gender and climate change vulnerability survey, 2015

Education plays a crucial role in shaping individuals' awareness and appreciation of environmental issues, including climate change. As Table 5.5 indicates, with the exception of respondents with tertiary education, men were more knowledgeable about climate change than women at all levels of educational attainment. In percentage terms, the highest level of climate change knowledge was recorded by men and women with tertiary education, although there were only two of them in this category. This was followed by those with secondary education where 71 percent of men compared to 64 percent of women claimed to have knowledge of climate change. Also, about one third (34 percent) of respondents with no education (34 percent) claimed to have knowledge of climate change which comprised slightly more males than females (37 percent compared to 33 percent). Overall, respondents with higher educational attainment appeared to be more aware of climate change. Given that information about climate change is disseminated mostly through the media and other formal sources, these respondents are most able to access information about climate change compared to their counterparts with lower educational status or no formal education.

Table 5.5 Percentage of Male and Female Survey Respondents who have Knowledge of Climate Change by Level of Education

Level of education	Male (% Yes)	Female (% Yes)	N	Total (%)
Basic	51.5	42.9	38	46.3
JHS / MSLC	50.0	47.1	43	48.9
Secondary	70.7	63.6	36	69.2
Tertiary	100.0	100.0	2	100.0
None	37.0	32.5	43	34.1

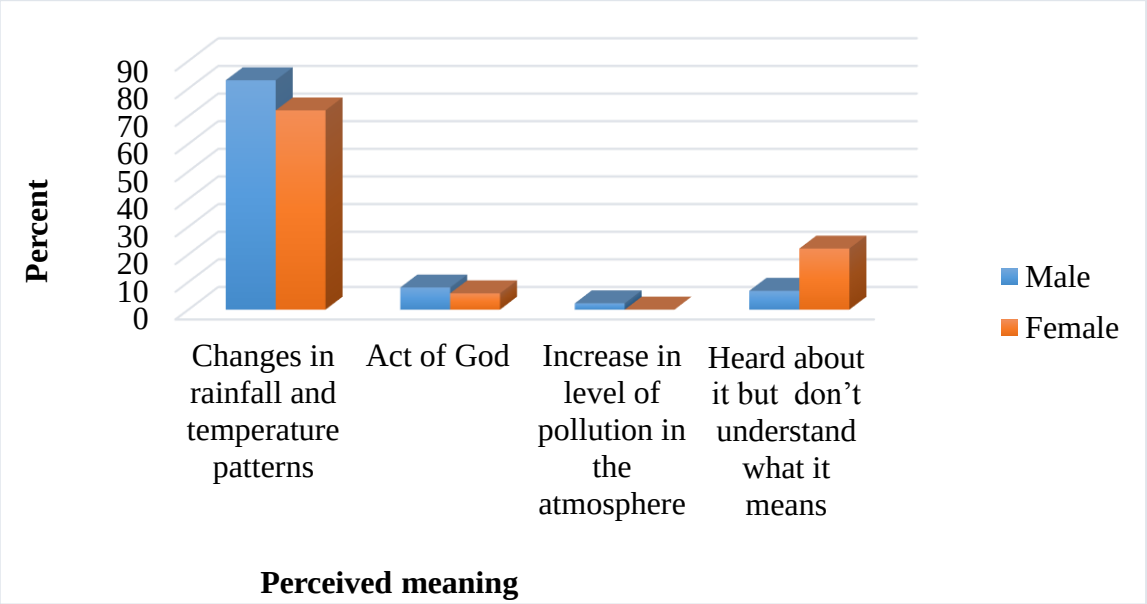
Source: Gender and climate change vulnerability survey, 2015

5.3.3 Synergy between Local Climate Change Knowledge and Existing Scientific Data

Understanding how people perceive climate change is important as it largely determines the forms of actions taken by people to mitigate, or to cope, with its impacts. As Byg and Salick (2009) have argued, local knowledge can make a valuable contribution in gaining a better

insight into climate change; provides information about local conditions; and redirect the foci of empirical investigations into issues that have been overlooked by science. In this regard, the study sought to explore how the respondents perceive the meaning of climate change. Figure 5.2 shows that for those respondents who claimed to have knowledge of climate change, the majority (78 percent) perceived climate change to be "changes in rainfall and temperature patterns", with 83 percent of men and 72 percent of women it this way. An additional 22 percent of women and 7 percent of men claimed to have heard about climate change, but maintained that they did not understand what it meant. As the results of this study indicate, the majority of the respondents who claimed to be have knowledge of climate change perceived it to be changes in rainfall and temperature patterns. Thus, in their own language, the majority of men and women perceived climate change to mean changes in the earth's temperature and precipitation. This finding is consistent with the results of other studies. For instance, as reported in a gender-related study by Oloukoi *et al*. (2014), both men and women in the Nigerian woodland savannah perceived climate change by recounting recent changes in rainfall and temperature patterns. In addition, the perception of climate change as an "act of God" by 8 percent of men and 6 percent of women may be attributed to the high level of superstition in the study communities. The high level of superstition in these communities is particularly ubiquitous in Faana, where women in labour are prevented from giving birth and no burial is allowed to take place due to the presence of fetish shrines. This means that women who are in labour have to be carried in a canoe from the community to other nearby communities for delivery.

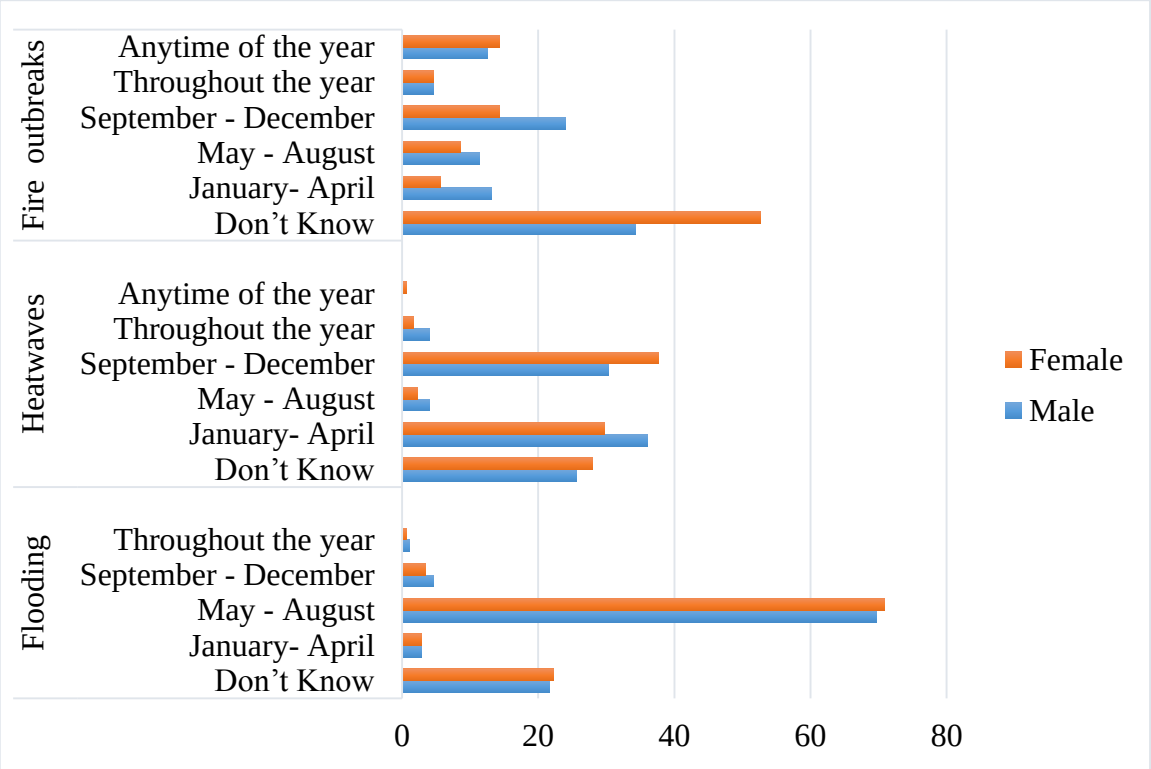
Figure 5.2 Perceived Meaning of Climate Change by Male and Female Survey Respondents



Source: Gender and climate change vulnerability survey, 2015.

Knowledge about when climate events occur is essential for assisting people to prepare for such events, and respondents were asked to indicate the period within which flooding commonly occurred in their communities. Figure 5.3 shows that the majority (70 percent) mentioned May to August, which was significant for women than for men. In contrast, about 33 percent of the respondents perceived heatwaves to occur between January and April, while 34 percent mentioned September to December. In addition, 38 percent of men and 30 percent of women perceived heatwaves to occur between September and December. It is interesting to note that a higher percentage of women (53 percent) than men (34 percent) could not indicate when fire outbreaks occur in their communities, while 24 percent of men compared to 14 percent of women, indicated that it occurred between September and December. Given that men are responsible for organising evacuation during fire outbreaks it appears that they high level of awareness regarding the period for the occurrence of this hazard in their communities.

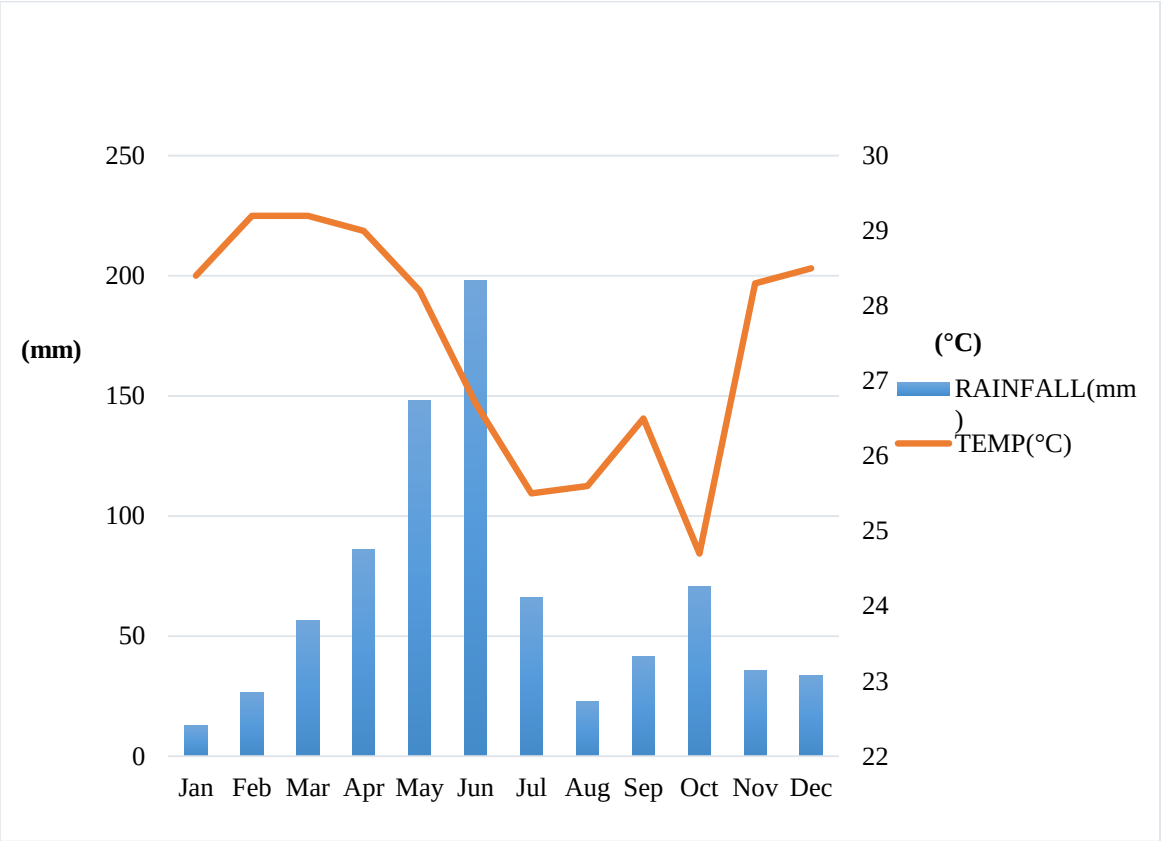
Figure 5.3 Perceived Periods for Climate Hazards by Male and Female Respondents across Study Areas



Source: Gender and climate change vulnerability survey, 2015

The study found the respondents' knowledge regarding the period for flooding (i.e. May-August) and heatwaves (September-December) to be similar to the existing meteorological data on flooding and heatwaves in Ghana (see Figure 5.4). These data were obtained in order to have a deeper insight into the actual rainfall patterns to complement what was obtained in the survey. Figure 5.4 confirms that Accra recorded its highest rainfall between April and July within the period under consideration (1994 – 2014), with highest rainfall recorded in the month of June, when flash floods became common in Accra. In Ghana, flooding is usually associated with the rainy season (i.e. May–September) when heavy rainfall is recorded. Additionally, it can be inferred from Figure 5.4 that there were two distinct periods in the year during which Accra experienced high temperatures i.e. January-May and September-December. These periods correspond with the dry/harmattan season in Ghana during which temperatures soar and fire outbreaks become prevalent.

Figure 5.4 Average Rainfall and Temperature for Accra (1994-2014)



Source: Constructed by Author based on data from Ghana Meteorological Services Agency (2015).

5.4 Socio-Economic and Institutional Drivers of Vulnerability

This section examines the social, economic and institutional factors that shape women's and men's vulnerabilities to climate change. These results illustrate how gender as a social construct intersects with other social and economic factors to determine different vulnerabilities for men and women living in the selected slums. The findings further indicate that gender differences relating to issues of housing, infrastructure and service provision, gender roles and responsibilities, participation in decision-making, as well as ownership and control of assets or resources contributed to different vulnerabilities for men and women.

5.4.1 Quality of Housing

The essential role of quality housing in building the adaptive capacities of both individuals and communities to cope with the impacts of climate change cannot be overemphasised. It is recognised that climate change-related risks facing urban populations in the developing world are not only a function of impact of climate change, but also the quality of housing and the quality and extent of provision for infrastructure and services (Bartlett *et al*. 2009). Poor housing conditions make people more susceptible to climate hazard, such as flooding, sea erosion and heatwaves. In spite of this recognition, analysis of the results indicated that although the conditions of housing appeared to be generally poor across the study areas, men appeared to relatively better off compared to women. In response to questions about the condition of housing, analysis shows that 46 percent of women compared to 29 percent of men occupied compound houses, whereas 57 percent of men and 41 percent of women lived in single rooms. In addition, a slightly higher proportion of men than women lived in detached and semi-detached houses (13 percent versus 11 percent). The high concentration of women in compound houses heightened their exposure to flooding. Field observations conducted by the researcher demonstrated that most compound houses are either wooden shacks or concrete structures which are not painted, have no electricity connections and have deep cracks and holes in the walls. In addition, the roofs leak and the foundations are slightly or largely exposed to erosion with decaying or inadequate windows for proper ventilation.

Table 5.6 shows that in Old Fadama, single room housing predominated, with 93 percent of men and 88 percent of women claiming to occupy single rooms. A different trend, however, was reported in Glefe and Faana with more men than women living in compound houses. Specifically, 84 percent of women and 60 percent of men in Glefe claimed to live in compound houses, whereas 64 percent of women compared to 50 percent of men were in such living arrangements. It must be borne in mind that in compound houses, a number of families or households share a large house, and share a common compound and other facilities such as toilet, kitchen and bathroom. In many instances, there may be between five and ten families or households living in this large house.

Table 5.6 Type of House Occupied by Male and Female Survey Respondents by Study Area

Community	Type of house	Male (%)	Female (%)	Total (%)
Glefe	Compound	60.0	83.6	73.0
	Single Room	22.2	9.1	15.0
	Detached/semi detached	17.8	7.3	12.0
	Total	**100.0**	**100.0**	**100.0**
Faana	Compound	50.0	63.5	57.0
	Single Room	29.2	13.5	21.0
	Detached/semi detached	20.8	21.2	21.0
	Storey	0.0	1.9	1.0
	Total	**100.0**	**100.0**	**100.0**
Old Fadama	Compound	0.0	2.9	1.3
	Single Room	92.7	88.2	90.7
	Detached/semi detached	6.1	7.4	6.7
	Storey	1.2	1.5	1.3
	Total	**100.0**	**100.0**	**100.0**

Source: Gender and climate change vulnerability survey, 2015

As illustrated by Plate 5.1, overcrowding and unsanitary conditions predominate in such houses. Given this kind of living arrangement, it is reasonable to expect that the occupants of such houses mostly women would be more susceptible to waterborne diseases often associated with flooding.

Plate 5.1 Congestion and Unsanitary Conditions in Old Fadama

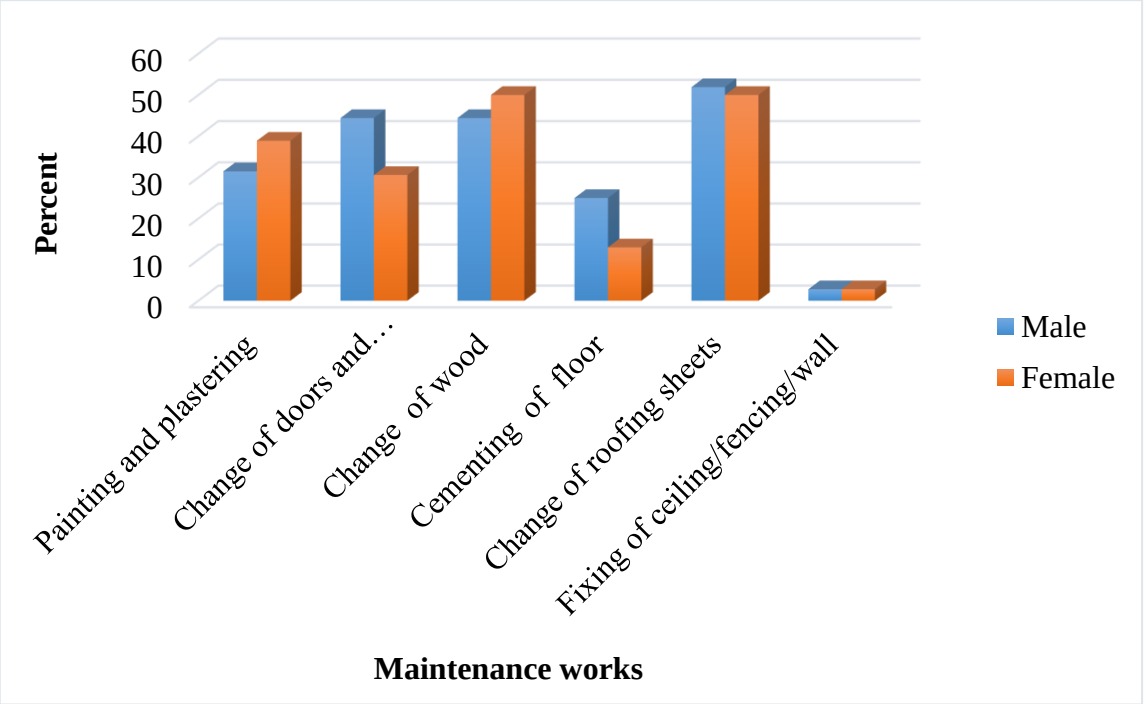
Source: Gender and climate change vulnerability survey, 2015

The poor state of housing acts as a major source of vulnerability for the urban poor, particularly women living in slum communities in Accra and Ghana in general. Watts and Bohle (1993) argue that individual's rights and social entitlements to basic resources, such as housing, information, health care, social welfare, and technological assistance are central to their adaptive capacity. However, individual entitlements to basic services or assets are often constrained or restricted for many reasons including gender (Barnett 2010). The disproportionate housing burden facing women in slum communities can be attributed to the unfavourable cultural and land use practices in Ghanaian society which continues to deny them access to land for various uses including housing. Even though it cannot be denied that Ghanaian women have land usage rights, their access is largely determined by its availability and the goodwill of men who control it by virtue of tenure arrangements, inheritance and land use systems (GSS 2013). This problem has been reported by women in other parts of Africa. For instance, the existence of the dual system of land administration in Uganda (the formal/statutory and informal/customary) has led to the breeding of conflict, confusion, and overlaps in institutional mandates that disadvantage women (Guloba 2014).

Apart from the physical conditions of housing, home ownership serves as an important indicator for assessing the vulnerabilities of slum residents to climate change; it determines the willingness of people to embark on maintenance activities. In this context, the study sought to ascertain gender differences in home ownership and how this contributed to the differences in vulnerabilities experienced by men and women. Analysis found that whereas 51 percent of men claimed to own their homes, only 36 percent of women did so. Home ownership was found to be relatively higher in Faana where 79 percent of men and 65 percent of women did so, while in Glefe, ownership was shared by about only one third of men and women respectively. In Old Fadama, about 46 percent of the respondents who claimed to own their homes were men compared to only 16 percent of women. The significant gender differences in home ownership recorded in Old Fadama may be attributed to the dominance of the traditional system of property ownership in this community, as the majority of residents of this community originally migrated from the northern part of Ghana where cultural and religious practices tend to give preference to men over women in relation to ownership and control of household properties or assets.

Analysis also showed vulnerabilities in relation to room conditions and maintenance with 52 percent of the respondents claiming to have embarked on home maintenance. Figure 5.5 shows the main types of maintenance activities carried out by the respondents and it is evident that changing roofing sheets was the most common activity undertaken by the majority of men and women. Whereas 44 percent of men changed their doors and windows, only 31 percent of women did so. In contrast, about half of the women claimed to have changed the wood on their homes, compared to 44 percent of men. When asked to indicate their main source of funds for home maintenance activities, personal savings was rated as the major source of funds by the majority of the respondents (94 percent of men and 87 percent of women). It can be inferred from this analysis that the inability of the respondents to undertake major home improvements may be attributed to the fact that the majority of them do not own their homes and also consider their settlements as temporary residences because of their ‘illegal’ status in Accra. Slum residents’ interest in undertaking risk-reduction through building improvements varies depending on ownership status, with tenants whose stay is only temporary often showing less interest (Satterthwaite 2008).

Figure 5.5 Types of Home Maintenance Activities Undertaken by Male and Female Respondents across Study Areas



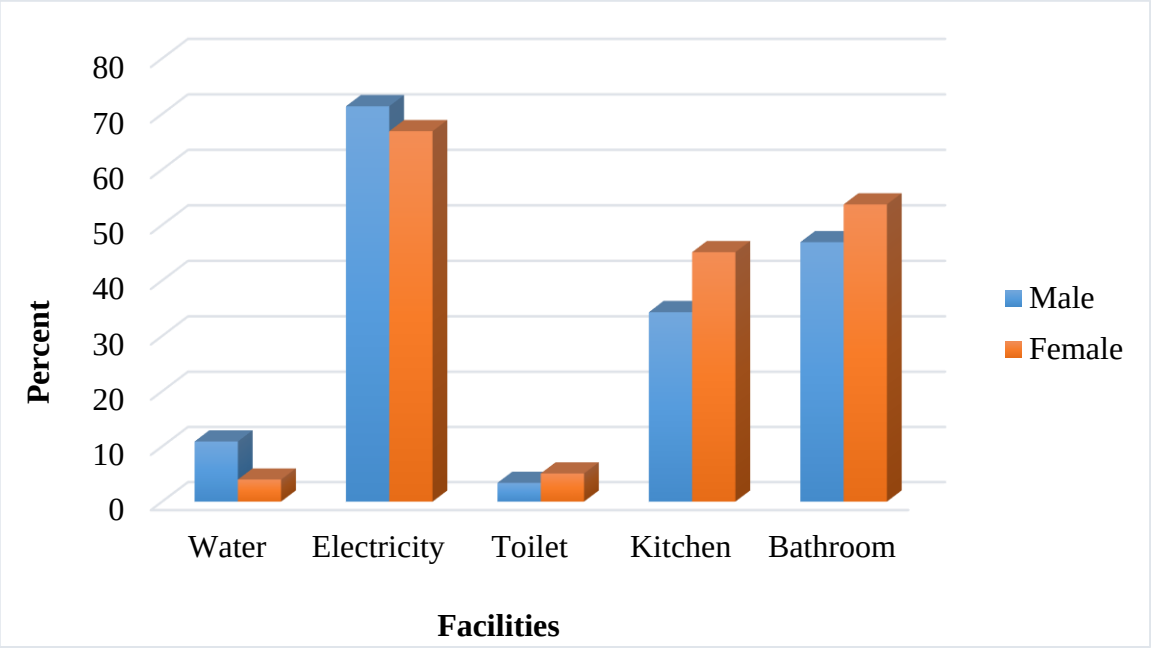
Source: Gender and climate change vulnerability survey, 2015

5.4.2 Availability and Quality of Infrastructure and Service Provision

Apart from the physical conditions of housing, access to quality infrastructure and service provision plays a crucial role in building an individual's resilience and reducing vulnerability to impacts of climate change in urban areas (Satterthwaite 2008). Home and communal infrastructural facilities, such as water, electricity, kitchen, bathroom and toilets are considered as key variables in assessing individuals' or groups' vulnerability to the impacts of climate change, as they tend to affect well-being outcomes. Consequently, this study sought to explore the types and quality of infrastructure available to men and women in the three slums and how they shaped their capacities to adapt to climate hazards. Overall, Figure 5.6 shows that electricity supply and bathrooms were the most common social amenities available to the majority of respondents, albeit, with some differences between men and women. The study found that 71 percent of men compared to 67 percent of women had access to electricity across the three communities. Conversely, women appeared to be better

off than men in terms of access to bathroom (54 percent compared to 47 percent) and kitchen (45 percent compared to 34 percent).

Figure 5.6 Percentage of Male and Female Respondents with Access to Basic Facilities across Study Areas



Source: Gender and climate change vulnerability survey, 2015

The survey results also revealed some differences between the study areas in terms of access to social and basic amenities. As shown in Table 5.7, overall, electricity was commonly available to both men and women in Glefe and Old Fadama but not in Faana, which emerged as the most deprived community in terms of access to basic amenities as none of the respondents in this community had access to water, electricity and toilets.

Table 5.7 Percentage of Male and Female Survey Respondents with Access to Basic Facilities by Study Area (Multiple Response)

Community	Amenities	Male (% Yes)	Female (% Yes)	N	Total (% Yes)
Glefe	Electricity	95.6	90.9	93	93.0
	Bathroom	82.2	78.2	80	80.0
	Kitchen	53.3	54.5	54	54.0
	Water	24.4	10.9	17	17.0
	Toilet	11.1	16.4	14	14.0
Faana	Bathroom	93.8	96.2	95	95.0
	Kitchen	75.0	92.3	84	84.0
Glefe	Electricity	100.0	98.5	149	99.3
	Bathroom	0.0	1.5	1	0.7
	Kitchen	0.0	1.5	1	0.7
	Water	9.8	1.5	9	6.0
	Toilet	1.2	0.0	1	0.7

Source: Gender and climate change vulnerability survey, 2015

The lack of in-yard water connections in the three communities resulted in a situation where the respondents had to walk long distances daily to collect water. Results indicate that about 28 percent of women compared to 25 percent of men trekked over 2km daily to collect water from nearby communities. In addition, 95 percent of women compared to 93 percent of men depended on water sources largely owned and operated by private commercial vendors. The heavy dependence of the respondents on private commercial facilities is due to the absence of municipal water services in these communities. Given this situation, the respondents have to depend on private water operators who in most cases monopolise the provision of water services, often making the price of water very expensive in slum communities.

In terms of access to toilets, it was found that 60 percent of the respondents depended on private commercial toilets, while 40 percent practised open defecation. Whereas 66 percent of men and 62 percent of women claimed to use private commercial toilet facilities, the proportion of respondents who resorted to open defecation was slightly higher for women than for men (34 percent compared to 30 percent). The situation was dire in Faana where none of the respondents had access to toilet facilities and had to engage in open defecation,

mostly along the beach and other open spaces. This situation certainly posed some serious challenges to the respondents, especially women. When the respondents were asked if the lack of toilets at home posed challenges to them, about 50 percent of women compared to 30 percent of men responded in the affirmative. As can be seen in Table 5.8, the problem was particularly acute for respondents aged 30-39 years, with 58 percent of women compared to only 37 percent of men indicating that the absence of a toilet in their houses was a problem. This was followed by the older respondents (aged 50 years and above), with 43 percent of them indicating this to be an issue, which was higher for women than for men (64 percent compared to 32 percent).

Table 5.8 Percentage of Male and Female Survey Respondents who have Problem with Location of Toilet by Age

Age	Male (%)	Female (%)	Total (%)
18-29	26.1	41.5	34.4
30-39	37.0	58.3	47.1
40-49	20.8	51.6	38.2
50+	32.1	64.3	42.9

Source: Gender and climate change vulnerability survey, 2015

Thus collectively, the above results indicate not only the dilapidated infrastructure and poor service provision in the three slums, but also the wide gender and spatial differences in terms of access. The inadequate and dilapidated state of amenities in these communities may be attributed to the dwindling role of city authorities in the provision of municipal infrastructure and services in slums in most cities in Ghana, especially Accra. The reluctance of the city authorities to provide infrastructure and other essential services to slum residents is largely underpinned by the neoliberal urban development paradigm, which views slums as "environmental hazards" that must be demolished in order to 'beautify' the city. Although the negative impact of this urban development approach, which is often manifested through shortage of essential drainage infrastructure, water and sanitation services, seemed to affect all slum residents, the impact was is often felt disproportionately by women. Given that the responsibility for collecting and storing water is borne largely by women and girls in the study communities, the lack of in-yard water connections meant that they were compelled not only to travel long distances, but also join long queues each day to collect water for

domestic uses. This activity often added extra burdens to their domestic responsibilities, and with climate change predicted to affect both the quality and quantity of water available, one cannot but conclude that women's vulnerability is likely to heighten. Similarly, the lack of domestic toilet facilities in the study areas has forced many of the respondents to defecate in the open. This posed some serious health challenges to the respondents, the peculiar situation of women made them more vulnerable to physical attacks and public embarrassment.

5.4.3 Social Roles and Responsibilities

The roles performed by men and women in society has often been implicated in the gender differentiated vulnerabilities to the impacts of climate change (Babugura *at al*. 2010; Mnimbo *et al*. 2015). For instance, McKinley *et al*. (2016) have argued that the social role of women in many countries can limit their abilities to adapt to climate change and that their responsibilities relating to childcare, water collection, and cooking fuel collection often enhance their sensitivity to climate change. The results shown in Table 5.9 indicate that women in comparison to men were overburdened with domestic responsibilities across the three communities. Overall, women performed the bulk of the routine domestic duties, such as collecting and storing water, bathing children, washing clothes, cleaning, cooking, home maintenance, house cleaning, collecting fuel/firewood, and taking care of sick children. For example, 71 percent of women compared to 57 percent of men were involved in collecting and storing water for domestic use. Similarly, whereas 84 percent of women claimed to have bathed or fed children, only 37 percent of men did so. Furthermore, 63 percent of women compared to only 24 percent of men were involved in cooking. It is evident that collection of water appears to be the topmost domestic responsibility performed by the respondents. The reason for this is attributable to the scarcity of water in slum communities in Accra. The antagonistic attitude of city authorities towards slums in Accra has meant that the residents of such communities are often denied access to essential services including water. The city planning authorities often justify their decision not to extend essential services to slum communities on their basis of their "illegal" status. Thus, in the view of city authorities, any attempts to extend essential services to such areas suggest a tacit approval of their legitimacy in the city space. As already stated, the impact of this situation was disproportionately felt

by women and children who often had to trek long distances to collect water for domestic use, thereby reducing their time available for engaging in income-generating ventures.

Table 5.9 Types of Domestic Duties Performed by Male and Female Survey Respondent across Study Areas (Multiple Response)

Duty	Male (% Yes)	Female (% Yes)	N	Total (% Yes)
Collecting water	57.1	70.9	224	64.0
Washing of clothes	34.9	67.4	179	51.1
Cleaning	29.7	69.1	173	49.4
Home maintenance	30.9	54.9	150	42.9
Cooking	24.0	63.4	153	43.7
Bathing/feeding children	36.6	84.0	211	60.3
House cleaning	24.0	52.6	134	38.3
Collecting fuel/firewood	14.9	49.1	112	32.0
Taking care of sick children	10.9	42.9	94	26.9

Source: Gender and climate change vulnerability survey, 2015

It was also found that different age groups performed different duties, with bathing and or feeding of children performed mainly by respondents aged 18-29 years and 30-39 years (see Table 5.10), with 85 percent of women compared to 52 percent of men claiming to have undertaken this duty. This is not surprising given that these respondents are within the childbearing age. In addition, the collection of water was done mostly by those aged 40 years and above. Given that the responsibility for collecting water mainly falls on children and young adults in Ghanaian society, one would expect that this activity be performed by respondents aged below 40 years. It appears that the heavy involvement of these respondents in other routine domestic duties, including bathing or feeding of children, may have reduced their involvement in water collection. It can also be inferred from Table 5.10 that whereas 74 percent of women aged 40-49 years undertook cleaning, only 25 percent of men within the same age range did so. In addition, washing of clothes was undertaken mostly by the respondents aged 40-49 years which comprised 81 percent of women compared to only 29 percent of men. Moreover, 74 percent of women compared to only 17 percent of men aged 40-49 years were involved in collecting fuel or fuelwood.

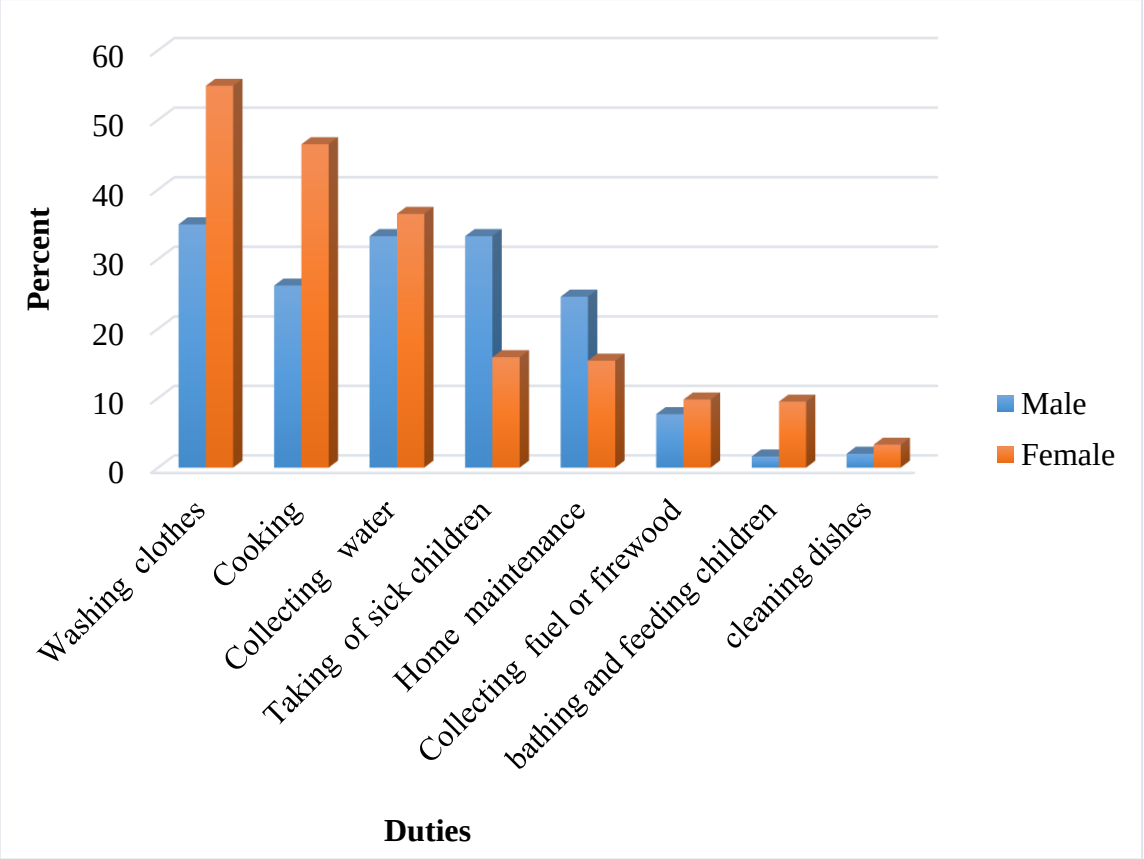
Table 5.10 Percentage of Male and Female Survey Respondents who Performed Domestic Duties by Age (Multiple Response)

Age	Domestic duty	Male (% Yes)	Female (% Yes)	N	Total(% Yes)
18-29	Collecting water	59.4	56.1	87	57.6
	Washing of clothes	42.0	57.3	78	50.3
	Cleaning	34.8	61.0	74	49.0
	Home maintenance	40.6	41.5	62	41.1
	Cooking	18.8	47.6	52	34.4
	Bathing/feeding children	39.1	90.2	101	66.9
	House cleaning	27.5	36.6	49	32.5
	Collecting fuel/firewood	13.0	32.9	36	23.8
	Taking care of sick children	8.7	29.3	30	19.9
30-39	Collecting water	46.3	79.2	63	61.8
	Washing of clothes	27.8	75.0	51	50.0
	Cleaning	25.9	81.2	53	52.0
	Home maintenance	29.6	64.6	47	46.1
	Cooking	24.1	77.1	50	49.0
	Bathing/feeding children	51.9	85.4	69	67.6
	House cleaning	20.4	64.6	42	41.2
	Collecting fuel/firewood	13.0	58.3	35	34.3
	Taking care of sick children	16.7	58.3	37	36.3
40-49	Collecting water	70.8	90.3	45	81.8
	Washing of clothes	29.2	80.6	32	58.2
	Cleaning	25.0	74.2	29	52.7
	Home maintenance	16.7	71.0	26	47.3
	Cooking	29.2	80.6	32	58.2
	Bathing/feeding children	25.0	71.0	28	50.9
	House cleaning	25.0	71.0	28	41.2
	Collecting fuel/firewood	16.7	74.2	27	49.1
	Taking care of sick children	8.3	58.1	20	36.4
50+	Collecting water	60.7	85.7	29	69.0
	Washing of clothes	35.7	71.4	20	47.6
	Cleaning	28.6	64.3	17	40.5
	Home maintenance	21.4	64.3	15	35.7
	Cooking	32.1	71.4	19	45.2
	Bathing/feeding children	10.7	71.4	13	31.0
	House cleaning	21.4	64.3	15	50.9
	Collecting fuel/firewood	21.4	57.1	14	33.3
	Taking care of sick children	7.1	35.7	7	16.7

Source: Gender and climate change vulnerability survey, 2015

The survey results also revealed that women spent more time than men in performing routine domestic duties. As Figure 5.7 indicates, 55 percent of women compared to 35 percent of men claimed to have spent more than one hour per day on washing clothes. In the same vein, 47 percent of women spent more than an hour per day on cooking, compared to only 26 percent of men.

Figure 5.7 Percentage of Male and Female Respondents who spent more than One Hour per day on Domestic Duties (Multiple Response)



Source: Gender and climate change vulnerability survey, 2015

Apart from the above-mentioned routine duties, focus group discussions also revealed that women and men had different roles in the community. Table 5.11 shows specific roles performed by men and women and it is evident that men were generally responsible for handling home finances, while women performed home management roles.

Table 5.11 Social Roles Performed by Men and Women in Community

Women's role	Men's role
• Caring for the sick • Cooking • Bathing of children • Collecting water • Collecting firewood/fuel • Home maintenance • Washing (clothes/dishes) • Securing food items • Cleaning	• Function as heads of households/families • Provision of clothing/essential items for the family • Provision of house-keeping money • Provision of shelter/payment of rent • Payment of school fees/expenses

Source: Focus Group Discussions, 2015

It can be inferred from these findings that most of women's domestic roles and responsibilities in the study communities depended largely on the availability of natural resources, such as water and fuel wood. This situation was found to have contributed to different degrees of vulnerabilities for men and women. Water and fuel shortages caused directly and indirectly by climate change, posed considerable time and labour burden for women, more so than men. The longer the women spend searching for water and fuel wood, the less time and energy they have for performing other domestic responsibilities, suggesting an increase in time poverty. The differential impacts of climate change are evident here due to the different role of men and women to source and secure water and fuel, which may also negatively impact on women's and girl's health (human capital) and well-being in the longer term. The finding also demonstrates women's vulnerability in connection with biophysical characteristics that is largely due to their roles relative to men. It is reasonable to suggest that whereas women were more vulnerable in times of resource scarcity, complementary roles, on the other hand, empowered men to have more opportunities than their female counterparts (Nelson *et al*. 2002; Babugura *et al*. 2010; Kakota *et al*. 2011). An increase in women's work load and burden as a result of changes brought by climate change may mean that they have to forgo opportunities that are crucial for their economic empowerment, such as education, training and income-generating activities (Goh 2012). The gendered nature of domestic roles has been found to be associated with different levels of vulnerability among smallholder farmers in Tanzania (Mnimbo *et al*. 2015). Similarly, in South Africa, women

have been found to have an extra burden when faced with climatic stressors as they make efforts to cope with them (Babugura *et al*. 2010).

Notwithstanding, the results of the focus groups discussions suggested that changes brought by climate change and variability have contributed to a transformation in gender roles and responsibilities in the study communities. For instance, it was found that women were engaged in income-generating activities to ensure the sustenance of their families. However, in spite of the fact that women are increasingly undertaking men's activities, they have not automatically acquired the same rights. This finding is in line with that of Kakota *et al*. (2011) who reported that in Malawi, women's and men's roles and responsibilities have changed due to climate variability in the sense that the responsibilities, which were previously for men, are now shared between men and women because of the increased demand at the homestead. However, it must however be stressed that climate change and variability cannot be to blame entirely for this transformation in gender roles. It was expressed during focus group discussion that this transformation has been accentuated further by non-climatic factors, such as unemployment, urban poverty, weak social protection system, and privatisation policies, which have compelled respondents to either diversify their existing roles or take on different ones. Although this transformation has negatively affected both men and women, it is recognised that women and girls bear the brunt of the impact. For instance, it has been argued by Dankelman (2008) that the privatisation agenda pursued by the government of Ghana under the World Bank's policy framework, has had wide implications for women and girls in terms of access to water and sanitation services (Dankelman 2008).The transformation in gender roles as revealed by this study has been confirmed elsewhere in South Africa, where Babugura *et al*. (2010) found both climate change and non-climatic factors (e.g. HIV/AIDS and unemployment) to have impacted on gender roles, thereby forcing men and women to engage in different activities to accommodate responses to the impacts of climate variability.

5.4.4 Accessibility to and Control over Resources/Assets.

Accessibility to resources (i.e. natural, physical, financial, human and social) is recognised as a key aspect of vulnerability to climate change in Africa (Bob and Babugura 2014). Resources or assets are important for the poor, especially slum residents in that they can assist them cope better with climate shocks and longer terms impacts of climate hazards or extremes. Specifically, control over assets plays a critical role in increasing incomes, reducing vulnerability and empowering people to move out of poverty (Goh 2012). Indeed, Adger and Kelly 1999 have argued that the entitlement of individuals or communities to the utilisation of resources largely influences their abilities to cope with and adapt to climate change. However, in spite of this recognition, access to resources or assets has been found to be gendered in many societies, especially those in the developing world (Dankelman 2008). Based on this, Goh (2012) has argued that climate-related disasters have immediate and longer term impacts that are different for men and women depending on the extent of physical, human and social capital they have access to under various social, economic and cultural contexts. It is against this recognition that this study explored the interconnections between resources or asset ownership and vulnerability to climate change at both the individual and community levels. Specifically, the study sought to address the following questions: What types of resources/asset are available in slum communities?; Who owns and controls these resources?; and in what ways have gender differentials in access to and control over resources contributed to differentiated vulnerabilities for men and women?

Table 5.12 shows the main types of physical assets or resources owned by men and women who were surveyed, and it is evident that ownership of assets or resources is gendered in favour of men, with about 60 percent of men compared to only 40 percent of women claiming to own assets. The house emerged as the most common asset with about 31 percent of respondents claiming to be home owners, with some 38 percent of men compared to only 24 percent of women. Similarly, the proportion of men who owned a bank account was higher than for women (27 percent compared to 18 percent). It is apparent that men owned and controlled the bulk of the resources indicated by the survey respondents, except for commercial structures where women dominated (12 percent compared to 7 percent). The

relatively higher proportion of women owning commercial structures may be attributed to their dominant role in retail trading in Accra and other cities of the developing world.

Table 5.12 Assets Owned by Male and Female Respondents in Three Study Areas (Multiple Response)

Asset	Male (% Yes)	Female (% Yes)	N	Total (% Yes)
House	37.7	24.0	108	30.9
Bank account	26.9	17.7	78	22.3
Livestock	20.6	12.0	57	16.3
Farm/land	16.6	14.9	55	15.7
Commercial structure	7.4	12.0	34	9.7
Fishing equipment	12.0	5.7	31	8.9
Machine	12.6	2.9	27	7.7
Car	2.9	1.1	7	2.0

Source: Gender and climate change vulnerability survey, 2015

It also emerged during focus group discussions that ownership and control of communal resources or assets is structured along gender lines. Women participants in focus groups intimated that although they may have the rights to utilise certain communal resources or assets, the decisions regarding their utilisation are mostly taken by men. This sentiment was expressed by a female participant during a focus group discussion in Old Fadama:

> *"Even though we* [women] *are more than the men at the Kokomba Yam Market, we don't have any say when they* [men] *are taking decisions about how to allocate stores or space. They make decisions on sanitation issues in the market as well. The men usually decide and inform us about it"* (Participant # 5, Old Fadama).

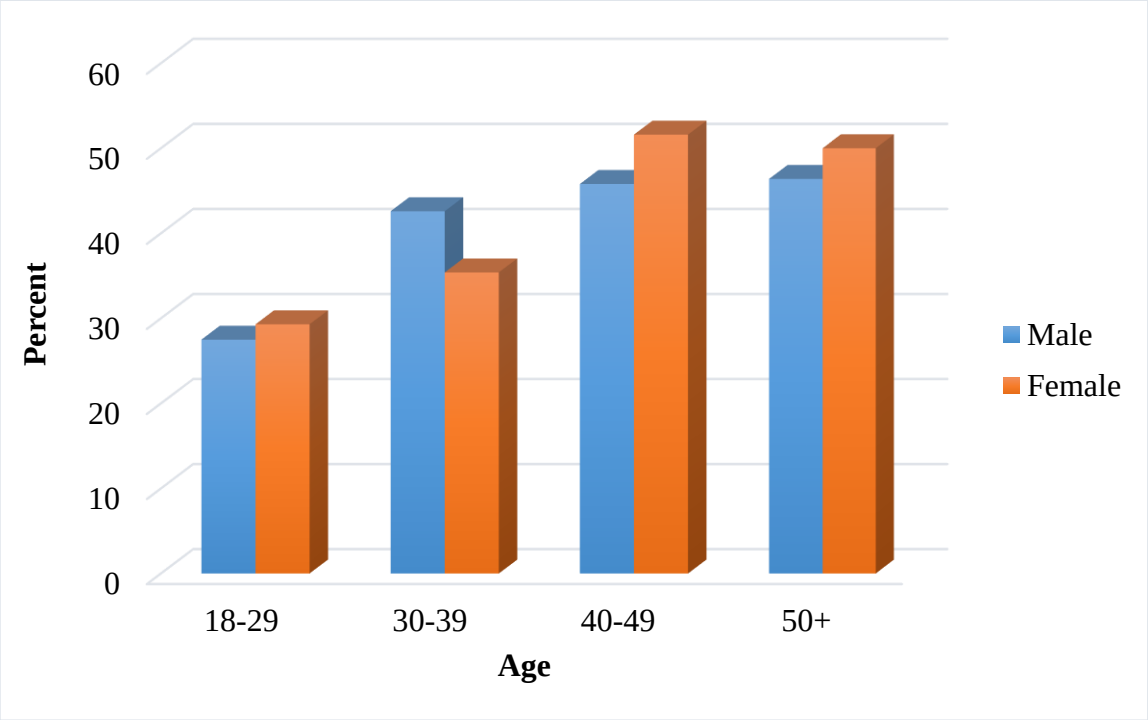
Apart from physical assets, social capital in the form of materials and non-material assistance, can enhance men's and women's adaptive capacities and assist them to mitigate the negative impacts of climate change. A great deal of research has demonstrated how social capital in the form of bonding, bridging and linking connections to others, facilitate collective action, provides information on trustworthiness and connect people to resources during climate disasters (Aldrich *et al*. 2016). This means that differences in access to

social capital by men and women could act as a key driver of vulnerability to climate change impacts. Therefore, the study sought to explore how differential access to social capital by the respondents contributed to differences in vulnerabilities experienced by men and women in the slum communities. The results indicated that social capital mainly in the form of bonding and bridging capital existed in the study communities, which respondents depended on to reduce their vulnerabilites to climate hazards. The bonding capital mainly took the form of dependence on family members or relatives or social networks, such as ethnic, religious or civic associations for material and non-material assistance during flooding and fire outbreaks. The survey results indicated that overall, a third of the respondents belonged to social networks or associations, and this activity was similar for men and women. Membership of social networks or groups was relatively higher in Faana where 44 percent of women and 35 percent of men claimed to participate in social associations. The high interest in social associations shown by the respondents in Faana may be attributed to its homogenous ethnic composition as the majority of the residents belong to the Ewe ethnic group, which provides the impetus for a stronger interpersonal and communal bonding compared to the other communities whose ethnic compsotions are more diverse.

Figure 5.8 shows that participation in social associations was higher among the older respondents, especially those aged 40-49 years where, 52 percent of women and 46 percent of men belonged to associations. This was followed by respondents aged 50 years and above (50 percent of women compared to 46 percent of men). For those aged 30-39 years, the proportion was skewed towards men (43 percent of men compared to 35 percent of women). For those aged under 30 years, slightly a lower percentage were men (28 percent of men compared to 29 percent of women). However, the survey revealed that a higher percentage of men (33 percent compared to 19 percent of women), claimed to have received assistance from their social associations in times of flooding and fire outbreaks. This was particularly high among the respondents in Old Fadama where 40 percent of men and 30 percent of women received assistance. Similarly, in Faana, a higher proportion of men than women received assistance in times of flooding. Glefe emerged as the community with the least proportion of respondents who received assistance, comprising 29 percent of men compared to only 8 percent of women. In addition, the majority of respondents who reported to have received assistance were aged 30-39 and 40-49 years, while those aged 50 years and above

and those below 30 years received the least assistance. In all age groups, the proportion of benefit receivers was higher for men than for women. Generally, older females were likely to get assistance from social associations in times of climate-related disasters.

Figure 5.8 Percentage of Male and Female Respondents Belonging to Social Associations by Age



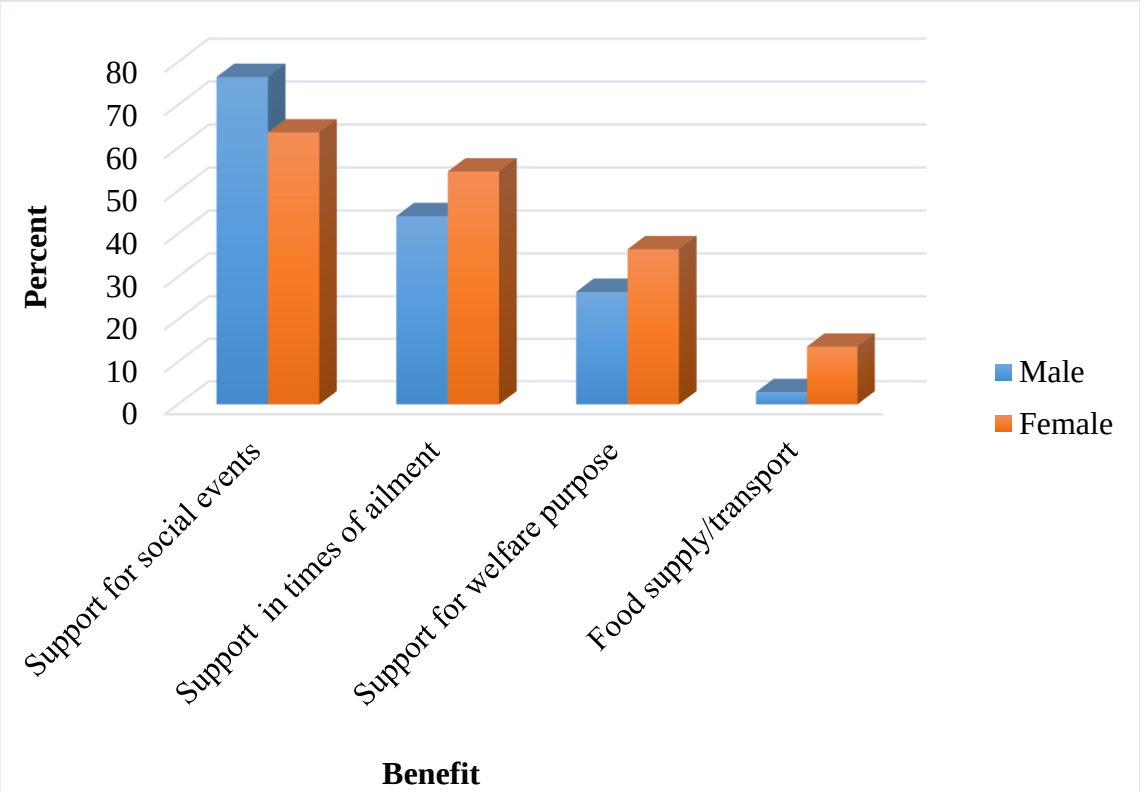
Source: Gender and climate change vulnerability survey, 2015

Figure 5.9 shows that assistance towards celebration of social events emerged as the most popular form of benefit received by respondents, with 77 percent of men compared to 64 percent of women claiming to have received such assistance. Although the respondents appeared to have received some assistance from their social associations, this was not used to cope with the impacts of climate hazards. The men and women participants indicated in the focus group meetings that this support did not fully assist them to cope with flooding and fire outbreaks, as it was largely geared towards social events.

As expressed by a woman participant during a focus group meeting:

> *"Yes we do receive support from our social groups or associations since we are the same people in the group but those are for social gathering such as weddings, out-dooring, funerals etc. not for coming to the aid of disaster victims"* (Participant # 3, FGD 2015).

Figure 5.9 Types of Assistance Received by Male and Female Respondents from Social Associations across Study Areas (Multiple Response)



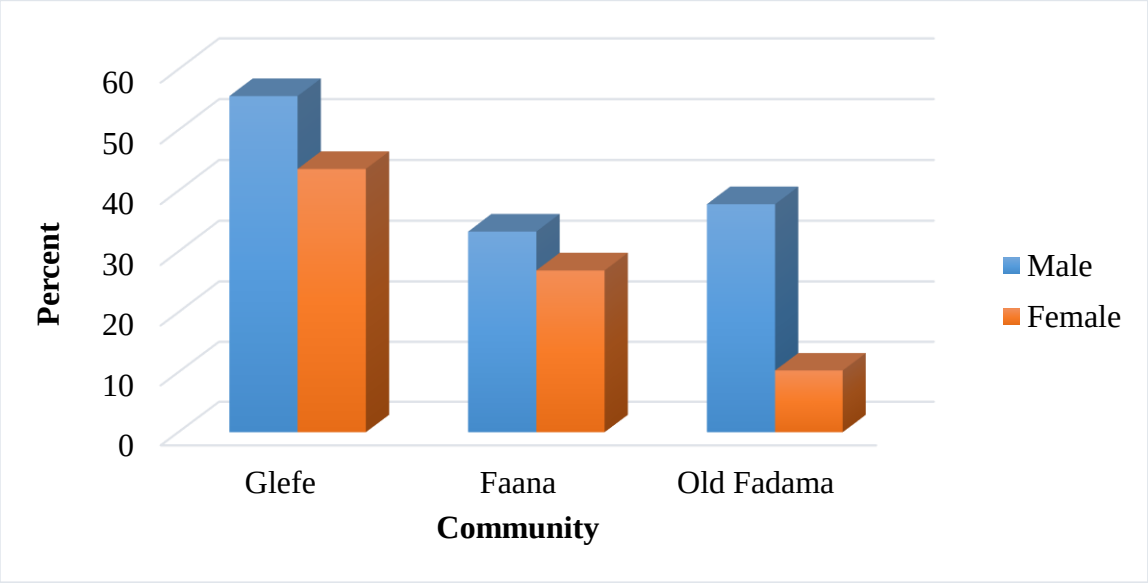
Source: Gender and climate change vulnerability survey, 2015

The men and women participants were also found to have benefitted collectively from bonding capital in the form of engagement in Community-Based Organisations (CBOs). A number of informal groups in the form of community development associations exist in the communities, which play a crucial role in addressing communities' vulnerabilities to climate hazards, such as flooding and fire outbreaks. In Old Fadama, there exist the Old Fadama Development Association (OFADA), the Ghana Federation of the Urban Poor (GHAFUP), and the Kayayei Youth Association, which have been involved in community development

activities for a considerable period of time. Similalry, there is Glefe Community Development Association which also seeks to champion the development needs of the commmunity. Membership of these groups is voluntary and collectively, these groups have been responsible for addressing many social and environmental issues confronting the communities including organizing community members for sanitation activities, resolving conflicts between community members, and dealing with formal state and non-state institutions on behalf of the communities. These informal organisations have arisen to fill the void that has been created by the absence of the disaster risk management activities by formal institutions in these communities. For instance, after the 2012 devastating fire in Old Fadama, OFADA working in collaboration with GHAFUP, organised the community members to undertake reconstruction when formal disaster management institutions, such as NADMO failed to assist the victims (Owusu 2012).

In spite of the crucial role played by these informal organisations, the study found that women did not fully participate in their localised adaptation decision-making processes. The results of the survey revealed that 41 percent of men compared to only 26 percent of women were aware of the existence of community governance structures responsible for making decisions on disaster risk management. Figure 5.10 shows that the level of awareness about local decision making bodies was higher among the respondents in Glefe, where 56 percent of men compared to 46 percent of women claimed to be aware of such structures. This was followed by Faana (33 percent of men compared to 27 percent of women), while Old Fadama recorded the least, with 38 percent of men compared to only 10 percent of women indicating that they were aware. The high level of awareness among respondents in Faana and Glefe can be explained in terms of the fact that these communities are considered as 'legal' settlements by the city authorities. Residents of Old Fadama, by contrast, are considered to be occupying the land illegally and are therefore under constant threat of eviction (Owusu 2012). Consequently, most people in this community consider themselves to be temporary residents despite the fact that they have been occupying the land for many years. The constant threat of eviction has often acted as a barrier for people to engage in the activities of such local organisations.

Figure 5.10 Percentage of Male and Female Respondents aware of Local Decision Making Structures by Study Area



Source: Gender and climate change vulnerability survey, 2015

The results of the focus groups discussions further indicated that men dominated in the membership of these informal organisations. Although some women were involved in the activities of these organisations, the leadership structures were controlled by men, thereby making it difficult for women to participate equally in the affairs of these organisations. It was also found that women tended to play peripheral roles in these organisations. As was expressed by a woman participant during focus group discussion in Old Fadama:

> *"There is an informal leadership structure in this community represented by Old Fadama Development Association (OLDFADA) and the Kaya Youth Association. We* [women] *are involved in the activities of OLDFADA but it is totally controlled and managed by the men. This makes it difficult for us to participate equally in the affairs of the association. We just play organizing role in this association and attend community durbars and forums"* (Participant #2, FDG 2015)

The female participants across the three communities indicated that they were not consulted or engaged in decision making by the community leadership although they attended other community programmes, such as durbars and public forums. This assertion is further

supported by the survey results which revealed that 30 percent of men compared to only 11 percent of women were consulted in localised adaptation decision-making processes.

Taken together, the findings in this section demonstrate that the differential vulnerabilities faced by men and women are closely linked to sociocultural norms (that is, institutional arrangements) prevailing in the study communities and Ghanaian society in general. By virtue of their roles as caregivers, social expectations of what is acceptable for women, and lack of access to decision making power, income generating activities and assets, women tend to be more vulnerable relative to men in facing the impacts of climate hazards. These findings further highlight how the interaction between user characteristics (i.e. men and women) and institutional arrangements (gender roles, ownership of resources, participation in decision making) tend to affect the context in which climate change occurs. In this regard, women in comparison to men were more vulnerable to the impacts of climate hazards because of their limited assets, social roles, and limited participation in decision making. These limitations are underpinned by the sociocultural norms which are largely determined by the institutional arrangements in the conceptual framework (see Figure 4.1).

5.5 Conclusion

This chapter presented analysis of the survey and focus groups in relation to how the main climate hazards are experienced and perceived within the study communities, including the respondents' actual knowledge of these hazards. The results relating to how gender interacted with social, economic and institutional factors to shape men's and women's vulnerabilities to climate change impacts in slum communities in Accra were also discussed. The findings indicate that overall, women and men living in the three study communities were exposed to a myriad of climate hazards prominent among which, were flooding, sea erosion, salinity intrusion, fire outbreaks and heatwaves, albeit with some differences in exposure between study communities. Although flooding was considered to be a major climate hazard by men and women in Faana and Glefe, fire outbreak predominated in Old Fadama. Moreover, the respondents' perceptions regarding the cause of climate hazards are moderately gendered, with men demonstrating a high level of climate change knowledge

than women. Even though men and women across the three communities experienced different vulnerabilities, overall women were found to have been more vulnerable to these hazards due to their limited control over productive resources/assets, poor housing conditions, limited access to urban infrastructure and service provision; and heavy involvement in domestic duties which negatively affected their time for engaging in income-generating activities. The different vulnerabilities experienced by men and women were also found to have contributed to differential livelihood impacts. These livelihood impacts are examined in the next chapter.

6 CHAPTER SIX: CLIMATE CHANGE AND LIVELIHOOD SECURITY

6.1 Introduction

This chapter presents the analysis of the impacts of climate hazards on the livelihoods of men and women involved in this study. It begins with the examination of the main sources of livelihoods for men and women in the study communities by exploring their gender and spatial differentiations. This is followed by a discussion on how climate hazards, specifically flooding, fire outbreaks, rainstorm and sea erosion impacted negatively on the livelihoods of men and women. It further examines the impacts of these hazards on physical and human assets utilised by men and women to pursue their livelihoods. The physical asset component of the discussion focusses on how flooding, sea erosion and fire outbreaks, impacted negatively on housing and communal infrastructure of men and women, while the human asset dimension deals with the impacts on their health. The focus on the physical and human assets in this chapter is underpinned by the important role that two types of assets play in the sustenance of livelihoods in slum communities. Since the overarching focus of this chapter is on the impact of climate hazards on men's and women's livelihoods, the discussion is structured using gender and other socio-demographic variables as units of analysis to establish differences that may exist in livelihood vulnerabilities.

Key Findings on Climate Change and Livelihood Security

- ✓ A wide range of livelihood activities existed across study communities, with trading and artisanal fishing emerging as the predominant livelihoods.
- ✓ Livelihoods are gendered and spatially differentiated, with men engaged mainly in artisanal fishing and collection and recycling of scrap metals/electronic waste while women were involved in retail trading, fish mongering and head porterage.
- ✓ Climate hazards impacted negatively on the livelihoods of men and women differently, with home-based enterprises of women disproportionately affected because of their location in vulnerable areas.
- ✓ Differential livelihood impacts were mediated largely by the gendered nature of livelihood and location of study area.

6.2 Types of Livelihood Activities in the Study Communities.

Analysis found that participants were engaged in a wide range of livelihood activities. Table 6.1 shows that trading and artisanal fishing predominated livelihoods across the study communities, with about 26 percent and 16 percent of the respondents engaged in these activities respectively. This was followed by head porterage, with about 12 percent of the respondents claiming to be head porters. It must also be emphasised that the major livelihoods, such as trading, artisanal fishing, head porterage, fish mongering and collection and recycling of electronic waste, are classified as private informal sector activities occurring within the informal economy. This finding is supported by the 2010 National Population and Housing Census Report of Ghana which found that 73 percent of the employed population in the Greater Accra Region is in private informal sector employment (GSS 2013b).

Table 6.1 Livelihoods of Male and Female Survey Respondents across Study Areas

Livelihood/occupation	**N**	**Male (%)**	**Female (%)**	**Total (%)**
Retail Trading	93	21.7	31.4	26.6
Artisanal Fishing	59	25.7	8.0	16.9
Head Porterage	42	0.0	24.0	12.0
E-waste/scrap metal	40	22.3	0.6	11.4
Fish mongering	37	0.0	21.1	10.6
Manufacturing/Artisanship	24	10.9	2.9	6.9
Unemployed/student	14	4.6	3.4	4.0
Food Vending	13	2.3	5.1	3.7
Driving	11	5.7	0.6	3.1
Fashion Designing	10	2.9	2.9	2.9
Farming/Others	7	4.0	0.0	2.0
Total	**350**	**100.0**	**100.0**	**100.0**

Source: Gender and climate change vulnerability survey, 2015

This finding suggests that there is a heavy concentration of slum residents in the urban informal economy, which further underscores the point that informal sector employment is on the ascendency in many cities of the developing world, and Accra is no exception. Decades of stunted economic growth recorded by the formal sector in many cities of the developing world has meant that many residents including slum dwellers, have had to find employment in the less regulated informal economy. The growth of the urban informal

economy in Ghana has been linked to the retrenchment policies pursued under the World Bank's and IMF's Structural Adjustment Programmes (SAPs) (Essamuah and Tonah 2004; Obeng-Odoom 2011). It has been suggested that the implementation of a number of policies under SAP such as government downsizing, cuts in public infrastructure expenditure, trade liberalisation, and the privatisation and closure of state-owned enterprises among others have led to the loss of large numbers of jobs in the civil and public services with unskilled and low-skilled urban employees being the most affected (Essamuah and Tonah 2004). Urban poor, particularly slum residents, are one category of urban population negatively affected due to their low levels of formal education and lack of professional training or capacity building opportunities. Thus, it can be argued that the implementation of the SAPs policy has had a negative impact on vulnerability in urban slums by undermining some institutional practices which served as security and coping mechanisms for the urban poor, particularly slum residents, in times of climate stress or shocks. For instance, Adger (1999) found that the market liberalisation process has led to inequality in income and changes in the incidence of poverty in the Xuan Thuy District in Vietnam. This finding illustrates how the institutional environment affects adaptation in the vulnerability context of the conceptual framework (see Figure 4.1). Institutions determine how climate risks and impacts are distributed across different social groups and populations (Agarwal and Perrin 2008; Jones *et al*. 2010).

The results of the survey also indicated that livelihoods were both gendered and spatially differentiated, with 25 percent of men engaged in artisanal fishing and only 8 percent of women involved in this activity. By contrast, trading was dominated by women, with 31 percent compared to 21 percent of men claiming to be traders. Similarly, whereas head porterage and fish mongering (i.e. preservation and selling of fish) were heavily dominated by women, collection and recycling of scrap metals or electronic waste was reserved exclusively for men. The reason for the heavy involvement of women in home-based enterprises, such as trading is attributable to the flexibility offered by such activities. Female participants in focus group discussions indicated that they prefer to engage in home-based enterprises because they are able to combine their home management and reproductive roles with such activities. Additionally, it emerged that the capital requirement for starting a home-based enterprise was relatively lower compared to other activities such as artisanal fishing which requires a huge initial capital outlay. The gendered nature of livelihoods as revealed

in this study correlates with results of the 2010 Population and Housing Census Report of the Ghana Statistical Service (GSS), which found that 45 percent of men were engaged in agriculture, forestry and fishing, compared to 37 percent of women (GSS 2013). This report also confirmed that 32 percent of women compared to only 10 percent of men were engaged in the services and retail trading sector in Ghana (GSS 2013). These findings further underscore the point that the gendered nature of occupational distribution in Accra's slums is similar to the national occupational dynamics.

Apart from the gender dimensions, survey results also highlighted notable differences between the study communities in terms of livelihoods. Table 6.2 shows that trading was reported as the predominant livelihood for men and women in Glefe (40 percent) and Old Fadama (33 percent), while their counterparts in Faana were mostly involved in fishing (55 percent) and fish mongering (31 percent). Nonetheless, there were some differences between men and women. Of the 40 percent of traders in Glefe, 55 percent were women compared to 22 percent of men. The responses were however split between men and women engaged in trading in Old Fadama. This is in contrast to Faana where men were found to be engaged predominantly in fishing while their female counterparts were involved in fish mongering. Overall, it is evident that trading and manufacturing or artisanship were the topmost livelihoods in Glefe, while artisanal fishing and fish mongering were the most popular activities in Faana. In the same way, trading, head porterage and collection and recycling of electronic waste were reported as the most dominant livelihoods in Old Fadama. The dominant role of artisanal fishing and fish mongering in Faana is explained by its location along the coast, sandwiched between the sea and the Sakumo Lagoon. The nature of its location means that the community is cut off from the rest of Accra as it does not have access to infrastructure facilities and other essential services from mainland Accra. This makes it difficult for the residents to access alternative employment opportunities in other parts of Accra to supplement their fishing and its ancillary activities. However, it is surprising that fishing was not considered as an important livelihood activity in Glefe given its coastal location. This may be explained in terms of the fact that this community is easily accessible from the rest of Accra, which therefore, makes it easier for the residents to access employment opportunities in other sectors of Accra's economy, especially in retail trading and small-scale manufacturing. The same explanation suffices for Old Fadama which is

located in close proximity to the CBD of Accra, and the Agbogloshie Market which is considered to be the largest open market in Accra is located in close proximity to this community and therefore makes trading an ideal livelihood option for the inhabitants.

Table 6.2 Livelihoods of Male and Female Survey Respondents by Study Area

Community	Occupation/Livelihood	N	Male (%)	Female (%)	Total (%)
Glefe	Trading	40	22.2	54.5	40.0
	Manufacturing/Artisanship	15	24.4	7.3	15.0
	Driving	9	17.8	1.8	9.0
	Unemployed/student	9	11.1	7.3	9.0
	Fashion Designing	8	8.9	7.3	8.0
	Fish mongering	6	0.0	10.9	6.0
	Food Vending	5	2.2	7.3	5.0
	Fishing	4	4.4	3.6	4.0
	Farming/Others	4	8.9	0.0	4.0
	Total	**100**	**100.0**	**100.0**	**100.0**
Faana	Trading	4	2.1	5.8	4.0
	Manufacturing/Artisanship	1	2.1	0.0	1.0
	Driving	1	2.1	0.0	1.0
	Unemployed/student	4	4.2	3.8	4.0
	Fish mongering	31	0.0	59.6	31.0
	Food Vending	2	0.0	3.8	2.0
	Fishing	55	89.6	23.1	55.0
	Head Porterage	2	0.0	3.8	2.0
	Total	**100**	**100.0**	**100.0**	**100.0**
Old Fadama	Trading	49	32.9	32.4	32.6
	Manufacturing/Artisanship	8	8.5	1.5	5.3
	Driving	1	1.2	0.0	0.6
	Unemployed/student	1	1.2	0.0	0.6
	Fashion Designing	2	1.2	1.5	1.3
	Food Vending	6	3.7	4.4	4.0
	E-waste Collection	40	47.6	1.5	26.6
	Head Porterage	40	0.0	58.8	26.6
	Farming/Others	3	3.7	0.0	2.0
	Total	**150**	**100.0**	**100.0**	**100.0**

Source: Gender and climate change vulnerability survey, 2015

The gender and spatial differentiation in relation to livelihoods, suggests that gender and place are two critical issues that need consideration in assessing the impacts of climate change on livelihood security of slum residents in the context of the developing world. The next section examines how the impacts of climate change manifested through flooding, sea erosion, and fire outbreaks impacted differently on livelihoods of men and women across the study communities.

6.3 The Impact of Climate Change on Livelihoods

Extreme climate events or hazards can affect the ability of individuals in urban areas to sustain livelihoods (Gasper *et al*. 2011). Cutter *et al.* (2000) argue that livelihood vulnerability to climate change can be understood as an outcome of biophysical and social factors. Studies have suggested that particular groups within cities sometimes bear the disproportionately large burdens of livelihood impacts based on gender, age and race (Gasper *et al*. 2011). The results of this study indicated that the livelihoods of men and women across the study communities were affected negatively by climate hazards. Overall, 81 percent of the respondents claimed that their livelihoods were affected negatively, with responses equally split between men and women. Nevertheless, the impacts were not felt in the same way across the different locations. Faana emerged as the most heavily affected community with all the respondents in this community claiming that their livelihoods were affected, with proportion equally split for men and women. This was followed by Glefe where the livelihoods of 78 percent of the respondents were claimed to be affected, with almost equal proportions of men and women. The situation was, however, different in Old Fadama where of the 70 percent of the respondents who were affected, the proportion was slightly higher for men than for women (72 percent compared to 68 percent).

The devastating effects of climate hazards on livelihoods were further confirmed by participants during focus group discussions. Both men and women across the study areas indicated that flooding, sea erosion, salinity intrusion, windstorm, and fire outbreaks have impacted negatively on their livelihoods and also contributed to an increase in their domestic activities, thereby reducing the time for engaging in income-generating ventures. However,

the impacts were observed to differ not only between men and women but also across the study communities. Table 6.3 shows the specific impacts of climate hazards on livelihoods of men and women and it is apparent that whereas the female participants in the three study areas recounted the impacts of climate change on their trading and fish mongering activities, their male counterparts observed impacts relating to artisanal fishing and infrastructure.

In particular, women were found to have been heavily impacted by flooding and fire outbreaks due to the fact that the bulk of their livelihood activities took place at home or within the community. These impacts were manifested through the destruction of trading sites or damage to homes. Food vending was mentioned as one of the home-based enterprises negatively affected by flooding and fire outbreaks. Female food vendors in focus group discussions stated that they recorded lower sales during floods because they were unable to provide services to their customers. This sentiment was expressed by a food vendor woman in Old Fadama as follows:

> *" Anytime floods occur we are not able to go to work because we have to spend time collecting water out of our rooms and even when we manage to cook food, customers do not buy because of the stagnant waters around us"*(Participant #2, FGD).

In the same way, some men involved in artisanal fishing maintained that the changes in seasons associated with climate change and variability have had some negative impacts on their fishing activities. This was particularly the case in Faana where the men in a focus group meeting indicated that they have observed a drastic reduction in the quantity of fish. This situation has compelled some men to either abandon fishing or look for other sources of employment to supplement their income. It must be stressed that the reduction in the quantity of fish also presented some serious challenges to women, especially those involved in fish mongering. Women in focus group meetings reported a reduction in income from fish mongering activities because they were unable to get enough fish to process and sell at the market.

Table 6.3 Specific Impacts of Climate Hazards on Livelihoods of Men and Women by Study Area

Community	Impact on men's livelihoods	Impact on women's livelihoods
Glefe	• Floods prevent us from going to work • Our workplaces/sites get flooded which leads to loss of income. • Flooding and sea erosion destroy our houses and personal effects.	• Our home-based businesses are affected by flooding and sea erosion • Floods prevent women who operate their businesses outside the community from going to work. • Reduction in quantity of fish caught has affected income of fish mongers.
Faana	• Floods destroy fishing equipment (nets, canoes, boats, outboard motors). • Inability to go fishing during flooding leads to loss of income • Destruction of houses/commercial structures.	• Sea erosion destroys fish smoking equipment • Floods destroy our stored fish • Flood and sea erosion fish storage equipment.
Old Fadama	• Fire outbreak destroy our working tools/equipment • House reconstruction after fire outbreaks is a huge drain on our time and resources. • We are unable to go to work in times of flooding leading to loss of income.	• We are prevented from going to work in times of flooding leading to loss of income • We lose customers in times of flooding as they are prevented from buying from us because of flood waters. • Floods affect our health through spread of malaria. • Floods damage trading/vending sites. • Floods and fire outbreaks destroy houses and other personal effects. • Our monies get burnt in times of fire outbreaks

Source: Focus Group Discussions, 2015

Notwithstanding, some men and women also reported positive impacts on their livelihoods as a result of exposure to some hazards. For example, some men involved in collection and recycling of electronic waste or scrap metals maintained that they benefitted from the sale of cheap metals in times of flooding. As expressed by a scrap metal collector:

> *"Floods sometimes affect our business positively because during the rainy season, most people get their shops or homes flooded and the flood waters may destroy engine parts of machines or cars so we get work to do"* (Participant #5, FGD)

Similarly, some women involved in food vending activity, especially those whose sites were not flooded reported recording higher sales during floods because most people were not able to cook in their homes, and therefore, patronised the food vendors.

6.4 Impact of Climate Change on Physical and Human Assets

As already indicated, assets in the form of physical and human capital (i.e. health) are very critical for the sustenance of livelihoods in slum communities. Undoubtedly, the health status of slum residents has a direct bearing on their productivity. Similarly, physical assets mainly houses or commercial structures are important inputs for livelihoods, especially for the running of home-based enterprises. The survey results revealed that the health and the physical assets or properties of men and women were also impacted negatively by flooding, sea erosion and fire outbreaks. These impacts were manifested through damage to homes, vending sites, personal belongings, cooking utensils, livestock, as well as communal infrastructure. The study found that overall, climate hazards affected the physical assets of about 61 percent of the respondents. Table 6.4 shows the main physical assets or properties impacted by flooding, sea erosion and fire outbreaks, and it is apparent that the impacts were felt differently by men and women. Of the 46 percent of respondents whose personal effects were destroyed or damaged by these hazards, 90 percent were men compared to 85 percent of women. In the same vein, whereas 49 percent of men reported damages to their houses, 43 percent of women did so. By contrast, 16 percent of women compared to only 4 percent of men reported that their cooking utensils were destroyed by such climate hazards. A similar trend appeared in terms of destruction of stored fish or food items, with a higher proportion of women being affected than men.

Table 6.4 Types of Physical Asset Affected by Climate Hazards across Study Areas (Multiple Response)

Asset/property affected	N	Male (% Yes)	Female (% Yes)	Total (%)
Personal effects	187	90.4	84.8	87.8
Houses	97	48.7	42.9	46.0
Money/savings	31	15.8	13.1	14.6
Fishing equipment	20	11.4	7.1	9.4
Cooking utensils	20	3.5	16.2	9.4
Smoked/stored fish	15	0.9	14.1	7.0
Food items	12	5.3	6.1	5.6
Commercial structures	8	4.5	3.0	3.8
Documents	7	3.5	3.0	3.3
Water storage facilities	5	1.8	3.0	2.3
Livestock	5	2.7	1.9	2.3

Source: Gender and climate change vulnerability survey, 2015

The differences in impact may be explained in terms of the distinct roles performed by men and women in the study communities. It appears that in recounting the loss of their physical assets, women tended to connect to their homes, while men focused more on infrastructure (Fordham 1998; Vasseur *et al*. 2015).

Although men suffered in terms of loss of assets, the overall physical impacts fell disproportionately on women. This is confirmed by the flooding/rainstorm disaster data for Accra in 2011 obtained from the National Disaster Management Organisation which reveals that although men and were negatively affected, women were more affected. It can be seen from Table 6.5 that of the 36,586 people that were affected by floods/rainstorm/windstorm in Accra in 2011, over half (52 percent) of them were women. Additionally, more than half (52 percent) of the children affected by these climate hazards were female children.

Table 6.5 Impact of Flooding/Rainstorm/Windstorm on Greater Accra Region, 2011

District affected	No. of communities affected	No. of people affected			
		Adult		Children	
		M	F	M	F
Dangbe West	3	212	298	378	415
Ashiedu Keteke	2	148	200	114	106
Ablekuma North	8	956	960	897	793
Ablekuma South	10	589	602	540	523
Lekma	8	147	159	158	164
Ga west	10	1,409	1,757	958	944
Ablekuma Central	1	334	358	191	198
Okai Koi South	3	1,233	1,214	980	1,034
Osu Korley Klottey	5	1,017	1,099	559	552
Ga East	26	1,175	1,216	592	633
Ayawaso Central	4	271	261	306	291
Ayawaso West	3	464	514	300	330
Adenta	11	548	485	730	676
Tema Metro	3	537	641	948	987
Ashaiman	1	152	140	74	88
Ga South	46	5,843	6,789	4,789	5,927
Okai Koi North	2	967	874	562	575
Accra Sub-Metro	3	1,521	1,496	678	660
Total	**149**	**17,523**	**19,063**	**13,754**	**14,896**

Source: National Disaster Management Organisation, Flood/Windstorm/Rainstorm Data for Accra 2011

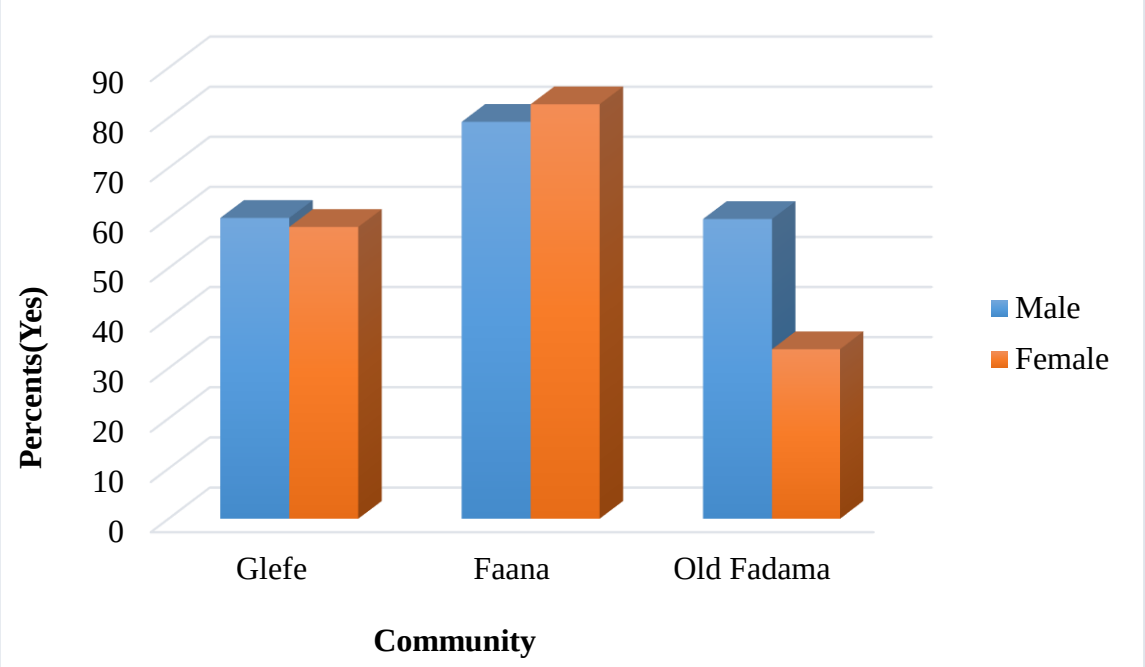
Head porters were identified as one category of women who were most affected by flooding. Women head porters indicated in focus group discussions that flooding posed a major challenge to them. As expressed by a female porter during a focus group discussion:

> *"During floods our situation becomes more terrible. We have to stand throughout the night and wait for the rains to subside for us to clean our rooms. Sometimes we put up with our male residents when we cannot clean our rooms"* (Female Porter in FGD, 2015).

Female participants maintained that head porters were often exposed to a number of social and health consequences, such as sexual violence, unplanned pregnancy, and sexually transmitted infections, because they sometimes had to put up with their male residents in

times of flooding or fire outbreaks. Apart from the gender-differentiated impacts, the results also indicated some differences between the study communities. Figure 6.1 shows the differences between the study communities in terms of impacts of climate hazards on physical assets.

Figure 6.1 Percentage of Male and Female Respondents whose Physical Assets were Negatively Affected by Climate Hazards by Study Area (Multiple Response)



Source: Gender and climate change vulnerability survey, 2015

(Glefe, n=59; Faana, n=81; Old Fadama, n=72)

Overall, the impacts were felt disproportionately in Faana where 23 percent of respondents whose physical assets were damaged by flooding and sea erosion lived, with a higher proportion of women than men reporting damages to their physical assets (83 percent compared to 79 percent). The situation was somewhat different in Glefe where 60 percent of men compared to 58 percent of women recorded negative impacts on their physical assets. The severity of sea erosion was particularly manifested in Glefe where authorities have

predicted that the community is likely to be submerged if action is not taken to ameliorate the situation. As expressed by an opinion leader during a focus group meeting:

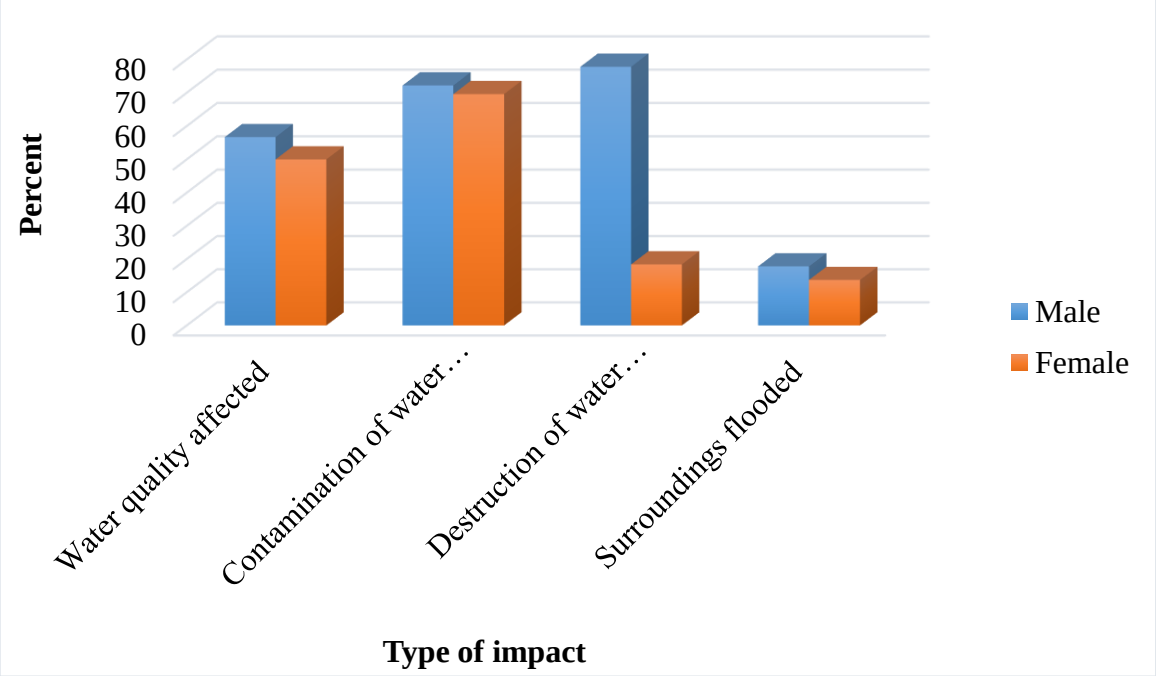
> *"The Geological Services Department predicts that if access routes/roads are not created in the community* [Glefe]*, the sea erosion will eventually submerge the entire settlement in 20 years"* (Male Participant in FGD, 2015).

The difference between responses of men and women regarding the impacts on physical assets was particularly significant in Old Fadama, with 60 percent of men compared to only 34 percent of women indicating that climate hazards impacted negatively on their assets. This trend in Old Fadama may be due to the wide gender inequalities in asset ownership and control, which are underpinned by perverse cultural and religious practices. The majority of residents in this community originally migrated from the northern part of Ghana where property ownership in the household is structured in favour of men. Even though women from this part of Ghana may own assets in certain cases, decisions regarding asset utilisation are taken by men. Therefore, it appears that the majority of residents in this community continue to hold on to such cultural and religious practices despite the fact that they have migrated to the city.

As already indicated, health is an important aspect of human capital for sustaining livelihoods in slums in the sense that it has a strong correlation with productivity. The study showed that, overall the health of 55 percent of respondents was affected directly or indirectly by flooding and salinity intrusion. These effects were manifested through the contamination of water sources and the spread of waterborne diseases, especially malaria and cholera. These impacts were high for both men and women (59 percent compared to 51 percent). Figure 6.2 shows the specific challenges posed to water sources by flooding and salinity intrusion and it is evident that the impacts on water quality and the contamination of water sources were the major health issues reported by the majority of respondents, albeit, with some differences between men and women. Of the 44 percent of respondents who were concerned about water contamination, 57 percent were men compared to 50 percent of

women. Similarly, a high proportion of men and women (70 percent) indicated that flooding and salinity intrusion negatively affected the quality of their water.

Figure 6.2 Challenges Posed to Water Sources of Male and Female Survey Respondents by Climate Hazards across Study Areas



Source: Gender and climate change vulnerability survey, 2015

(Male, n=175; Female, n=175)

Table 6.6 shows the rankings of challenges posed to water sources and it is evident that the challenges varied across the communities. The impact on water quality and contamination of water sources were more commonly experienced in Faana than in the other two communities. For instance, about 97 percent of the respondents in Faana experienced water contamination compared to 40 percent in Glefe and 53 percent in Old Fadama. In addition, whereas 76 percent of respondents in Faana complained about poor quality of water, only 46 percent and 20 percent of their counterparts did so in Old Fadama and Glefe respectively. However, destruction of water storage facilities emerged as the biggest challenge in Old Fadama, with 70 percent of the respondents in this community indicating that they

experienced this problem. The peculiar challenges imposed on water sources in Faana by flooding and salinity can be attributed to its location as an island community. The community is sandwiched between the sea and the Sakumo Lagoon and, therefore, salinity intrusion is a common occurrence. Consequently, the community does not have access to pipe borne water and residents have to trek long distances to collect water daily from neighbouring communities by using rudimentary canoes (See Plate 6.1).

Table 6.6 Challenges Posed to Water Sources of Male and Female Respondents by Climate Hazard by Study Area (Multiple Response)

Community	Effect on water sources	Male (% Yes)	Female (% Yes)	Total (%)
Glefe	Water quality affected	13.0	24.3	20.0
	Contamination of water sources	30.4	45.9	40.0
	Destruction of water storage facilities	8.7	8.1	8.3
	Surroundings get flooded	65.2	35.1	46.7
Faana	Water quality affected	80.9	72.0	76.3
	Contamination of water sources	95.7	98.0	96.9
	Destruction of water storage facilities	2.2	14.0	8.3
	Surroundings get flooded	2.1	0.0	1.0
Old Fadama	Water quality affected	50.0	40.0	45.7
	Contamination of water sources	66.7	33.3	52.8
	Destruction of water storage facilities	81.0	56.2	70.3
	Surroundings get flooded	0.0	6.7	2.9

Source: Gender and climate change vulnerability survey, 2015

Plate 6.1 Women Carting Water in a Canoe from Neighbouring Community to Faana

Source: Gender and climate change vulnerability survey, 2015

Flooding also contributed to the spread of waterborne diseases. Table 6.7 shows the common diseases experienced by the respondents, and it is clear that malaria and cholera emerged as the topmost health concerns for about 67 percent and 20 percent of the respondents respectively, albeit, with no significant differences between men and women in terms of the distribution of the disease burden. However, age appeared to be an important factor in the experience of malaria, with respondents aged 18-29 years most likely to frequently experience malaria than the older age groups.

Table 6.7 Diseases Experienced Frequently by Male and Female Survey Respondents across Study Areas (Multiple Response)

Disease	N	Male (% Yes)	Female (% Yes)	Total (%)
Malaria	234	65.7	68.0	66.9
Cholera	69	22.3	17.1	19.7
Body ache	16	5.1	4.0	4.6
Stomach ache	13	4.0	3.4	3.7
Skin Rashes	6	0.6	2.9	1.7
Other Diseases	12	2.3	4.6	3.4
Total	350	100.0	100.0	100.0

Source**:** Gender and climate change vulnerability survey, 2015

This trend may be attributed to immunological reasons. The malaria parasite is known to have devastating effects on younger persons due to their poor immunity to the disease, compared to older persons who tend to develop a better immunity over time due to prolonged infection. It is important to note that the respondents took some precautionary measures to combat malaria, as both male and female participants mentioned that they often slept under insecticide treated mosquito nets to reduce their vulnerability to malaria. This practice was particularly common among pregnant women and children. Moreover, community development associations in Old Fadama and Glefe organised community members to desilt choked drains to get rid of stagnant waters which serve as breeding grounds for malaria carrying mosquitoes.

6.5 Conclusion

This chapter discussed the impacts of climate hazards, specifically flooding, sea erosion, salinity intrusion and fire outbreaks on the livelihoods of men and women involved in this study. The results demonstrated that occupation was not only gendered but also spatially differentiated. Whereas men were involved mainly in artisanal fishing, collection and recycling of electronic waste, and small-scale manufacturing or artisanship, their female counterparts engaged in trading, fish mongering and head porterage. Spatially, artisanal fishing and fish mongering were predominant livelihoods in Faana, with men involved in the former, while women engaged in the latter. In Old Fadama, head porterage was

exclusively for women and men were involved in collection and recycling of electronic waste. Similarly, while trading was the major livelihood for women in Glefe, their male counterparts were found mainly in artisanship or manufacturing.

The study also found that the bulk of these livelihoods were found in the informal sector of Accra's economy. Though climate hazards impacted negatively on the livelihoods of both men and women, the home-based enterprises of women were disproportionately affected due to their location in vulnerable areas. These impacts were manifested through damage to trading sites or homes. However, in some cases, it was found that changes in the seasons associated with climate change and variability also impacted negatively on livelihoods of some men, especially in fishing activities. The physical and human assets of the respondents were also threatened by flooding, sea erosion, salinity intrusion, windstorm, and fire outbreaks. These impacts were manifested through damage to respondents' homes, infrastructure facilities and health status. Evidently, flooding was found to have contributed to the spread of malaria and cholera, thereby posing serious health challenges to the respondents, particularly women and younger respondents. It was found that differences in impacts felt by men and women and between the study communities were determined largely by the gender differences in access to, and control over, resources, the distinct roles performed by men and women in the community, as well as the nature of location of the study communities. To overcome their livelihood vulnerabilities, men and women have implemented a number of coping mechanisms. These mechanisms are examined in the next chapter.

7 CHAPTER SEVEN: ADAPTATION TO CLIMATE CHANGE

7.1 Introduction

This chapter examines the mechanisms employed by men and women to cope with impacts of climate change on their livelihoods and well-being. It begins with a discussion on the main coping practices or strategies that are currently implemented by men and women in coping with the impacts of flooding, sea erosion, salinity intrusion and fire outbreaks, and differences in their coping practices. This is followed by an examination of the capabilities and constraints faced by men and women in coping with climate hazards focussing specifically on issues relating to access to early warning information, and their participation in local adaptation governance processes. Further, the role of local institutions in building the adaptive capacities of men and women to cope with climate change is evaluated, highlighting the strengths and weaknesses as they relate particularly to the issue of gender-mainstreaming in climate change adaptation planning.

Key Findings on Adaptation to Climate Change

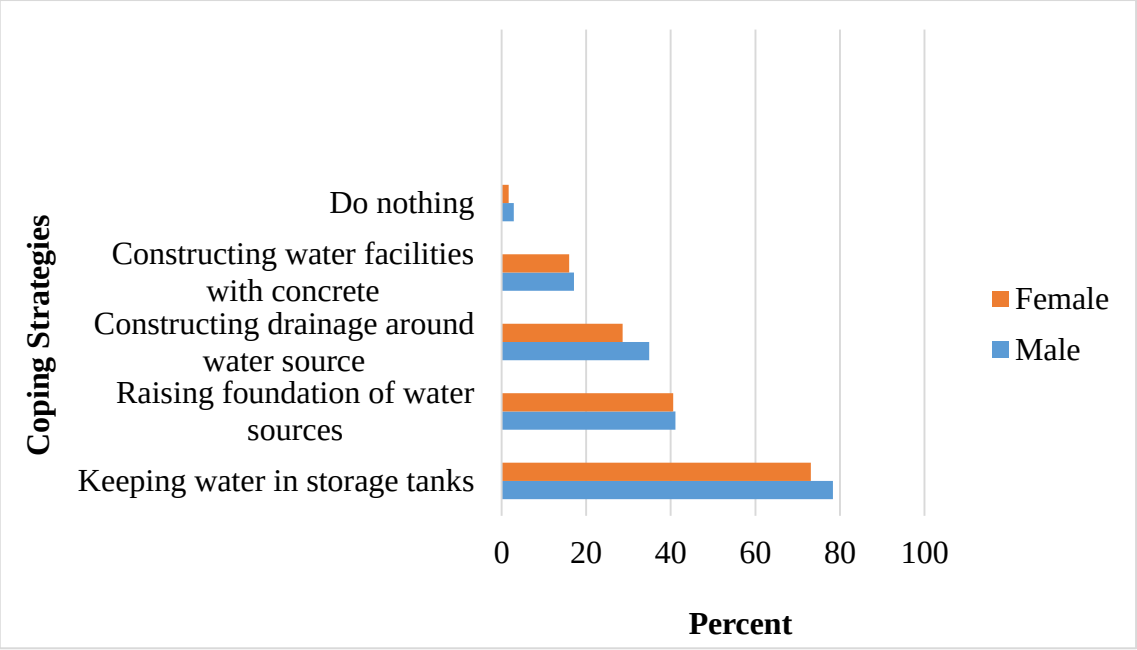
- ✓ Respondents implemented a wide range of strategies to enable them cope with impacts of climate hazards, albeit, with no significant differences in the coping practices of men and women across study areas.
- ✓ Access to early warning information for adaptation was found to be gendered and spatially differentiated which presented different implications for men and women and study areas in terms of adaptive capacities.
- ✓ Utilisation of male-dominated community structures for disseminating early warning information by local disaster risk management institutions constrained the adaptive capacity of women as their needs and priorities were sidelined.
- ✓ Weak collaborative partnerships among local institutions hampered effective gender mainstreaming in adaptation planning and management.
- ✓ A weak nexus between national and local levels in climate change adaptation policy development and implementation contributed to ineffective adaptive capacity building in slum communities.

7.2 Coping Strategies.

People and communities are not only victims in the face of climate change, but also active managers of vulnerability (IPCC 2012). The results of the survey demonstrated that

respondents were not passive victims in the wake of climate change as they implemented a wide range of adaptive measures or strategies, either as individuals or as collectives to cope with the impacts of climate hazards. Figure 7.1 shows the main strategies implemented by men and women to protect their water sources from impacts of flooding and salinity intrusion, and it is evident that keeping water in sealed plastic containers or high storage tanks was the most popular strategy, with 45 percent of respondents claiming to have implemented this strategy. In addition, 24 percent of the respondents also protected their water sources from possible contamination from flooding and salinity intrusion by putting water on high concrete platforms or by raising the foundations of their water sources. However, the results of the Mann Whitney U test indicated that there were no significant statistical differences in the mean rankings of the coping practices implemented by men and women to protect their water sources from climate hazards (See Appendix 11). In other words, the coping practices implemented by respondents to protect their water sources did not differ significantly between the genders.

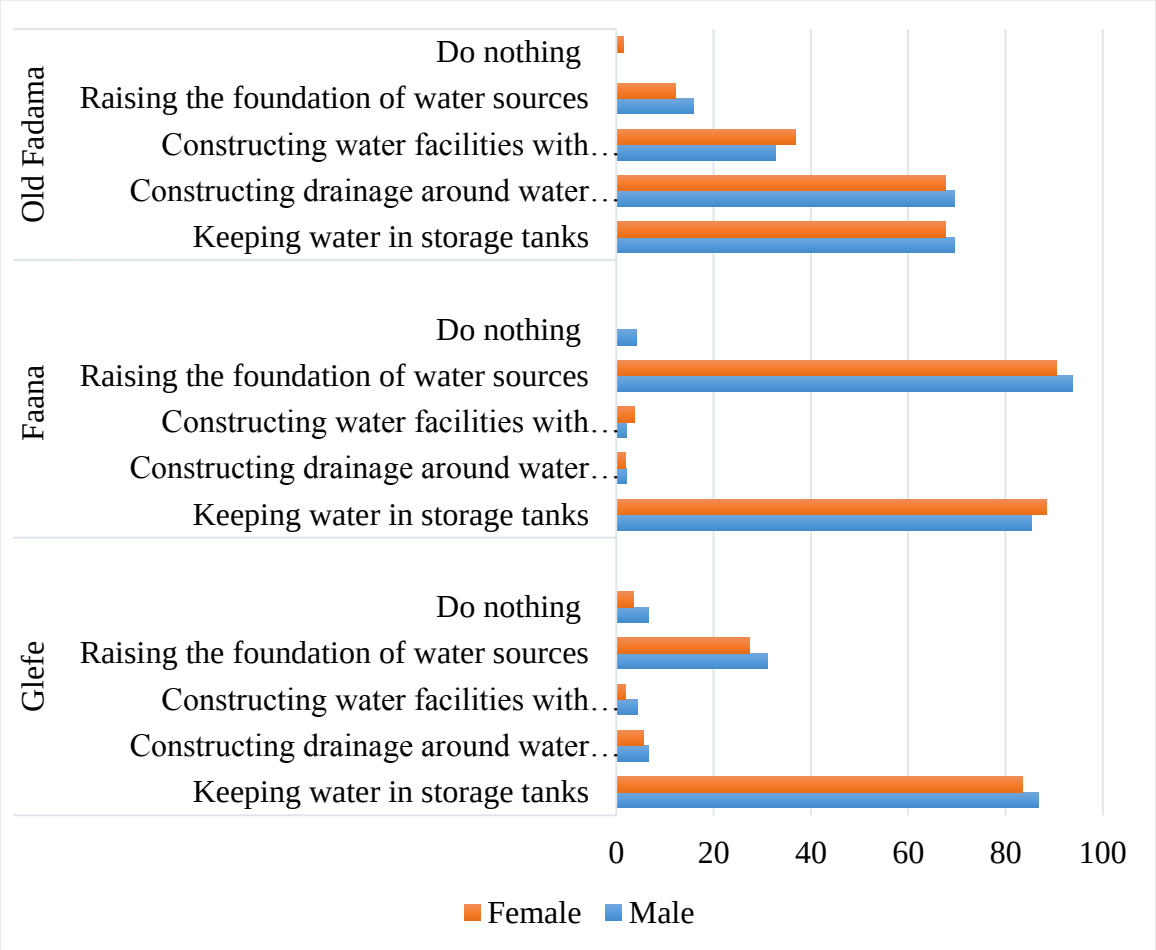
Figure 7.1 Strategies Implemented by Male and Female Respondents to Protect Water Sources from Flooding across Study Areas (Multiple Response)



Source: Gender and climate change vulnerability survey, 2015

The results also revealed some differences between the study areas in terms of coping practices. As Figure 7.2 shows, keeping water in high storage tanks (see Plate 7.1) was commonly implemented in Glefe by 87 percent of men and 84 percent of women. By contrast, the majority of respondents in Faana protected their water by raising the foundations of their water facilities. This practice was adopted by 94 percent of men and 90 percent of women in this community

Figure 7.2 Strategies Implemented by Male and Female Survey Respondents to Protect Water Sources from Flooding by Study Area (Multiple Response)



Source: Gender and climate change vulnerability survey, 2015

However, the construction of drainage systems around water sources in order to divert flood waters was seen as the most effective strategy in Old Fadama.

Plate 7.1 Water Storage Tanks Mounted on a High Platform in Glefe to Protect Water from Floods.

Source: Gender and climate change vulnerability survey, 2015

The differences in coping practices observed among the study communities may be attributed to their differentiated exposure to flooding and salinity intrusion, as well as the nature of their locations. For example, given their low-lying nature and coastal locations, water sources in Glefe and Faana were more vulnerable to floods and salinity intrusion compared to Old Fadama, which is located inland on relatively higher ground. Therefore raising the foundations of water facilities and keeping water in high storage tanks appeared to be much more effective for combating water contamination issues in these two communities. On the other hand, the overcrowded and waterlogged nature of Old Fadama meant that flood waters tended to accumulate around water sources thereby contributing to water contamination and the spread of water borne diseases. To overcome this challenge, the residents often constructed drainage channels around water to facilitate the flow of flood waters.

To prevent damage to houses by climate hazards, the respondents also implemented a number of strategies. Table 7.1 shows the main strategies implemented by men and women to protect their houses and other physical structures from impacts of climate hazards and it

can be seen that about 34 percent of respondents resorted to cleaning choked or blocked drains to aid the flow of flood waters. This strategy was implemented by 36 percent of men and 32 percent of women. In addition, a third of respondents indicated that they usually relocated on a temporary basis to the unaffected parts of their community or to neighbouring communities in times of flooding. Furthermore, 38 percent of men and 26 percent of women respondents constructed temporary dykes or trenches to divert flood waters from damaging their houses. Interestingly, only 3 percent of respondents did not take any action to protect their houses.

Table 7.1 Strategies Implemented by Male and Female Respondents to Protect Houses from Impact of Climate Hazards across Study Areas (Multiple Response)

Coping Strategies	Male (% Yes)	Female (% Yes)	Total (%)
Cleaning up blocked drains	36.0	32.0	34.0
Constructing temporary dykes or trenches to divert water away	38.3	26.3	32.3
Temporal relocation	33.7	33.1	33.4
Lodge with friends/relatives	6.9	9.7	8.3
Bailing water out of house	25.7	28.0	26.9
Relying on family members for support	12.6	16.0	14.3
Do nothing	2.9	3.4	3.1

Source: Gender and climate change vulnerability survey, 2015

The results shown in Table 7.2 also indicate some differences between the study communities. In Glefe, bailing water out of the house was rated as the most popular strategy by 50 percent of respondents, while temporal relocation from community was the preferred strategy in Faana. Similarly, the majority of respondents in Old Fadama (77 percent) embarked on clean up exercises to desilt choked or blocked drains to aid the flow of flood waters, which was not popular at all in the other communities.

Table 7.2 Strategies Implemented by Male and Female Respondents to Protect Houses from Impacts of Climate Hazards by Study Area (Multiple Response)

Community	Coping Strategies	Male (% Yes)	Female (% Yes)	Total (%)
Glefe	Bailing water out of room	57.8	43.6	50.0
	Constructing temporary dykes or trenches to divert water away	24.4	38.2	32.0
	Temporal relocation	35.6	20.0	27.0
	Do nothing	8.9	9.1	7.0
	Lodge with friends/relatives	4.4	9.1	7.0
	Relying on family members for support	2.2	7.3	5.0
	Cleaning up blocked drains	2.2	3.6	3.0
Faana	Bailing water out of room	12.5	23.1	18.0
	Constructing temporary dykes or trenches to divert water away	2.1	0.0	1.0
	Temporal relocation	89.6	90.4	90.0
	Do nothing	2.1	1.9	2.0
	Lodge with friends/relatives	0.0	9.6	5.0
	Relying on family members for support	0.0	3.0	2.0
	Cleaning up blocked drains	2.1	0.0	1.0
Old Fadama	Bailing water out of room	15.9	19.1	17.3
	Constructing temporary dykes or trenches to divert water away	67.1	36.8	53.3
	Temporal relocation	0.0	0.0	0.0
	Do nothing	0.0	0.0	0.0
	Lodge with friends/relatives	12.2	10.3	11.3
	Relying on family members for support	25.6	32.4	28.7
	Cleaning up blocked drains	74.4	79.4	76.7

Source: Gender and climate change vulnerability survey, 2015

Taken together, these findings suggest that the respondents were not passive victims in the face of climate change, as the majority of them implemented some strategies to help manage

their vulnerability to climate hazards. On the issue of whether there are differences in the coping strategies of men and women, the results of the Mann Whitney U test (see Appendix 12) indicated that out of the seven strategies implemented by respondents to protect houses, only one i.e. “constructing temporal dykes or trenches to divert water away” recorded a statistically significant difference in the mean rankings of men and women (Z= -2.397, p=0.02).

In addition to individual efforts, collective actions were undertaken by the informal Community-Based Organisations to reduce vulnerability. For instance, participants in the focus group meetings in Glefe stated that the Glefe Development Association organised community members periodically to desilt choked drains and also lay sandbags (see Plate 7.2), along the beach to protect houses from sea inundation. The participants stated that such activities were usually initiated by the Glefe Development Association in collaboration with local councillors without any support from the city authorities or disaster management institutions. In the same way, the residents of Old Fadama through the OFADA also implemented a number of strategies to reduce the community’s exposure to fire outbreaks. For example, after the devastating fire in 2011, OFADA insisted that residents used good quality wires in their electric connections. This initiative helped in reducing the incident of fire outbreaks in the community (Owusu 2013).

Plate 7.2 Sandbags Laid Along the Beach in Glefe to Protect Houses from Sea Inundation

Source: Gender and climate change vulnerability survey, 2015

When discussing what they did about personal belongings, the results as shown in Table 7.3 indicate that "bailing water out of rooms or house" emerged as the most dominant coping practice across the communities, with an equal proportion of men and women claiming to do so. This was followed by "keeping personal belongings on high platforms or tables", which was implemented by a third of the respondents. These results further indicate that overall, the majority of respondents implemented some measures to protect their personal belongings from being damaged or destroyed by floods or sea erosion. Nevertheless, the results of the Mann Whitney U-test (see Appendix 13) did not indicate any significant differences in the coping practices of men and women. This further suggests that not only are men and women exposed to similar climate hazards in slums, but they also do not differ significantly in terms of the measures they implement to cope with such hazards.

Table 7.3 Strategies Implemented by Male and Female Respondents to Protect Personal Belongings from Impacts of Climate Hazards across Study Areas (Multiple Response)

Coping Strategies	**Male (% Yes)**	**Female (% Yes)**	N	**Total (%)**
Bailing water out of rooms/houses	34.9	35.4	123	35.1
Keep personal effects in nearby communities.	17.7	17.1	61	17.4
Keep personal effects on high platform/tables/beds	36.0	32.0	119	34.0
Sell off personal effects	0.0	1.1	2	0.6
Keep personal effects in friend's house	26.3	23.4	87	24.9
Rely on family members for support	30.3	29.1	104	29.7
Do nothing	2.3	4.6	12	3.4

Source: Gender and climate change vulnerability survey, 2015

The key differences appear to be between community responses which in turn seem to be affected by geographical and other local circumstances. The results shown in Table 7.4 indicate that whereas men and women in Glefe ranked “bailing water out of houses” as their topmost coping practice, those in Faana mostly kept their personal belongings in nearby communities to avoid damage or destruction during floods. On the other hand, “relying on family members for support” appeared as the most popular strategy in Old Fadama. The strong ethnic bond or attachment in Old Fadama may explain why the majority of them tended to depend on friends or relatives to keep their valuables during floods. In addition, the devastating effects of flooding and sea erosion in Faana may explain why the residents of this community have to keep their valuables in nearby communities in order to avoid huge losses or damages.

Table 7.4 Strategies Implemented by Male and Female Respondents to Protect Personal Belongings from Impacts of Climate Hazards by Study Area (Multiple Response)

Community	Coping Strategies	Male (% Yes)	Female(% Yes)	Total (%)
Glefe	Bailing water out of rooms/houses	71.1	63.6	67.0
	Keep personal effects on high platform/tables/beds	33.3	36.4	35.0
	Keep personal effects in friend's house	22.2	14.5	18.0
	Rely on family members for support	6.7	10.9	9.0
	Do nothing	8.9	9.1	9.0
	Keep personal effects in nearby communities.	2.2	3.6	3.0
Faana	Bailing water out of rooms/houses	10.4	11.5	11.0
	Keep personal effects on high platform/tables/beds	18.8	25.0	22.0
	Keep personal effects in friend's house	12.5	11.5	12.0
	Rely on family members for support	12.5	17.3	15.0
	Do nothing	0.0	5.8	3.0
	Keep personal effects in nearby communities.	62.5	53.8	58.0
Old Fadama	Bailing water out of rooms/houses	29.3	30.9	30.0
	Keep personal effects on high platform/tables/beds	47.6	33.8	41.3
	Keep personal effects in friend's house	36.6	39.7	38.0
	Rely on family members for support	53.7	52.9	53.3
	Sell off personal effects	0.0	2.9	1.3

Source: Gender and climate change vulnerability survey, 2015

Children, the elderly and those physically challenged need to be protected in times of floods and fire outbreaks due to the limitations placed on their mobility either by age or physical ability. The survey results, as shown in Table 7.5 indicate that overall, 67 percent of the respondents protected their children and other vulnerable members of their families by relocating them from the community in times of flooding and fire outbreaks. This strategy was implemented by 75 percent of women compared to 58 percent of men, while 38 percent

of respondents moved the vulnerable members of their families to nearby unaffected dwellings in the community, some 41 percent of men and 35 percent of women doing so. Once again, the results of the Mann Whitney U-test indicated a significant statistical difference in the mean ranking of men and women only in relation to "temporal relocation of children/physically challenged from the community" (Z= -3.402, p=0.001). This suggests that generally men and women did not differ markedly in their coping practices

Table 7.5 Strategies Implemented by Male and Female Respondents to Protect the Vulnerable from Impacts of Climate Hazards across Study Area (Multiple Response)

Coping Strategies	Male (% Yes)	Female (% Yes)	N	Total (%)
Temporal relocation of vulnerable from community	58.3	75.4	234	66.9
Move vulnerable to nearby unaffected dwellings	41.1	35.4	134	38.3
Temporal relocation to highest parts of dwellings/keep vulnerable on high places	18.3	12.0	53	15.1
Do not have children	5.7	2.3	14	4.0
Do nothing	2.9	3.4	11	3.1

Source: Gender and climate change vulnerability survey, 2015

Moreover, Table 7.6 shows that relocating children and other vulnerable members from the community emerged as the most popular coping practice for respondents across the three communities. The participants in focus groups meetings indicated that the peculiar vulnerabilities faced by children, the aged and the physically challenged make it imperative to move them out of the community to avoid exposing them to such hazards. They maintained that the adult members of the family, especially men often remain in the community in times of fire outbreaks or flooding to salvage some of their personal belongings.

Table 7.6 Strategies Implemented by Male and Female Respondents to Protect the Vulnerable from Impacts of Climate Hazards by Study Area (Multiple Response)

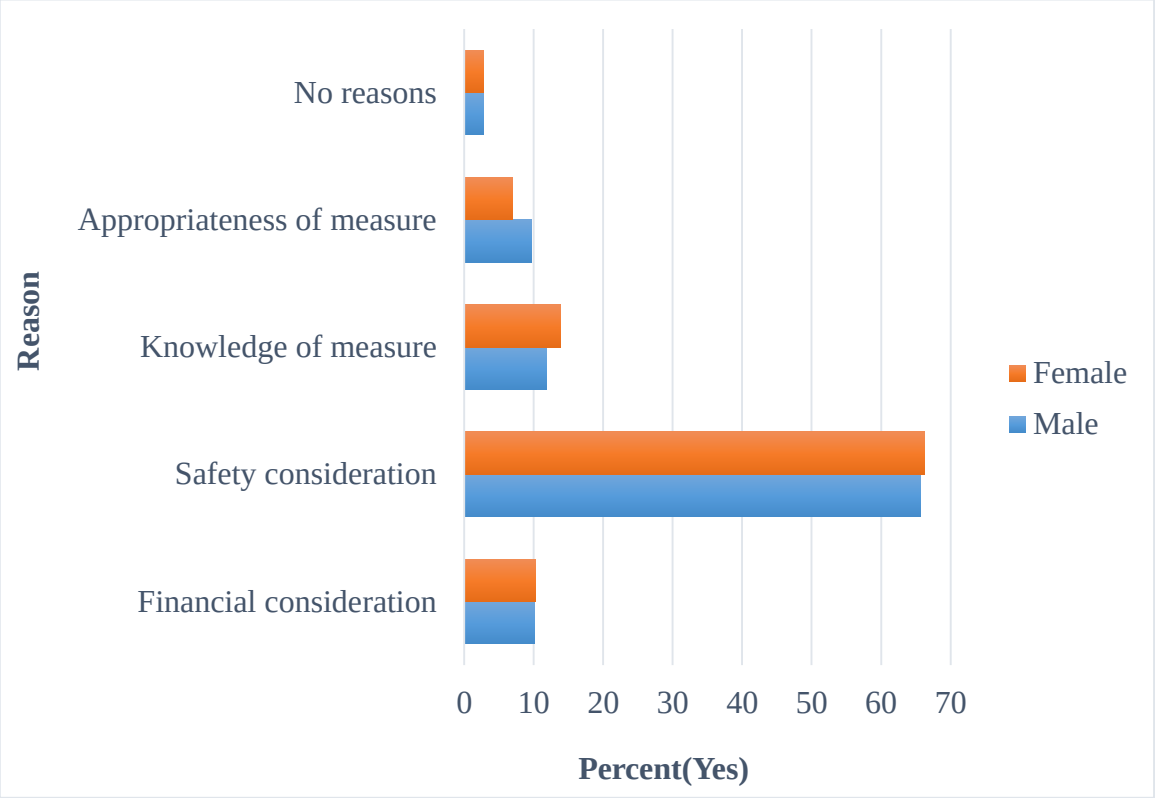
Community	Coping Strategies	Male (% Yes)	Female (% Yes)	Total (%)
Glefe	Temporal relocation of vulnerable from community	40.0	56.4	49.0
	Move vulnerable to nearby unaffected dwellings	31.1	35.4	33.0
	Do nothing	11.1	9.1	10.0
	Do not have children	11.1	5.5	8.0
	Temporal relocation to highest parts of dwellings/keep vulnerable on high places	6.7	1.8	4.0
Faana	Temporal relocation of vulnerable from community	81.2	92.3	87.0
	Move vulnerable to nearby unaffected dwellings	12.5	11.5	12.0
	Do nothing			
	Do not have children	6.2	0.0	3.0
	Temporal relocation to highest parts of dwellings/keep vulnerable on high places	60.4	38.5	49.0
Old Fadama	Temporal relocation of vulnerable from community	54.9	77.9	65.3
	Move vulnerable to nearby unaffected dwellings	63.4	54.4	59.3
	Do nothing			
	Do not have children	2.4	1.5	2.0

Source: Gender and climate change vulnerability survey, 2015

Analysis of the underlying reasons for the coping decisions made by men and women (see Figure 7.3), show that safety emerged as the overriding factor in the decision-making process, with two thirds of respondents indicating safety reasons, which was similar for men and women. In addition, 13 percent of the respondents made their decisions based on their local knowledge of those coping practices, whereas 10 percent cited financial considerations. Thus, it can be inferred from these findings that men and women were primarily concerned about safety issues when deciding what to do. It is surprising though, given their low-income status, to find that financial considerations did not weigh heavily on the minds of

respondents. This may also be due to the fact that the simple nature of these coping strategies did not require huge financial outlays.

Figure 7.3 Factors Underlying the Choice of Coping Practices of Male and Female Respondents across Study Areas (Multiple Response)



Source: Gender and climate change vulnerability survey, 2015

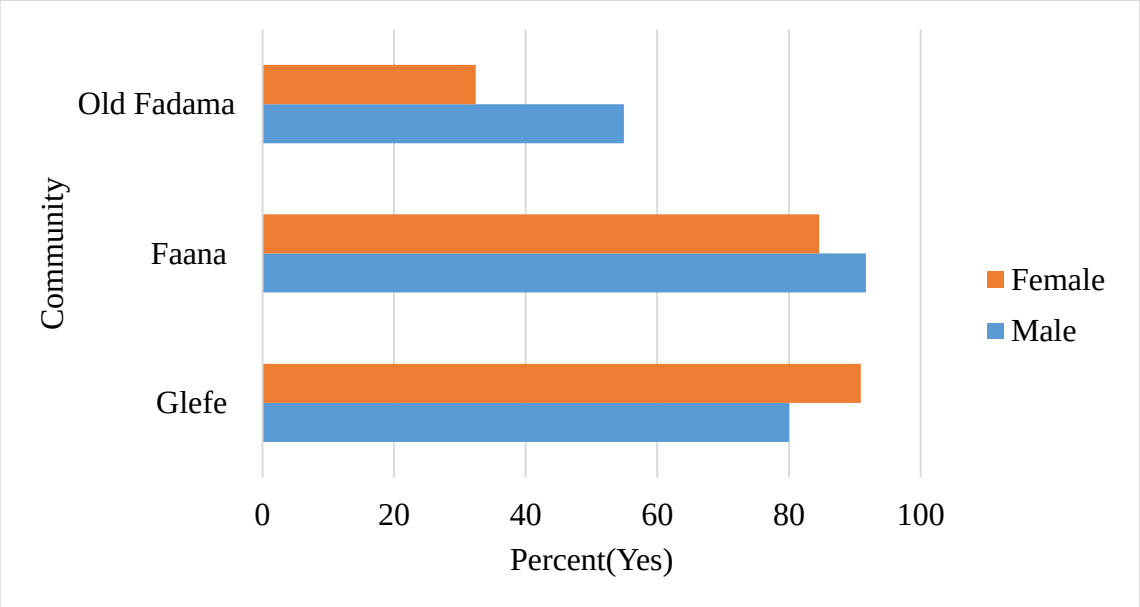
7.3 Capabilities and Constraints to Adaptation

The results show that study respondents were faced with a number of challenges in both their individual and collective efforts to cope with the impacts of climate hazards. One of these barriers is the limited access to early warning information. It is suggested in the disaster literature that access to early warning about disasters is an important lifesaving aspect of reducing disasters or risks (Ajibade *at al*. 2014). Further, access to early warning information is essential to enhancing men's and women's knowledge and awareness about climate change (Zhang *et al*. 2014). This presupposes that agencies or institutions responsible for

providing early warning information must understand the needs and preferences of both men and women, the sources of such information and the most appropriate means to disseminate that information so as to best serve all groups.

The survey results indicated that overall, over two thirds of the respondents received early warning information to enable them to cope with climate hazards, with the proportion being slightly higher for men than for women (71 percent compared to 69 percent). In addition, Figure 7.4 shows that access to early warning information was better in Glefe and Faana. Overall, 88 percent of respondents in Faana received early warning information for coping purposes, while 86 percent did so in Glefe. Old Fadama emerged as the community less likely to receive information (45 percent). This finding suggests that overall, men had better access to early warning information for coping purposes than women across the study communities except, in Glefe where the proportion was higher for women than for men (91 percent compared to 80 percent). The difference in access was particularly significant in Old Fadama where 55 percent of men compared to 32 percent of women received early warning information.

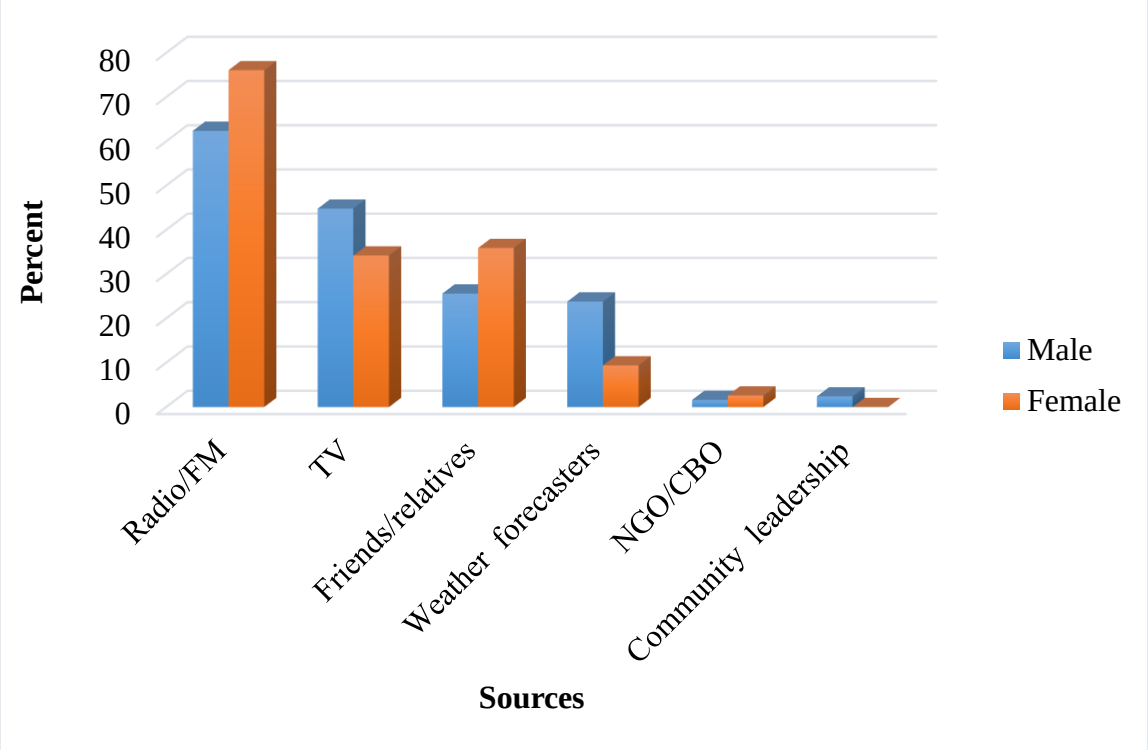
Figure 7.4 Percentage of Male and Female Survey Respondents who Received Early Warning Information by Study Area



Source: Gender and climate change vulnerability survey, 2015

The study also found that access to different sources of early warning information was gendered across the study communities. Figure 7.5 shows that the respondents were exposed to a range of early warning information and that radio and television were the most popular sources.

Figure 7.5 Sources Through which Male and Female Respondents Received Early Warning Information across Study Areas (Multiple Response)



Source: Gender and climate change vulnerability survey, 2015

However, a higher proportion of women than men received early warning information from radio (76 percent compared to 62 percent). In contrast, television was the media of preference for a higher proportion of men than women (45 percent compared to 34 percent). A higher proportion of women than men received early warning information from friends or relatives (36 percent compared to 26 percent). The heavy dependence on radio by women may be attributed to their livelihood activities. As already indicated, the majority of women were involved in home-based enterprises most of which are sedentary in nature, thereby affording

most women the opportunity to listen to radio and undertake their productive duties simultaneously. By contrast, men's livelihood activities were mostly located outside the home which meant that they often had to leave their homes during the day for income generation activities, thereby making it difficult for them to access information from the radio. On the other hand, the home management roles of women, such as cooking, bathing of children, washing and cleaning also acted as a barrier for accessing information from television, especially during the evening when most television stations in Ghana disseminate early warning information. However, because men were not generally involved in home management roles they tended to spend much of their leisure time watching television in the evening. Moreover, the reasons for these gender differences may also be attributed to the medium used for disseminating early warning information. In Ghana, most television stations use the English language as the medium for disseminating early warning information. This is in contrast to radio stations which mostly tend to employ local dialects for the same purpose. Given that the majority of the literate respondents were men, it is reasonable to assume that women would prefer radio to television.

Table 7.7 shows that sources of early warning also differed between study areas, with the majority of respondents in Faana (93 percent) and Glefe (78 percent), claiming to have depended mostly on radio. By contrast, television was considered the most popular source by those in Old Fadama (57 percent) and Glefe (52 percent). Furthermore, dependence on weather forecasters and friends or relatives for early warning information, appeared popular only in Old Fadama. The reason for this may be attributed to the community's enhanced accessibility to Accra, as well as the strong ethnic bond among its residents.

Table 7.7 Sources of Early Warning Information for Male and Female Respondents by Study Area (Multiple Response)

Community	Source	Male (%)	Female (%)	Total (%)
Glefe	Radio	77.8	78.0	77.9
	TV	63.9	44.0	52.3
	Friends/relatives	8.3	30.0	20.9
	Weather forecasters	13.9	6.0	9.3
Faana	Radio	90.9	95.6	93.3
	TV	11.4	17.8	14.6
	Friends/relatives	15.9	31.1	23.6
	Weather forecasters	6.7	2.2	4.4
Old Fadama	Radio	22.2	31.8	25.4
	TV	62.2	45.5	56.7
	Friends/relatives	48.9	59.1	52.2
	Weather forecasters	48.9	31.8	43.3
	NGO/CBO	4.4	13.6	7.5
	Community leadership	6.7	0.0	4.5

Source: Gender and climate change vulnerability survey, 2015

Collectively, the above findings suggest that access to early warning information was gendered and also varied between communities. This means that scientific information in the form of early warning climate information cannot be pre-packaged and delivered to users, without paying attention to how that information will be perceived, understood and utilised (Nelson and Stathers 2009; Nelson 2011). As scientific information is delivered it is inserted into the existing power relationships, potentially catalysing further change and in some cases reinforcement of inequalities (Nelson and Stathers 2009). It is also apparent from the findings that traditional sources for disseminating early warning information, such as the weather forecasters and disaster management institutions were not widely consulted by the respondents. The low interest in formal or traditional sources of early warning information by respondents may be attributed to the preoccupation of traditional warning systems in Ghana, with forecasting rather than the dissemination, thus urban poor community communities, such as slums, have rarely received attention. The heavy reliance on radio and television by the respondents should not be interpreted to mean that their information needs

were adequately satisfied. This is because men and women in focus group discussions indicated that the early warning information they received from radio and television sometimes tended to be unreliable, thereby eroding their confidence in these sources.

Additionally, it emerged that the local institutions, such as the local government authorities and the NADMO often used the informal community governance structures to disseminate early warning information, and to distribute relief items to community members. However, this approach was considered by women participants to be unfair in the sense that these structures are dominated by men. Female participants in the focus groups stated that they are often sidelined in the process as they are not fully represented in the community leadership structures. A female community organiser in Old Fadama expressed the following during focus group discussions:

> *"I feel that the information dissemination process does not take our* [women] *needs into account. I think that we* [women] *should be directly involved in the consultation process with the city authorities rather than authorities always dealing with men in the information dissemination process. …. One of the challenge we face in this community is that we do not have direct access to NADMO in times of flooding and fire outbreaks. NADMO should consult us* [women] *directly in the registration and distribution of relief services instead of always dealing with the men"* (Participant # 1, Old Fadama).

Moreover, the results of the key informant interviews revealed that the local government authorities were not able to develop and implement gender-sensitive adaptation interventions in slum communities, because they faced a number of challenges. Table 7.8 shows the main challenges enumerated by the local authorities as being responsible for their inability to undertake effective gender-sensitive climate adaptation in slum communities in Accra.

Table 7.8 Challenge/Constraints Faced by Local Authorities in Developing and Implementing Gender-Responsive Climate Adaptation Interventions in Slum Communities

Challenges faced by Accra Metropolitan Assembly
✓ Lack of space in vulnerable communities for implementing adaptation-related interventions.
✓ High levels of illiteracy and superstition hamper effective implementation of climate change education and awareness raising programmes
✓ Lack of interest in environmental issues at the local due to overemphasis of national policy on physical non-environmental projects.
✓ Haphazard physical development in vulnerable communities caused by weak spatial planning regime
Challenges faced by Ga South Municipal Assembly
✓ Weak financial capacity to embark on resettlement programmes/projects.
✓ Weak human resource capacity of the Social Welfare Department impacts negatively on implementation of social protection interventions in vulnerable communities.
✓ Inability to harmonize sectoral policies and programmes on climate change issues.
✓ Lack of positive discrimination in favour of vulnerable communities in climate change programming
✓ Top-down approach to developing and implementing climate change-related projects/programmes.

Source: Gender and climate change vulnerability survey, 2015

7.4 The Role of Local Institutions in Climate Change Adaptation

The role of local institutions in climate change adaptation has been emphasised widely in the literature. Indeed, international attention to climate change has begun to focus on the role of institutions (structures and operations) to meet global and regional challenges of the 21st century (Rodriquez 2009). In this context, the study sought to examine the role played by the local institutions (i.e. state and non-state) in building the adaptive capabilities of men

and women to cope with impacts of climate change. The following institutions were identified and included those groups whose activities involve climate change adaptation in Accra: the Ghana Meteorological Services Agency (GMSA); the Ministry of Gender, Children and Social Protection (MGCSP); the Environmental Protection Agency (EPA); the Accra Metropolitan Assembly (AMA); the Ga South Municipal Assembly (GSMA); the National Disaster Management Organisation (NADMO); and the People's Dialogue on Human Settlements (PDHS). Both the AMA and GSMA are local government authorities and are referred to as the LAs hereafter. Each of the aforementioned actors performed specific functions or roles related to development and, or implementation of climate change adaptation policies or interventions, either at the national, city or community level. The discussion of the role of these actors in climate change adaptation has been structured under two overarching themes: existence of active collaborative partnerships in climate change adaptation activities; and mainstreaming of gender in climate change adaptation planning.

7.4.1 Existence of Collaborative Partnerships in Climate Change Activities

Collaboration among local institutional in the governance arrangement is considered essential for successful local adaptation planning and management. As has been argued by Measham *et al*. (2011, p.891),

> "While the interest in local adaptation planning and policy highlights the relevance of local government for adaptation, its ultimate role with respect to practical implementation of policies and measures is dependent upon other actors within the governance network"

The results of the key informant interviews indicated that some form of collaborative partnerships existed among the local institutions involved in climate change adaptation planning and management. Specifically, the EPA has collaborated with other organisations to undertake climate change adaptation-related activities in slums or marginalised communities. For instance, it emerged from the interviews that the EPA in collaboration with other organisations has conducted research on gender and climate change adaptation focussing specifically on vulnerable rural communities. In addition, it has collaborated with ABANTU for Development to conduct training in climate change adaptation information

dissemination in rural communities in fulfilment of Article 6 of the UNFCCC. The following was stated by an official from the EPA in relating to institutional collaboration:

> *"The EPA has been collaborating with the ABANTU for Development with respect to training in climate change education and information dissemination in rural areas. This activity focussed on climate change adaptation and mitigation*" (Official from EPA, 2015).

However, some weaknesses were uncovered in the collaborative relationships between the EPA and other climate change-related institutions specifically the MGCSP and the LAs. Firstly, the interviews highlight that the MGCSP was not consulted or involved in the development of both the National Climate Change Adaptation Strategy (NCCAS) and National Climate Change Policy (NCCP). This is against the backdrop of the fact that a number of relevant organisations whose activities border on climate change were involved in the development of these policies. According to an official of the EPA, although the agency extended an invitation to the MGCSP during the policy development process, it was not honoured. The lack of participation by MGCSP in the climate change policy development, in the view of the EPA official, is underlined by its lack of interest in environmental issues including climate change. As summed up by the official from the EPA during an interview:

> *"They* [the LAs] *were invited to participate in the validation workshop but they did not come. They don't seem to show much interest in climate change issues. They are still grappling with other issues like waste collection but they are not even able to do this. They are not doing the environmental issues that they are supposed to handle at the local level"*.

The results of the interviews also revealed the existence of collaborative relationships between the LAs, the NADMO and the PDHS mostly in the area of disaster management and prevention in slums or marginalised communities. The collaboration between the NADMO and the LAs is demonstrated by the fact that the former draws funds for some of its minor operational activities from the District Assemblies Common Fund (DACF) belonging to the LAs. However, in times of large scale disasters, NADMO relies on funds from its national headquarters. NADMO also collaborates with the development enforcement task forces of the LAs in enforcing development controls. For instance, it works

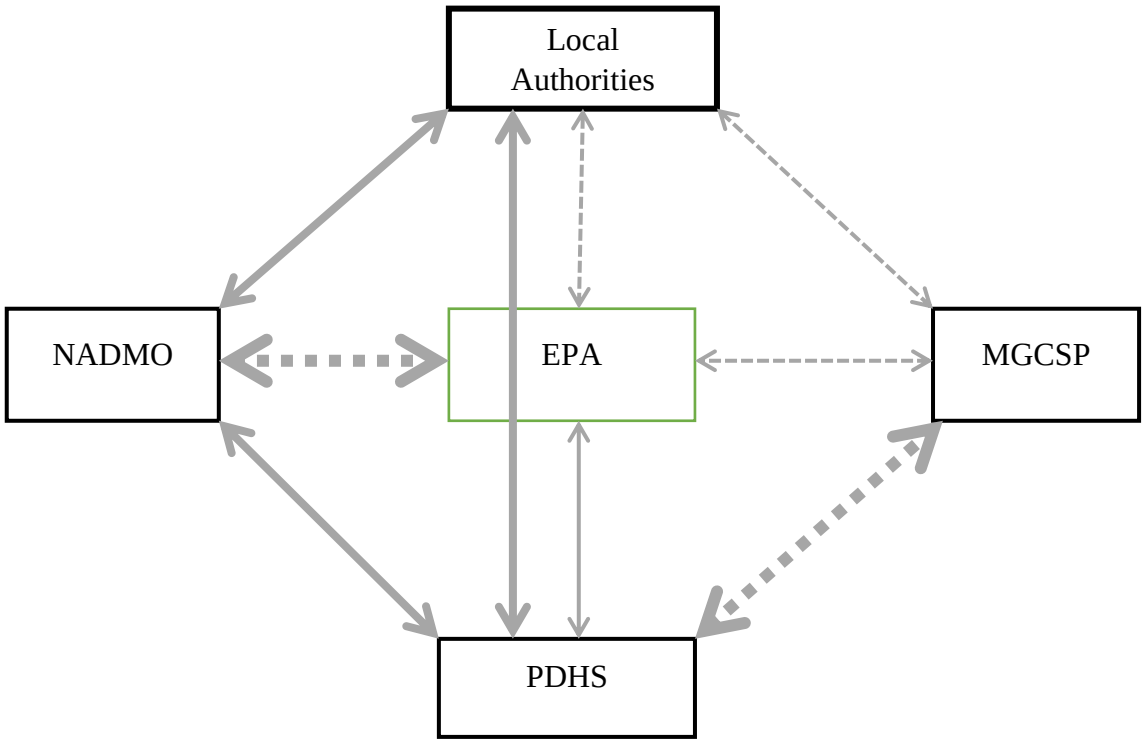
in consonance with the task forces of the LAs to address haphazard physical development in order to prevent flooding. In the same vein, the PDHS collaborates with the NADMO and the LAs in the management of relief services in marginalised communities in times of climate change-related disasters. Again, it has collaborated with the EPA through the Africa Adapt Programme to undertake climate change communication and awareness raising activities in slum communities in Accra.

The results of the key informant interviews indicated some collaborative arrangements between the MGCSP and the EPA. This collaboration is through the existence of the Social Welfare Department (SWD) in the LAs. The SWD is a decentralized department of the MGSCP. However, this collaboration is by default in the sense that while policy formulation on gender is done by the MGSCP at national level with no or little involvement from the LAs, they (LAs) are expected to implement such policies at the local level. The results also revealed that there was no working collaboration or partnership between the LAs and the EPA in carrying out climate change adaptation activities. Indeed, it emerged that the EPA has no department or desk in the LAs to oversee environmental issues including climate change. Rather, the agency participates in the statutory meetings of the LAs whenever large scale environmental projects that warrant environmental impact assessment approval are to be undertaken. This situation was identified as a weakness by an official from AMA during an interview as follows:

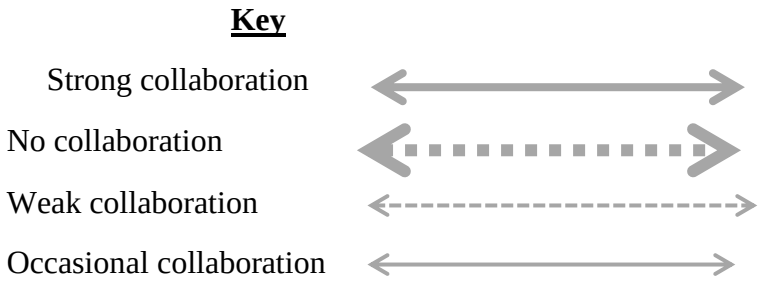
> *"I believe there is a weakness there. We all know that the environment in which we live in is very paramount. If the environment is not safe, we are not safe. So we should have EPA representative at the assembly"* (Local Authority Official, 2015).

The results relating to the collaborative institutional arrangements for the development and implementation of climate change adaptation activities between the institutions studied are represented diagrammatically in Figure 7.6

Figure 7.6 Schema of Collaborative Institutional Arrangements for Climate Change Adaptation Policy Development and Implementation



Source: Author's own illustration, 2016



Interviews also demonstrated that, in some cases, a personalised rather than an institutionalised approach to collaboration was adopted by some of the institutions. In particular, this was manifested through collaboration between the EPA and the MGCSP, where the nature of personal relationships rather than long term institutional interest or goal became the overriding factor in collaborative partnerships. Consequently, the success or otherwise of the collaborative partnerships in climate change adaptation planning and

management was largely determined by the existing personal relationships between officers in charge of climate change issues in these two organisations. The following statement from an official of MGCSP confirms this:

> *"One thing about the government is that it depends on the collaboration you have with the current officer in charge of gender. If that officer is transferred and a new person* [officer] *comes….. The new person also has different interests so we don't collaborate…. Because we used to have a very good collaboration with Angela* [the former gender focal person at the EPA]. *We had a good collaboration with her so she was very much involved in our activities. But the collaboration stopped at the time"* (Official from MGCSP, 2015).

7.4.2 Mainstreaming Gender in Climate Change Adaptation

The study also sought to ascertain the extent to which the EPA, the MGCSP, the LAs and the NADMO involved women, men and other vulnerable groups or their representatives in climate change adaptation planning activities, to ensure that the outcomes are able to adequately address their needs and concerns. The results of the interviews revealed that some form of gender mainstreaming was undertaken in adaptation-related activities of some of the institutions. This was particularly the case in the development of the NCCAS. The interview with an official of the EPA revealed that a team of experts from fifteen climate change-related institutions was established to develop the NCCAS.This team comprised representatives from the various sectors of the Ghanaian society. As part of the process, a number of sector-specific studies were carried out by the team to provide the basis for the development of the NCCCAS. However, the MGCSP charged with the utmost responsibility for representing the needs of women and the vulnerable in Ghana in both policy development and implementation was not represented on the team. On why a crucial actor like the MGCSP was not represented on this team, an official from the EPA indicated the following reason during an interview:

> *"MGCSP was not involved because they did not respond to our invitation…. They* [MGCSP] *have not been interested in environmental issues"* (EPA Official, 2015)

It also emerged from the interviews that the Ministry of Local Government and Rural Development (MLGRD) which is the lead ministry for all the LAs was not represented on

the team. An official of the EPA stated the following reasons as responsible for their lack of participation in the development of NCCAS:

> *"Environmental issues are not incorporated or taken care of in the District Assemblies' Common Fund. Because of this, they* [LAs] *normally do not focus on environmental issues let alone climate change. They are more focussed on collection of tolls, desilting of drains etc. … they lack the capacity"* (EPA official, 2015)

The resource constraints faced by the LAs as indicated by the above quote, meant that gender and climate change issues were considered as secondary in the local development planning process. The reason for this may also be attributed to the wide range of activities in which the local authorities engage. As argued by Measham *et al*. (2011), the resource challenge faced by municipalities can be attributed to the wide range of activities they are involved in as well as their lack of institutional autonomy. These authors have further suggested that resource challenges faced by municipalities can lead to self-perpetuating short-term technical fixes rather than long-term integrated approaches to addressing problems.

The lack of a gender desk or climate change department was also found to have hampered the ability of climate change-related institutions in undertaking gender mainstreaming in their respective adaptation activities. Analysis of the interviews reveals that both the EPA and the LAs had no gender desks to handle gender issues in their climate change activities, while the MGCSP had no climate change unit. In the EPA, there is rather a Gender Focal Person charged with the responsibility of mainstreaming gender in all the agency's activities. Apart from the lack of gender desk, it also emerged that the EPA lacks capacity in techniques of gender mainstreaming in climate change policy development and planning. This challenge is illustrated by the following sentiment expressed by the EPA official in an interview:

> *"There is a focal person to mainstream gender issues in the entire agency's work, but this has not happened because we do not have a department to handle that. I* [focal person] *have taken it* [the role] *up on my own but I do not have any training or capacity in gender"* (EPA Official, 2015)

Coupled with the above is that the LA and MGSCP does not have desks or departments to handle issues related to gender and climate change. Rather, what the ministry does is to

ensure that there are gender desks in the various ministries, department and agencies to mainstream gender in their activities. Indeed, most of the responsibilities for gender mainstreaming are designated to Gender Desk Officers in the other ministries, most of whom are not working on a full time-basis. Resource constraint was cited as the main reason responsible for the paucity of climate change desk in the MGCSP. As stated by an official during an interview:

> *"The funds for climate change are allocated to the EPA and the Ministry of Environment, Science and Innovation. So we* [MGCSP] *play a coordinating role. It is not possible to have a desk for climate change"* (Official from MGCSP, 2015)

With respect to the LAs, the Planning Units were responsible for mainstreaming climate change issues in the development plans and programmes at the local level due to weak human resource capacity. As expressed by a Planning Official during an interview:

> *"Lack of personnel at the assembly* [LA] *makes it difficult to have a dedicated desk at the assembly for climate change issues. We have a few staff at the Development Planning Coordinating Unit and this makes this difficult"* (Official from GSMA, 2015).

The collection and dissemination of gender-disaggregated data is an important component of mainstreaming, particularly in disaster risk reduction. However, the results of the interviews indicated that this principle was not adhered to by all the organisations involved in climate change adaptation activities. Specifically, the results indicated that the NADMO which is responsible for reducing the risk of people, especially the poor and vulnerable in society from the effects of natural and human induced hazards did not have any policy guidelines in collecting gender-disaggregated data. Rather, the organisation employs a gender-disaggregated risk assessment form for gathering information on impact assessment in the aftermath of climate-related disasters. An official from the organisation stated this in an interview:

> *"Yes, we* [NADMO] *do have a risk assessment form for data collection and is gender-disaggregated. It is a form and not a policy guideline".*

Interestingly, despite this lack of gender desks per department/institution, gender was found to have been accorded the needed consideration by the GMSA it its dissemination activities.

As part of its community outreach programmes, the agency specifically requests its collaborating partners to include at least 25 percent of women as participants. However, further analysis of interviews highlights that the dissemination activities conducted by the GMSA tended to focus mainly on vulnerable rural communities and not their counterparts in urban areas or cities in Accra. This state of affairs was described by an official from the GMSA as follows:

> *"The Ghana Meteorological Services Agency collects and disseminates information to user agencies including vulnerable communities, especially those in the Northern Ghana and farming communities. The agency briefs these communities on precautionary measures to take. However, the dissemination activities of the agency have not been focused on urban vulnerable communities. This is because the agency is not so much resourced to be able to embark on effective planning. Hence it cannot focus on both rural and urban vulnerable communities"* (Official from GMSA, 2014).

In addition, analysis shows that, as a civil society actor, the PDHS did not accord gender a major consideration in its climate change adaptation programming due to a lack of gender consciousness. Although gender is a major consideration in the organisation's non-climate related projects, it is not specifically considered as an important issue in its climate change adaptation projects. This, as an official of PDHS noted, is due to the overemphasis on 'household' as a unit of analysis in development programming in Ghana. What this means is that needs assessments are conducted on the basis of the concept of household and since women, children and other vulnerable groups are part of the household, they are often assumed to be default beneficiaries of climate change interventions. The following statement from the official of the PDHS is telling:

> *"Our organisation's approach has been to focus on household as a unit of analysis. In this respect, women are believed to be part of the household. Gender is often articulated in other projects implemented by our organisation but not specifically in climate change projects"* (PDHS Official, 2015).

The other challenges enumerated by the PDHS that are perceived to have affected gender-responsive adaptation planning included (a) the lack of capacity in gender mainstreaming in climate change programme development and implementation (b) resistance to gender-sensitive programming due to asymmetrical power relations embedded in slums or

marginalised communities; and (c) the technocratic approach to climate change adaptation policy development and implementation in Ghana.

7.5 Conclusion

This chapter, based on the combined results of the survey, focus groups and interviews has presented an analysis relating to how men and women adapted to, or coped with, impacts of climate hazards, specifically flooding, sea erosion, salinity intrusion, and fire outbreaks in their various communities. It emerged that men and women involved in the survey implemented a number of strategies to enable them cope with the impacts of these hazards. However, overall, the results did not indicate any significant differences in the coping strategies of men and women. Safety considerations were also found to have been a predominant influence affecting the decisions of both men and women. The results further indicated that even though both men and women faced a number of challenges or constraints in their efforts to cope with climate hazards, these constraints were disproportionately felt by women. These constraints related to the lack of access to diverse sources of early warning information, the sidelining of women in the traditional/formal early information dissemination processes and lack of equal participation by women in localised adaptation decision making.

Although a number of institutions or organisations in public, private and civic sectors were involved in climate change adaptation activities in the study communities, no working partnerships or collaborative arrangements existed between them to facilitate effective gender mainstreaming in adaptation planning and management. In some cases, collaborative partnerships were found to have been personalised rather than institutionalised in these institutions, thereby affecting effective gender mainstreaming in their adaptation-related interventions. Moreover, the state institutions charged with the responsibility of mainstreaming gender and social protection issues in important national policies, such as the National Climate Change Policy played a minimal role in climate change policy development and implementation activities. Coupled with this is the finding that a wide gulf existed between climate change policy development at the national level and its

implementation at the local level. Consequently, local authorities responsible for implementing climate change adaptation interventions did not participate in climate change policy development activities and therefore had limited room to manoeuvre in incorporating the different needs of men and women in adaptation-related interventions or action plans. Rather than addressing the practical and strategic gender concerns of women in adaption planning, the adaptation interventions of the local authorities tend to be gender-neutral in their approach thereby failing to tackle the existing gender differences in adaptive capacities and across the three study communities.

8 CHAPTER EIGHT: CONCLUSIONS AND IMPLICATIONS

8.1 Introduction

This study investigated how the impacts of climate change are experienced by men and women living in three urban slums in Accra, Ghana. The study explored the impact of climate change on the livelihoods of men and women and documented their knowledge and perceptions regarding climate hazards. Primary data were collected to address the following questions:

1. What environmental hazards are posed to men and women living in slum communities by climate change and what are their perceptions of these hazards?
2. In what ways do the socio-demographic characteristics of men and women influence their knowledge and perceptions of climate change and how does this knowledge match with or differ from existing scientific data?
3. What socio-economic and institutional factors drive men's and women's vulnerabilities to climate hazards?
4. What are the main forms of livelihoods for men and women and how are they affected by climate hazards?
5. What coping mechanisms are employed by men and women to cope with the impact of climate hazards and what constraints or challenges do they face?
6. What is the nature of institutional response to climate change adaptation in urban slums and what are the strengths and weaknesses of such responses?

The data collection and analysis was guided by the central argument that climate change impacts affect men and women differently, and that women tend to suffer more negatively in terms of their livelihoods and well-being. Patterns of differentiation in vulnerability between men and women are underpinned by the intersection of gender with other socio-economic, institutional and physical factors. A gender and climate change adaptation framework was utilised to guide data collection and analysis, with a focus on elements that may comprise vulnerability factors, on the one hand, and those at the level of adaptive capacity, on the other. In this study, vulnerability is viewed from the social perspective which stipulates that climate change and variability occur in the context of political, institutional,

economic and social structures, and changes which interact dynamically with contextual conditions associated with particular exposure unit (O'Brien *et al*. 2007). As such, emerging frameworks for exploring adaptive capacity at the individual and community levels informed this study.

This chapter draws together the conclusions of the study, assesses the extent to which the study objectives have been achieved and discusses the implications arising from the findings. Relevant recommendations to issues which have been identified in the study are also integrated throughout the discussions. The chapter ends with some recommendations for future research.

8.2 Summary of Key Findings

The key findings of this study as it relates to the research questions can be summarised as follows:

Exposure to Climate Hazards

The study found that slum communities were exposed to serious climate risks or hazards, with flooding emerging as the most frequently experienced and devastating hazard. Nevertheless, the results indicated some gender differences in relation to perceived exposure to climate hazards, with women showing much more concern about flooding, salinity intrusion and sea erosion, whilst men perceived heatwaves to be their major concern. The pattern of differentiations in perceived exposure between men and women was found to be have been influenced by nature of their social roles, with women perceiving flooding and salinity intrusion to be major concerns due to their water collection and storage activities. Locational or spatial differentiations in exposure also emerged, with flooding perceived to be a major hazard in Glefe and Faana, while fire outbreak was common in Old Fadama.

Notable Gender and Spatial Differences in Climate Change Knowledge

Some notable gender and spatial differences with respect to local climate change knowledge were found, although knowledge of climate change was generally low among the respondents, somewhat lower for women than men. Demographic and locational factors had an important influence on respondents' local climate change knowledge. The highest level of climate change knowledge was reported by men and women with secondary and tertiary education, as well as younger adults. This was attributed to their high exposure to modern forms of communication technology for disseminating climate change information. In terms of location, a high level climate change knowledge was recorded in Glefe, with Old Fadama reporting the lowest levels

Synergies between Local Climate Change Knowledge and Scientific Data

Additionally, it was found that the knowledge of the respondents regarding climate change was similar to the general scientific knowledge as the majority of them perceived climate change to be changes in rainfall and temperature patterns. Closely related to this was that the respondents' knowledge regarding the period for the occurrence of climate hazards, specifically flooding (i.e. May- August) and heatwaves (September-December) coincided with the existing scientific information about the period for the occurrence of heavy rainfall and high temperatures in Ghana.

Socio-Economic and Institutional Drivers of Vulnerability

A number of sociocultural, economic, physical and institutional factors contributed to produce different vulnerabilities for men and women within the vulnerability context. Among these factors were: gender differences in housing conditions, infrastructure and service provision, performance of social roles, participation in decision-making, as well as ownership of, and control over, productive resources. Rented accommodation, and the inadequate and dilapidated infrastructure and service provision across the study communities produced different vulnerabilities for men and women, with women exposed to personal attacks and public embarrassment.

In addition, the social role of women made them more vulnerable to impacts of climate hazards compared to men. Women performed the bulk of the routine domestic duties which contributed to increase their time poverty and negatively affected their adaptive capacity. Most of the women's social roles depended largely on the availability of natural resources such as water and fuel wood, a situation which heightened their vulnerability particularly in terms of access to water and sanitation services. Gender differentials in asset ownership and control, and decision making power also resulted in differences in vulnerabilities for men and women. The study found that except for commercial structures, men owned and controlled the bulk of the assets across the study communities. Although women had the rights to utilise certain communal resources or assets in some cases, the decisions regarding utilisation were mostly taken by men. In addition, utilisation of social capital for vulnerability reduction was found to have been gendered in favour of men, with them dominating informal local governance structures responsible for adaptation decision-making. Although local social associations existed and provided some benefits to men and women, assistance was not specifically for coping with climate hazards but rather for celebrating social events

Impacts of Climate Change on Livelihoods

Respondents engaged in a diverse range of livelihood activities with retail trading, artisanal fishing, head porterage, collection and recycling of scrap metals or electronic waste being the predominant activities. Livelihoods were gendered and spatially differentiated, with men engaged mainly in artisanal fishing, collection and recycling of scrap metals or electronic waste, while women dominated in retail trading, fish mongering (i.e. preservation and selling of fish) and head porterage. Spatially, there were some differences between the communities. Climate hazards impacted differently on the livelihoods of men and women, with the home-based enterprises of women found to have been severely impacted, especially by flooding and fire outbreaks because of their locational vulnerability. The impacts were manifested through destruction of trading sites, damage to homes, loss of income, and destruction fishing equipment. This pattern of differentiation in livelihood impacts was found to have been influenced by nature of the livelihood as well as location, with livelihoods in Faana and

Glefe found to have been impacted severely by flooding and sea erosion whilst those in Old Fadama were highly vulnerable to fire outbreaks.

Coping Practices and Constraints

Nonetheless men and women demonstrated some resilience in the wake of their increasing vulnerability to climate change by implementing a number of strategies to enable them to cope with the impacts of climate hazards. While there was not statistical difference amongst male and female coping strategies, the most popular strategies for preventing water contamination from flooding and salinity intrusion included (amongst others) keeping water in sealed storage tanks or containers mounted on raised platforms; raising the foundations of water facilities; and constructing drainage around water sources. In protecting children and other vulnerable members from climate hazards, the following were the most popular strategies: relocating children/vulnerable members out of the community; keeping children/vulnerable members in unaffected parts of communities. Irrespective of area, age, education or income levels, safety was the overriding consideration for both men and women.

However, accessibility to traditional sources of early warning information, such as weather forecasters or disaster management institutions was limited and highly gendered. The respondents relied heavily on non-traditional sources of early warning information, with men relying mostly on television while women depended on radio and friends or relatives. The limited access to traditional sources of early information interfered with the ability of men and women to cope successfully with climate hazards. In some cases, formal organisations disseminated early warning information through the community leadership structures which were mostly dominated and controlled by men. This situation was considered by most women to be a constraint to effective adaptation as their needs and concerns were often not considered in the information dissemination process.

Institutional Responses

The study found only weak collaborative partnerships among local institutions involved in building the adaptive capacities in slum communities, with some institutions adopting a personalised rather than an institutionalised approach to mainstreaming gender and social protection issues in their adaptation-related activities. In addition, critical institutions such as the MGCSP and the LAs showed low interests in climate change issues which made mainstreaming of gender and social protection issues in local climate change policy planning ineffective. Coupled with this is the weak nexus between adaptation policy planning at the national level and its implementation at the local level thus contributing to weak adaptive capacity building at the community level. The study found that slum communities were also not given a priority in the dissemination of early warning information by the local disaster risk management organisation because of resource constraints.

8.3 Implications for Climate Change Adaptation Research and Policy-Making.

8.3.1 Contributions to Knowledge

Understanding local knowledge and perceptions of climate change is essential not only for formulating climate change education and communication interventions, but also for effectively implementing risk reduction strategies (Danielsen *et al.* 2005 In addition, local knowledge and perceptions influence people's decisions both in deciding whether to act or not, and what adaptive measures need to be implemented in both the short and long term (Berkes and Jolly 2001; Williams *at al*. 2008). It is therefore imperative that local knowledge and perceptions should be taken into consideration in attempts to understand climate change, its impacts, and adaptation to it. Nevertheless, it has been argued that local people's knowledge and perceptions, as well as climate change-related behaviours are often embedded in the local cultural and social contexts and therefore cannot be said to be gender-neutral (Wolf and Moser 2011). In spite of this, some authors, such as Greenberg and Schneider (1995), have argued that males and females who actually confront environmental hazards in stressed neighbourhoods will have the same level of concern. Therefore, the question of whether differences actually exist between women and men who live in slum communities with multiple hazards was one of the issues explored in this study. The result

of the study demonstrate that even though men and women in this study live in vulnerable communities with exposure to multiple climate hazards, their knowledge and perceptions regarding these hazards differed. These gender-differentiated experiences were found to be associated with the distinct social roles performed by men and women, an experience supported by McCright (2010).

Additionally, a person's proximity to perceived manifestation of climate change plays an important role in how people feel about it and how threatening it may be for them (Bateman and Edwards 2002; Etkin and Ho 2007). These interpretative processes are determined largely by social factors, cultural biases, and gender (Bateman and Edwards 2002). The study found that perceptions of climate risks or hazards were significantly related to which area people lived in, and to the differences in levels of exposure among the study areas. This means that vulnerability differs not only between genders but also across space or between places (Cutter *et al.* 2003). Taken together, these findings imply that perception of climate hazards or risks can be gendered and spatially differentiated and that if care is not taken women's risk perceptions can be given less attention than those of their male counterparts (IPCC 2007) in social vulnerability research. This underscores the fundamental need for such studies to adopt gender-sensitive and context-specific assessment methodologies to be able to account for the spatial and sociocultural differentiations in risk perceptions among different populations in urban areas and cities in the developing world.

The relationship between gender and environmental knowledge or concern has engaged the sociological theories of gender over the years (McCright 2010). This engagement has resulted in the development of two broad perspectives or approaches to explain the effect of gender on environmental knowledge or concerns namely: gender socialisation perspective and social role perspective. The former perspective asserts that the different values and social expectations conferred to boys and girls through socialisation continue into their society's dominant culture. Women's place is often limited to the private sphere, with concern about child rearing, food production, health and other natural responsibilities, whist men's place, on the other hand, lies in the public or cultural sphere, which include the areas of business,

politics and science (Davidson and Freudenburg 1996). According to gender socialisation theorists, this gender socialisation explains why women are more concerned than men about local environmental problems that pose significant safety risks for community members (Mohai 1992; Davidson and Freudenburg 1996). The gender role perspective, on the other hand, explains the gender differences in environmental knowledge by focussing on the influences of their social roles that they perform in society; arguing that a woman's decision to be a homemaker triggers her values of nurturance, compassion, and empathy in such a way as to increase environmental concern (Blocker and Eckberg 1997). By extending these theories to the realms of climate change, one would expect that women will demonstrate a high level of awareness about climate change given their nurturing and caregiving roles. However, the results of this study did not support an extension of these theories to predict that women are more knowledgeable about environmental problems, such as climate change.

The social roles of men and women in the study communities influenced their abilities to adapt to climate change and invariably resulted in their different levels of vulnerability. Overall, women performed the bulk of the routine domestic activities which reduced their time for engaging in income-generating activities which is considered crucial for reducing poverty and building adaptive capacities of individuals. Coupled with this is that most of the women's social roles were largely dependent on the availability of natural resources, such as water and fuel wood. This means that women are more vulnerable in times of resource scarcity while men more opportunities Thus it is essential for adaptation researchers to adopt gender-sensitivity analysis in their vulnerability assessment studies to account for time poverty associated with gender roles and how it affects the adaptive capacities of men and women differently

The differences in knowledge about climate change by age as revealed in the study may result in different levels of perceived vulnerabilities and invariably the choice of coping strategies. This implies the need for social vulnerability research to move beyond the framing of gender analysis from the binary comparison of men's and women's situations by

accounting for the complex interactions between gender and other forms of disadvantage based on age (Carr and Thompson 2014).

8.3.2 Implications for Policy-Making

Women in this study demonstrated a low level of climate change knowledge. Men were found to have better access to information sources since most of them attended local community meetings where information about climate change was shared. The low level of climate change knowledge among women raises serious doubts about the effectiveness of gender-mainstreaming in Ghana's climate change education and awareness programme. In Ghana, although gender-mainstreaming has been accorded the needed consideration in climate change education at the national level, much work remains to be done in translating it into programme implementation at the local level. This raises the need for the national climate change education programme to broaden its scope to cover people living in slums and also ensure that attention is paid to gender in the capacity building processes. This goal can be achieved through effective collaborative arrangements with civil society organizations, such as NGOs and CBOs representing the concerns and interests of women at the local level.

Besides, the results also show some notable differences in climate change knowledge at different ages. The younger adults exhibited a high level of awareness about climate change compared to older respondents. This was found to be associated with their exposure to the mass media and other modern communication technology where information about climate change is often disseminated. This result further confirms the important role of information and technology in determining adaptive capacity among different users or actors as indicated in the gender and vulnerability framework (see Figure 4.1). This has implications for climate change communication, and highlights the point that there is the need for policy makers to develop and implement climate change communication strategies to target different age cohorts to address their diverse information needs and concerns.

As has been emphasised in the vulnerability context in the conceptual framework (see Figure 4.1) access to information and technology is considered essential for successful adaptation to climate change. Indeed, access to scientific information in the form of early warning information has become one area of increasing focus in climate change adaptation research. Undoubtedly, a more dependable and efficient pre-warning information dissemination system could improve public emergency responses, and enable people to evacuate and take protective measures prior to and during a disaster (Zhang *et al*. 2014). The study found that access to early warning information was gendered, with women and men accessing information from different sources. These findings support the argument in the adaptation literature that scientific information cannot be pre-packaged and delivered to users without paying attention to how that information will be perceived, understood and utilised for adaptation (Nelson and Stathers 2009; Nelson 2011). As scientific information is delivered, it is inserted into the existing power relationships, potentially catalysing further change and in some cases reinforcement of inequalities (Nelson and Stathers 2009). To be effective, early warning systems should consider men's and women's different communication needs and sources for meeting those needs to enhance their adaptive capacities. This will enable men and women to make informed decisions as they respond to the everyday manifestations of climate change and variability (Bomuhangi *et al*. 2016). Furthermore, the traditional early warning systems should move beyond their preoccupation with technical solutions and incorporate social dimensions (i.e. gender) in the information dissemination process. Similarly, given that women are the most disempowered in the decision making process, the focus of urban adaptation policy in the developing world must be to ensure that women are not just present but also visible and empowered in the local adaptation governance process to stop power relationships from reproducing themselves. This is also to ensure that the diversity of knowledge that men and women bring is incorporated into local adaptation policies and programmes.

Extreme climate events or hazards can interfere with the ability of men and women in urban areas to sustain livelihoods, which can manifest in the destruction of a wide range of assets that individuals rely upon to maintain their livelihoods (Gasper *et al*. 2011). The livelihoods of urban poor are particularly vulnerable to climate risks in the sense that they are typically

accommodated and work in informal settlements, which are often densely populated and constructed with poor materials and lack access to adequate infrastructure facilities (Gasper *et al*. 2011; Olajide and Lawasnson 2014). Nevertheless, livelihood impacts of climate change are not experienced in the same way by gender groups. The results indicate that the gendered nature of livelihoods in the study communities influenced the degree of livelihood vulnerability. The heavy concentration of women in home-based enterprises, especially in retail trading made them more vulnerable to impacts of flooding and fire outbreaks because of their location in vulnerable areas. Similarly, artisanal fishing was impacted negatively by changes in the seasons associated with climate change. This suggests that even though men and women may be exposed to similar climate hazards, the impacts on their livelihoods may differ. This underscores the point that national and local adaptation policies which aim to promote sustainable livelihoods for men and women in poor urban communities should pay attention to the gendered nature of livelihoods in order to ensure that men and women could benefit equally. For this goal to be successfully realised, there is the need for the city authorities of Accra and Ghana in general to incorporate gender-sensitivity analysis in the development and implementation of adaptation interventions that aim to promote sustainable livelihood for different groups of people or populations, particularly slum residents.

Adger (2006) identifies resource availability, resource distribution and regulatory institutions as the main drivers of social vulnerability. Similarly, Alston (2013) enumerates inequality, access to technology, power relations, conflicts, values, knowledge, policies, cultural context, governance, and institutions as social systems with gendered elements that determine levels of vulnerability. The results of this study demonstrate that the vulnerability of men and women across the study communities were driven by a suite of social, economic, and institutional factors. Among the drivers of vulnerability was poor housing and dilapidated infrastructure. The essential role of housing and urban infrastructure in reducing individual's vulnerability to climate extremes is widely recognised in the adaptation literature (Watts and Bohle 1993; Moser and Satterthwaite 2010). In this respect, the focus of adaptation policy must not only be to assist slum residents to improve their housing but also address the gender disparities in housing and infrastructure facilities. This can be effectively achieved if adaptation planners adopt a participatory approach to formulating and

implementing housing improvement interventions to ensure equal participation by men and women as well as other disadvantaged groups. To address the infrastructure challenge in slums also suggests the need for urban authorities to rethink their planning paradigms which tend to view slums settlements as 'environmental hazards' by recognising the fact that slums have become a permanent feature of the urbanisation process in developing countries. This paradigm shift can potentially transform the antagonistic relationship between city authorities and slum dwellers into a more collaborative approach. Adopting a more collaborative approach to planning will not only ensure the full participation of men and women in the city planning process but will also result in the proper integration of the infrastructure needs of slum communities in planning policies and programmes of urban authorities and other service providers.

Access to and control over assets is essential for reducing both individuals' and groups' vulnerability to climate change. However, the results of the study demonstrate that access to critical assets or resources for adaptation remains unequal across the study communities, with the bulk of the assets owned and controlled by men. Although women had access to some communal assets for adaptation, the decision making processes regarding the utilisation of such assets were dominated by men. This finding provides some useful insights into understanding how the traditional approach to adaptation planning, which often revolves around offering aid interventions to men and women to enhance asset base, may become counterproductive in the long run. This is because such an approach may fail to address gender-differentiated vulnerabilities by promoting climate change adaptation among males than females (Nabikolo *et al*. 2012). It is important therefore for adaptation policy makers to appreciate and incorporate gender-disaggregated analysis in the policy formulation and implementation processes, to prevent the risk of reinforcing and solidifying gender inequalities in asset ownership and control in poor urban communities in the developing world.

Finally, the important role of local institutions in building the adaptive capacities of urban poor groups, especially slum residents, and reducing their vulnerability to impacts of climate

change cannot be overemphasised. At the national level, residents of slums or marginalised communities need assistance, especially in ensuring that their needs and priorities are incorporated into national disaster risk management plans and poverty reduction programmes (Bartlett *et al*. 2009). Also, when faced with climate disasters, slum residents have only a limited set of options; they need help at both the local and the municipal levels to improve their options for emergency action and evacuation; to improve drainage; and to grant them greater security of tenure to enable them invest in home improvements (Bartlett *et al*. 2009). Therefore, institutional partnerships among civic, public and private organisations is extremely important in helping slum residents and other marginalised groups to undertake climate hazards-related adaptation (Agrawal 2010).

However, the results of this study suggest weak collaborative partnerships among local institutions charged with climate change adaptation planning in Accra. This situation greatly hampered effective adaptive capacity building in slum communities. The lack of institutional collaboration was found to have been caused by factors relating to weak financial and human resource capacities of local institutions, low interest in environmental issues, and lack of dedicated departments or units within institutions for overseeing gender, climate change and social protection issues. Adger (1999) has emphasised an aspect of this challenge by arguing that environmental issues often tend to be downplayed within formal institutions as they do not easily fit into the reorganisation of operating cultures and procedures. The results further indicate that gender mainstreaming was not given an important consideration in adaptation activities of the local authorities because of resource constraints, as well as competing interests at the local level. As a result, adaptation represents only one area of priority amongst other competing interests for local government planning (Measham *et al*. 2011). This finding brings to the fore the great financial resource challenge faced by local authorities in Ghana, and the developing world in general in mainstreaming gender and climate change issues in local development planning. It is important that central governments and multilateral development agencies assist in building the financial capacities of local authorities in order to enable them perform their assigned institutional roles at the local level.

8.4 Suggestions for Future Research

The study makes the following suggestions for further research. First, in order for researchers to understand men's and women's motivation for adaptation to guide adaptation research, it is imperative that their climate change perceptions must be well appreciated and documented. Based on this, the study suggests that extended studies of the relationships between gender and perceived risks and vulnerability be undertaken in a wide range of slums in Ghana. Such studies will enable adaptation researchers to better appreciate the underlying drivers of how men and women of different ages, incomes, ethnicities and religious persuasions perceive climate risks, and how and why this may change across space and time. The outcomes of such longitudinal studies would provide further basis for the refinement of the survey instrument which could then be developed as a tool for use by other researchers or other local institutions involved in climate change activities to undertake their own gender and climate change adaptation research.

Second, the study found that women were excluded from participating in localised decision-making on adaptation planning and governance. In this regard, it is suggested that further studies should be undertaken to provide a more in-depth exploration of the societal, cultural, and policy barriers or obstacles to women's participation in adaptation policy making. Such studies would provide researchers useful insights into the motivation factors for women's participation in the urban adaptation governance process. Furthermore, since the study focussed on individuals rather than households, it is recommended that further studies should be carried out to specifically assess how the impacts of climate change-related hazards are experienced differently by male-headed and female-headed households in urban slum communities.

8.5 Conclusion.

In Ghana, it is acknowledged that women living in slums and marginalised communities bear the brunt of climate change impacts. In spite of this, adaptation research in Ghana has focussed on the livelihoods of rural women to the detriment of poor women living in vulnerable urban locations. Yet the challenge posed by climate change to urban residents

cannot be adequately addressed without understanding its gender dimensions. This study explored the gender aspects of climate change by focussing on the intersection of gender with social, economic, and institutional factors in producing different vulnerabilities for men and women in three slum communities in Accra, Ghana. It is argued that climate change impacts affect men and women differently and that women are more negatively affected than men because of sociocultural, economic, and institutional factors. It has drawn on a conceptual model under social vulnerability theory to explore gender and spatial differentiations with respect to exposure, impacts, perceptions and coping.

The results illuminate how men and women living in urban slums or marginalised communities are perceiving, understanding, valuing and responding to climate change within their various settings. In particular, the mixed methods design adopted in this study presented a more holistic, nuanced picture of how gender intersects with various other factors (economic, social and institutional) within the vulnerability context to influence men's and women's experience of climate change, as well as the response mechanisms employed at the individual and community levels to overcome vulnerability. Men and women living Accra's slums have been the focus of this study since they will not only experience climate change impacts in the same way, but they will also not have the same capacities to adapt. As such, understanding the gender dimensions of climate change is paramount for Ghana in order to meet its international obligations to the UNFCCC's goal of ensuring gender equity in climate change adaptation. This study has contributed to current knowledge on gender and climate change adaptation such that it will assist policy makers to frame climate change policies and programmes in a gender-sensitive manner to respond to the circumstances of women, men and other marginalised groups. The gendered nature of ownership and control of resources in the Ghanaian society will have implications on women's participation in localised adaptation decision making. It is therefore imperative that gender-blind adaptation policy be avoided.

Appendix 1. Project Ethics Approval Letter

RESEARCH BRANCH
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY

SABINE SCHREIBER
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CRICOS Provider Number 00123M

17 October 2014

Dr M Nursey-Bray
School of Social Sciences

Dear Dr Nursey-Bray

PROJECT NO: H-2014-170
Gender vulnerability to climate change and livelihood security in marginalized communities in Accra, Ghana

I write to advise you that the Human Research Ethics Committee has approved the above project. Please refer to the enclosed endorsement sheet for further details and conditions that may be applicable to this approval. Ethics approval is granted for a period of three years subject to satisfactory annual progress reporting. Ethics approval may be extended subject to submission of a satisfactory ethics renewal report prior to expiry.

The ethics expiry date for this project is: 31 October 2017

Where possible, participants taking part in the study should be given a copy of the Information Sheet and the signed Consent Form to retain.

Please note that any changes to the project which might affect its continued ethical acceptability will invalidate the project's approval. In such cases an amended protocol must be submitted to the Committee for further approval. It is a condition of approval that you immediately report anything which might warrant review of ethical approval including (a) serious or unexpected adverse effects on participants (b) proposed changes in the protocol; and (c) unforeseen events that might affect continued ethical acceptability of the project. It is also a condition of approval that you inform the Committee, giving reasons, if the project is discontinued before the expected date of completion.

A reporting form for the annual progress report, project completion and ethics renewal report is available from the website at http://www.adelaide.edu.au/ethics/human/guidelines/reporting/

Yours sincerely

Dr John Semmler
Convenor
Human Research Ethics Committee

Appendix 2: Questionnaire

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

Code……

Name of community…….

Date of interview……..

House No……...

Telephone No. (Optional)…….

Please circle the number or tick the box

A.**CLIMATE CHANGE AND GENDER PERCEPTIONS**

A. 1(a). Have you heard about climate change?

1. Yes [ ] Go to Question A 1(b) 2. No [ ] Go to Question A2

A.1 (b) If Yes, how do you understand climate change?…….

……
….……

A.2.Which of the following climate events have you been experiencing in this community in the last five years? (You may tick more than one)

1. Floods [ ] 2. Excessive heat [ ] 3. Rainstorm [ ] 4. Sea erosion [ ] 5. Saltwater intrusion [ ] 6. Fire outbreaks [ ]

A.3. **Around what period of the year do you experience such events**?

Event	**Month(s)**
Flooding	
Excessive heat	
Rainstorm	
Sea erosion	
Saltwater intrusion	
Fire outbreaks	

A.4. Based on a scale of 0-10, how would you rate the following climate hazards in terms of their severity on you?

Key:

0: Do not know (Not experienced it yet)

0-2: Not severe (Irregular, no destruction/discomfort/death/injury)

3-5: Less severe (Regular, no destruction/discomfort/death/injury)

6-8: Severe (Regular, minimum destruction/discomfort/ death/injury)

9-10: Very severe (Regular, maximum destruction/ discomfort/death/injury)

1. Floods 1. Severe [ ] 2. Very Severe [ ] 3. Less Severe [ ] 4. Not severe [ ]

5. Do not know [ ]

2. Sea erosion 1. Severe [ ] 2. Very Severe [ ] 3. Less Severe [ ] 4. Not severe [ ]

5. Do not know [ ]

3. Rainstorm 1. Severe [ ] 2. Very Severe [ ] 3. Less Severe [ ] 4. Not severe [ ]

5. Do not know [ ]

4. Fire outbreak . Severe [ ] 2. Very Severe [ ] 3. Less Severe [ ] 4. Not severe [ ] 5.Do not know [ ]

5. Saltwater intrusion. Severe [ ] 2. Very Severe [ ] 3. Less Severe [ ] 4. Not severe [ ] 5.Do not know [ ]

6. Excessive heat 1. Severe [ ] 2. Very Severe [ ] 3. Less Severe [ ] 4. Not severe [ ] 5.Do not know [ ]

A.5 (a). Do you know the causes of the following climate events in this community?

1. Flooding 1. Yes [ ] 2. No [ ] 2. Rainstorm 1. Yes [ ] 2. No [ ]

3. Sea erosion 1.Yes [ ] 2. No [ ] 4. Fire outbreak 1. Yes [ ] 2. No [ ]

5. Excessive heat 1.Yes [ ] 2. No [ ]

A.5 (b) What do you consider to be the causes of the following climatic events in this community if question A.5 (a) applies?

1. Flooding……..

2. Rainstorm……

3. Sea Erosion…….

4. Fire outbreak……

5. Excessive heat……..

A.6. Have you been affected by any of the climate climatic events in Question A.5 (b)?

1. Yes [ ] 2. No [ ]

A.7 (a). Did you have any property destroyed as a result of these events?

1. Yes [ ] Go to Question A.7 (b) 2. No [ ] Go to Question A.8 (a)

A.7 (b). If Yes, list the property destroyed and value

Property destroyed	Estimated value (GH)

A.8 (a). Are your water sources affected by climatic events such as flooding, sea erosion or salinity intrusion?

1. Yes [ ] Go to Question A.8 (b) 2. No [ ] Go to Question A.9 (a)

A.8 (b). If Yes, how do they affect your water sources? (You may tick more than one)

1. Contaminate water sources [ ] 2. Destroy water storage facilities [ ] 3. Affect water quality [ ] 4. Other (please specify)……..

A.9 (a). Are your waste disposal points affected by flooding and sea erosion?

1. Yes [ ] Go to Question A.9 (b) 2. No [ ] Go to Question A.10

A.9 (b). If Yes, how do they affect your waste disposal points?

1. Rubbish washed into gutters/drains [ ] 2. Rubbish collected into house [ ] 3. Rubbish brought into homes [ ] 4. Rubbish washed away from house [ ] 5. Other (please specify)……..

A.10. Please rank the following climate-related hazards in terms of their effects on you

Climatic event	Rank
Floods	
Sea Erosion	
Fire outbreak	
Rainstorm	
Excessive heat	
Saltwater intrusion	

Ranking

1st: Very severe (regular, maximum destruction/ discomfort/death/injury)

2nd: Severe (regular, minimum destruction/discomfort/ death/injury)

3rd: Less severe (regular, no destruction/discomfort/death/injury)

4th: Not severe (irregular, no destruction/discomfort/death/injury)

5th: Do not know (Not experienced it yet)

B.HOUSING CONDITIONS

B.1. Type of structure 1. Single room [ ] 2. Detached [ ] 3. Semi-detached [ ] 3. Compound [ ] Storey [ ]

B.2. (a) Are you the owner of this structure?

1. Yes [ ] Go to Question B.3 2. No [ ] Go to Question B.2 (b)

B.2 (b) If No, what type of tenancy do you have? 1. Rented [ ] 2. Family House [ ] 3. Free Occupancy [ ] 4. Other (specify)……...

B.3. How many rooms do you occupy……

B.4 (a). Does your roof leak when it rains?

1. Yes [ ] Go to Question B.4 (b) 2. No [ ] Go to question B.5

B.4 (b) If Yes, What do you do in such situations? 1. Abandon my room [ ] 2. Lodge with relatives/friends [ ] 3. Call for assistance from NAMDO [ ] 4. Do nothing [ ] 5. Other (please specify)……..

B.5. What facilities are available in your house? (You may tick more than one)

1. Water [ ] 2. Electricity [ ] 3. Toilet [ ]

4. Kitchen [ ] 5. Other (specify)……..

B.6 (a) Do you carry out any maintenance work on your house?

1. Yes [ ] Go to Question B6 (b) 2. No [ ] Go to Question C.1

B.6 (b). If Yes, what kind of maintenance work do you carry out on your house?

1. Painting and plastering [ ] 2. Change of doors and windows [ ] 3. Change of wood [ ] 4. Cementing of floor [ ] 5. Changing of roofing sheets [ ] 6.Other (please specify)……

B.6 (c) How many times in a year do you carry out this maintenance work?

1. 1-2 times 2. 3-4 times 3. 4-5 times 4. 5-6 times

B.6 (d). How do you fund this maintenance work? 1. Personal savings [ ] 2. Loans from Friends [ ] 3. Loans from Family members [ ] 4. Savings groups [ ] 5. Other social network [ ] 6.Remittances [ ] 7. Other (specify)……...

C.INFRASTRUCTURE

C.1.What is your main source of water? (You may tick more than one) 1. Pipe borne [ ] 2. Well [ ] 3. Bore hole [ ] 4. Rainwater [ ] 5. Tanker service [ ] 6. Other (specify)……

C.2. What is the distance to the source of water? 1. Less than 100m [ ] 2. Between 100m and 500m [ ] 3. Between 0.5km and 2km [ ] 4. More than 2km [ ]

C.3. Is your source of water affected by any climate event(s)

1. Yes [ ] Go to Question C.4 2. No [ ] Go to question C.5

C.4. If Yes, which of the following climate events affects your water sources? (You may tick more than one)

1. Flooding [ ] 2. Salinity intrusion [ ] 3. Excessive heat [ ] 4. Fire outbreak [ ]

5. Others (please specify)…….

C.5. Who owns your source of water? (Please tick one) 1. Myself [ ] 2. City authorities [ ] 3. GWCL [ ] 4. NGO/CBO [ ] 5. Community [ ] 6.Private vendor [ ] 7. Others (specify)……

C.6. How do you dispose off refuse? (You may tick more than one) 1. Public refuse dump [ ] 2. Buried [ ] 3. Skip Container/rubbish bin [ ] 4. House to house collection [ ] 5. Other ……..

C.7 (a). Are your refuse disposal sites affected by any climate events?

1. Yes [ ] Go to Question C.7 (b) 2. No [ ] Go to Question C.8 (a)

C.7 (b) If Yes, which of the following climate events affects your refuse disposal sites? (You may tick more than one)

1. Flooding [ ] 2. Sea erosion [ ] 3. Fire outbreaks [ ] 4. Others (specify)……...

C.8 (a). How do you dispose off liquid waste?(You may tick more than one) 1. Surface dumping [ ] 2. Drains [ ] 3. Soak-aways [ ] 4.Pits [ ] 5. Others (specify)……

C.9 (a). Is your liquid waste disposal process affected by any climate event?

1. Yes [ ] Go to Question C.9 (b) 2. No [ ] Go to Question C.10

C.9 (b) If Yes, which of the following climate events/hazards affect your liquid waste disposal process? (You may tick more than one)

1. Flooding [ ] 2. Sea erosion [ ] 4. Salinity intrusion [ ] 5. Fire outbreak [ ]

C.10. What type of toilet do you use? (Tick one) 1. KVIP [ ] 2. Pan latrine [ ]

3. WC [ ] 4. Open defecation [ ] 5. Others (specify)……..

C.11. Who owns the toilet facility? (Tick one) 1. Myself [ ] 2. Community [ ]

3. City authorities [ ] 4.NGO/CBO [ ] 5.Private vendor [ ] 6. Other (specify)……..

C.12.Is this toilet located in your house?

1. Yes [ ] Go to Question C.14 (a) 2. No [ ] Go to Question C13 (a)

C.13 (a). How far is the toilet from your house? 1. Less than 100m [ ] 2. Between 100m and 500m [ ] 3.Between 0.5km and 2km [ ] 4.More than 2km [ ]

C.13 (b) Is this a problem?

1. Yes [ ] Go to Question C.13(c) 2. No [ ] Go to Question C14 (a) 3. Do not know [ ]

C.13(c) If Yes, why is it a problem?

1. Not able to attend at night 2. Fear of attack [ ] 3. Distance too long [ ] 4. Long queues [ ] 5. Other (please specify)……..

C.14 (a). Are your toilet facilities affected during flooding?

1. Yes [ ] Go to Question C14 (b) 2. No [ ] Go to Question C.15

C.14 (b) If Yes, how does flood affect your toilet facilities?

1. Rubbish washed into toilet facilities [ ] 2. Toilet facilities washed away by flood [ ] 3. Spillage of human excreta [ ] 4. Other (Please specify)…….

C.15. Where do you mostly receive medical treatment for minor illness? (Tick one)

1. Hospital [ ] 2. Clinic [ ] 3. Traditional Healer [ ] 4. Mobile Health Team [ ] 5. Traditional Birth Attendant [ ] 6. Pharmacy [ ] 7. Drug store [ ]

C.16. Where is the facility located?

1. In the community [ ] 2. Outside community and within sub-metro [ ] 3. Outside metropolis [ ]

C.17. How long does it take to get to the facility?

1. 0-30 minutes [ ] 2. 30min-1 hour [ ] 3. More than 1 hour [ ]

C.18. Do you experience any difficulties at the medical facility because of your gender?

1. Yes [ ] 2. No [ ]

C.19. What do you mostly health receive medical treatment for major illness? (Tick one)

1. Hospital [ ] 2. Clinic [ ] 3. Traditional Healer [ ] 4. Mobile Health Team [ ] 5. Traditional Birth Attendant [ ] 6. Pharmacy [ ] 7. Drug store [ ]

C.20. Where is the facility located?

1. In the community [ ] 2. Outside community and within sub-metro [ ] 3. Outside metropolis [ ]

C.21. How long does it take to get to the facility?

1. 0-30 minutes [ ] 2. 30min-1 hour [ ] 3. More than 1 hour [ ]

C.22. Do you experience any difficulties at the medical facility because of your gender?

1. Yes [ ] 2. No [ ]

C.23 (a). Do you have health insurance?

1. Yes [ ] Go to Question C24. 2. No [ ] Go to Question C23 (b)

C.23 (b). If No why?.....

C.24. List the common diseases that affect you in this community starting with the one that occurs most frequently

Rank	Disease/Condition

C.25.What problems do you face with accessing health care in this community?

1. High cost of service [ ] 2. Long queues/overcrowding [ ] 3. Poor service [ ] 4. Inadequate medical personnel [ ] 5. Inadequate medical supplies [ ] 6. Poor transportation system [ ] 7. Other (please specify)……..

C.26 (a). Are your health care facilities affected by any climate events/hazards?

1. Yes [ ] Go to Question C.26 (b) 2. No [ ] Go to Question D1

C.26 (b). If Yes, which of the following climate events affects your health care facilities?(You may tick more than one)

1. Flooding [ ] 2. Sea erosion [ ] 3. Fire outbreak [ ] 4. Others (specify)…….

C.27(c). How does the above climate event affect your health care facilities?(You may tick more than one)

1. Medical supplies destroyed [ ] 2. Work of medical personnel impeded [ ] 3. Medical equipment washed away [ ] 4. Other (please specify)……

D.GENDER ROLES AND RESPONSIBILITIES

D.1. Which of the following household activities do you undertake daily? (You may tick more than one)

1. Collecting Water [ ] 2. Taking care of sick children [ ]

3. Bathing/feeding of children [ ] 4. Collecting fuel/firewood [ ] 5. Cooking [ ]

6. Cleaning dishes [ ] 7. Washing of clothes [ ] 8. Home maintenance [ ] 9. House cleaning [ ]

D.2. How much time do you spend daily undertaking the following activities?

Activity	Time spent(daily)
Collecting Water	
Taking care of sick children	
Bathing/feeding of children	
Collecting fuel/firewood	
Cooking	
Cleaning dishes	
Washing of clothes	
Home maintenance	

D.3. Do you have time to engage in income generating activities besides performing these activities? 1. Yes [ ] 2. No [ ]

D.4. How does the performance of the above-mentioned activities affect your ability to engage in income generating activities? ……

……..
..

D.5 (a). Have these activities changed in the last 5 years as a result of climate change?

1. Yes [ ] Go to Question D6 (b) 2. No [ ] Go to Question D 7

D.5 (b) If Yes, in what ways?.....

E. CLIMATE CHANGE & LIVELIHOOD SECURITY

E.1. What is your main occupation?.....

E.2 (a) Do you engage in any other occupation apart from your main occupation?

1. Yes [ ] Go to Question E2 (b) 2. No [ ] Go to Question E3

E.2 (b). If Yes, what occupation?.....

E.3. Where is your job located? 1. Within the community [ ] 2. Outside the community [ ]

E.4. What is the nature of your job? 1. Casual [ ] 2. Permanent [ ]

E.5 (a).Have you changed occupation in the last 5 years?

1. Yes [ ] Go to Question E5 (b) 2. No [ ] Go to Question E6 (a)

E.5 (b). If Yes, what was your previous occupation? .....

E.5(c). Was your decision to change occupation climate related? 1. Yes [ ] 2. No [ ]

E.5 (d). If Yes, please give reason(s) (You may tick more than one)

1. Work site flooded [ ] 2. Work site destroyed by fire [ ] 3. Change in season affecting occupation [ ] 4. Other (please specify)…….

E.5 (e) If No, please give reasons…….

E.6(a). Are you able to save at the end of every month?

1. Yes [ ] Go to Question E6 (b) 2. No [ ] Go to Question E6(c)

E.6 (b) If Yes, what percentage of your income is saved every month?.....

E.6(c) If No, which of the following factors is responsible for this?(You may tick more than one)

1. Lack of knowledge on savings [ ] 2. Lack of banking facilities [ ] 3. Lack of trust in the formal banking system [ ] 4. Difficult banking procedures [ ] 5. Others (specify)……..

E.7 (a) Are you able to invest every month?

1. Yes [ ] Go to Question E7 (b) 2. No [ ] Go to Question F.1

E.7 (b) If Yes, what percentage of your income is invested every month?.....

F. INCOME AND EXPENDITURE

F1. Expenditure pattern

Item	Week	Month
Food		
Clothing		
Toiletries		
House rent		
Utilities		
Housing maintenance		
Fuel		
Health care		
Transportation		
Education		
Donation, gifts & remittances		
Farm inputs(other than labour)		
Farm machinery(rental)		
Levies		
Credit/loan repayment		
Others(specify)		
Total		

F.2. Source of income

Source	Amount(GH)
Farming	
Business	
Remittances	
Salary	
Others(specify)	

G.OWNERSHIP OF ASSET/RESOURCE

G.1. Which of the following asset do you own? (You may tick more than one)

1. House [ ] 2. Car [ ] 3. Machine [ ] specify…… 4. Bank Account [ ] 5. Commercial structure [ ] 6. Livestock [ ] 6. Fishing equipment [ ] specify……..7. Other (specify)……..

G.2. Has this asset(s) being generating income to you?

1. Yes [ ] 2. No [ ]

G.3. How do you obtain food?(You may tick more than one)

1. Own farm [ ] 2. From open market [ ] 3. From relatives in hometown [ ] 4. From cooperative/savings group [ ] 5. Other (specify)……

G.7. Are you able to obtain enough food to feed yourself in the last five years?

1. Yes [ ] Go to Question G.9 2. No [ ] Go to Question G8 (a)

G.8 (a). Has your ability to obtain food been affected by climate change in the last five years?
1. Yes [ ] Go to Question G8 (b) 2. No [ ] Go to Question G.9

G.8 (b). If Yes, in what ways has this been affected by climate change…….

……
…..……
……..

G.9. Whose needs do you consider first in your household in times of food shortage? (Tick one)

1. Myself [ ] 2. Husband [ ] 3. Wife [ ] 4. Son [ ] 5. Daughter [ ] 6. Elderly [ ] 7. Physically challenged [ ] 7. Other (specify)……

H. ACCESSIBILITY TO CLIMATE INFORMATION

H.1 (a). Have you received information on weather from any source in the last five years?

1. Yes [ ] Go to Question H.1 (b) 2. No [ ] Go to Question I.1

H.1 (b) If Yes, from what source? (You may tick more than one)

1. Weather forecasters [ ] 2. FM/Radio stations [ ] 3. Friends [ ] 4. TV station [ ] 5. NGO/CBO [ ] 6. Community leadership [ ] 7. Other (specify)……

H.2 (a). Did this information prove useful in helping you to prepare for any climate-related disasters?

1. Yes [ ] Go to Question H.2 (b) 2. No [ ] Go to Question H.3

H.2 (b) Why do you consider this information not useful? (You may tick more than one)

1. Language too difficult to understand [ ] 2. Information not timely [ ] 3. Medium of communication not accessible to me [ ] 4. Information too gender biased [ ] 5. Other (Please specify)……

H.3. Which of the above mentioned source(s) do you prefer and why?

Preferred Source: ……

Reasons……

I. MEMBERSHIP OF SOCIAL NETWORKS (SOCIAL CAPITAL)

I.1. Are you a member of any social group?

1. Yes [ ] 2. No [ ]

I.2 (a). Do you receive any support from your social group in times of climate-related disasters?

1. Yes [ ] Go to Question I.2 (b) 2. No [ ] Go to Question J.1

I.2 (b) If Yes, what kind of support is it? (You may tick more than one)

1. Financial support in times of ailment [ ] 2. Financial support towards social events [ ] 3. Welfare purpose [ ] 5. Other (please specify)…….

I.3. Is this support timely and effective in helping you to cope with effects of climate-related disasters?

1. Yes [ ] 2. No [ ]

J. GENDER AND PARTICIPATION IN DECISION MAKING (GOVERNANCE)

J.1. Are you aware of any group of people in this community who make decisions regarding the control and prevention of climate-related disasters?

1. Yes [ ] 2. No [ ]

J.2 (a). Have you been consulted on decisions regarding disaster prevention and management in the last five years?

1. Yes [ ] Go to Question J.2 (b) 2. No [ ] Go to Question K.1

J.2 (b) If Yes, were you satisfied with the level of engagement /consultation in decision making process?

1. Yes [ ] 2. No [ ]

K. COPING STRATEGIES

K.1.What measures do you adopt in coping with the effects of flooding/sea erosion/rainstorm on the following and what reasons inform your choice?

A. Protecting water sources (You may tick more than one)

1. Constructing high storage tanks [ ] 2. Constructing gutters around water source for easy drainage [ ] 3. Constructing water sources with concrete [ ] 4. Raising foundations of water sources [ ] 5. Other (please specify)……..

Reasons for the choice of measures (You may tick more than one)

1. Financial considerations [ ] 2. Safety considerations [ ] 3. Knowledge of measures [ ] 4. Appropriateness of measure [ ] 5.Other (Please specify)……

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. Sleep in friend's house [ ] 7. Other (specify)……..

Reasons for the choice of measures (You may tick more than one)

1. Financial considerations [ ] 2. Safety considerations [ ] 3. Knowledge of measures [ ] 4. Appropriateness of measure [ ] 5.Other (Please specify)……

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

1. Collecting water out of rooms [ ] 4. Rely on family members for support [ ] 3. Keep personal effects in friend's house [ ] 4. Insure personal effects [ ] 5. Sell off personal effects [ ] 5. Other (specify)……

Reasons for the choice of measures (You may tick more than one)

1. Financial considerations [ ] 2. Safety considerations [ ] 3. Knowledge of measures [ ] 4. Appropriateness of measure [ ] 5.Other (Please 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. Avoid indiscriminate dumping of refuse [ ]

7. Other (please specify)……

Reasons for the choice of measures (You may tick more than one)

1. Financial considerations [ ] 2. Safety considerations [ ] 3. Knowledge of measures [ ] 4. Appropriateness of measure [ ] 5.Other (Please specify)…….

E. Protecting Children/the elderly/ physically challenged (You may tick more than one)

1. Keeping them out of the community [ ] 2. Keeping them at safe houses/homes in community [ ] 3. Other (Please specify)…….

Reasons for the choice of measures (You may tick more than one)

1. Financial considerations [ ] 2. Safety considerations [ ] 3. Knowledge of measures [ ] 4. Appropriateness of measure [ ] 5.Other (Please specify)……

L. ROLE OF LOCAL INSTITUTIONS

L.1 (a). Are you aware of the National Disaster Management Organisation (NADMO)?

1. Yes [ ] Go to Question L.1 (b) 2. No [ ] Go to Question L.3 (a)

L.1 (b). If Yes, have you received any support from NADMO in dealing with climate-related disaster in the last five years?

1. Yes [ ] Go to Question L.1(c) 2. No [ ] Go to Question L.3 (a)

L.1(c) If Yes, what kind of support did you receive? (You may tick more than one)

1. Financial [ ] 2. Food supplies [ ] 3. Shelter [ ] 3. Information [ ] 4. Other (Please specify)……..

L.2 (a). Was this support satisfactory for you?

1. Yes [ ] Go to Question L.3 (a) 2. No [ ] Go to Question L.2 (b)

L.2 (b) Why was this support not satisfactory? (You may tick more than one)

1. Support not enough [ ] 2. Support not timely [ ] 3. Political bias [ ] 4. Gender discrimination [ ] 5. Others (Please specify)……

L.3 (a). Have you ever received any education on how to prepare for and prevent disasters from NADMO?

1. Yes [ ] Go to Question L.3 (b) 2. No [ ] Go to Question L.3 (d)

L.3 (b).If yes, was this education timely?

1. Yes [ ] 2. No [ ]

L.3(c) Was the education useful to you for disaster prevention and management?

1. Yes [ ] Go to Question L.4 2. No [ ] Go to Question L.3 (d)

L.3 (d).If No, why was this education not useful to you?

1. Language too difficult to understand [ ] 2. Education not targeted at my needs [ ] 3. Medium not accessible to me [ ] 5. Gender bias [ ] 6. Wrong timing [ ] 7. Other (specify)……..

L.4. Do you know of any disaster prevention and management plan of the city authorities for this community?

1. Yes [ ] 2. No [ ]

L.5. What do you think can be done to improve your participation in decision making regarding disaster prevention and control in this community?

1. Regular community meetings [ ] 2. Regular announcements on impending disasters [ ] 3. Educating community members [ ] 4. Organise regular clean up exercises [ ] 5. Holding separate communal meetings for men and women [ ] 6. Giving women equal role in communal activities [ ] 7. Other (please specify)……

M. RESPONDENT CHARACTERISTICS

M1. Sex of Respondent 1. Male [ ] 2. Female [ ]

M.2. Age of Respondent……...

M.3. Marital status of respondent

1. Single [ ] 2. Married [ ] 3. Divorced [ ] 4. Widowed [ ] 5. Separated [ ]

M.4.
Ethnicity…….

M.5. Religion 1. Christianity [ ] 2. Islam [ ] 3. Traditional [ ] 4. Other (specify)……..

M.6. Educational level

1. Basic [ ] 2. JHS/MSLC [ ] 3. Secondary [ ] 3. Tertiary [ ] 4. None [ ]

M.7. How long have you been living in this community?.....

L.8. Can you read or write (any language)

1. Yes [ ] 2. No [ ]

Appendix 3: Interview Guide for Women

A. CLIMATE HAZARDS AND GENDER PERCEPTIONS

A.1. Do you believe that the climate is changing? If yes, which aspects of the climate are changing?

A.2. What climatic events/disasters/hazards have you been experiencing in in this community in recent years?

A.3. Around what time in the year do you experience such events? (Encourage discussants to use seasonal calendars to recall their experiences)

A.4. Which of the climatic events have you been experiencing frequently in the last five years?

A.5. Please rank the climatic events/disasters in order of frequency of occurrence.

A.6. How severe have these events/disasters been on women in terms of:

a. Occupation/livelihoods
b. Household duties
c. Health
d. Access to communal infrastructure (water and sanitation, health, market facilities etc.)

A.7. What do you consider to be the causes of these climatic events? (Encourage discussants to list many possible causes and rank them in order of importance to them?

B. GENDER ROLES AND RESPONSIBILITIES

B.1. List the roles/responsibilities performed by only women in the household?

B.2. What extra roles/responsibilities do women perform in addition to these common roles/responsibilities?

B.3. What burden does the performance of these extra roles/responsibilities place on the ability of women to engage in income generating activities in the household?

B.4. Have these roles changed over time as a result of climate variability?

B.5. Are women now sharing in roles/responsibilities that were previously performed by men in the household?

B.6. Are these roles dependent on availability of natural resources such as water and fuel?

B.7. Discuss the timelines of these roles and ascertain whether they are routinely performed or as and when needed.

B.8. What are the main livelihood activities engaged in by women in this community? Do these livelihood activities differ from or match with those of men?

B.9. Have there been any shifts in livelihood activities of women as a result of climate change?

C. RESOURCES AND ADAPTATION

C.1. What are the main types of resources mostly owned and controlled by women in the community?

C.2. Do you have access to early warning information? If yes, from whom and by what means?

C.3. On the average, how long does it take between the prior warning and the actual incidence of flooding/sea erosion?

C.4. What actions do you take to reduce the impact prior to flooding/sea erosion events when they are forewarned?

C.5. Do you consider these actions to be effective in reducing the impact of floods/sea erosion? If no, how would you like to be alerted about imminent flooding/sea erosion?

C.6.Do you receive any support from the National Disaster Management Organisation (NADMO) before, during or after disasters? If yes, what kind of support do you receive before, during and after disasters?

C.7. What difficulties do you normally encounter in accessing relief services from NADMO and other organisations?

C.8. Are you aware of any disaster mitigation plan of the city authorities of Accra your community? If yes, what mechanisms do the city authorities adopt to engage with you on disaster preparedness and response?

C.9. Are your inputs considered in the development of disaster mitigation plans by the city authorities? If not, what barriers do you face in participating in this process?

C.10. Is there a formal/informal leadership structure in the community? What is the composition of the community leadership? Are women proportionally represented on the community leadership? If not, what are the reasons for this state of affair?

C.11. Are you consulted/engaged on decisions taken by community leadership regarding climate change related activities/disaster prevention and management? If yes, what is the level of consultation/engagement?

C.12. How do city authorities disseminate information in the community regarding the prevention of disasters? Do you feel that this information dissemination process takes the needs and priorities of women into account?

C.13. Are there any social networks in the community that assist women in taking action against flood/erosion prevention and control? If yes, how useful are these networks in building your capacity climate related against disasters?

C.14. Do you have access to critical services and facilities in this community (e.g. Shelter with adequate space, marketing facilities, water and sanitation facilities etc.)?

C.15. What coping strategies do you adopt in dealing with the following situation and what reasons inform the choice of these strategies?

Predicting and preparing for disaster

a. Protecting properties
b. Storing essential items
c. Teaching children

Managing strategies

a. Safety of family members
b. Ensuring food security
c. Protecting assets
d. Household work
e. Managing finances
f. Alternative employment.

Recovery strategies

a. Re-building houses
b. Securing an income
c. Repaying borrowed money
d. Treating affected family members
e. Restoring other aspects of life e.g. children's education.

D. EFFECTS OF CLIMATE CHANGE-RELATED HAZARDS ON LIVELIHOOD SECURITY

D.1.What effects do climate change related disaster have on you in terms of the following:

a. Housing
b. Occupation
c. Marketing
d. Trading sites
e. Income and savings

f. Lives and Health

D.2. What factors compound your situation e.g. lack of medical facilities, lack of uncontaminated drinking water etc.?

D.3. Do you experience physical and sexual abuse/violence during the aftermath of climate change related disasters? If yes, how do you overcome them?

D.4. Are separate facilities provided for men and women in shelters supplied by NADMO during the aftermath of disasters? If no, are you able to share these facilities with men?

Appendix 4: Interview Guide for Men

A.CLIMATE HAZARDS AND GENDER PERCEPTIONS

A.1. Do you believe that the climate is changing? If yes, which aspects of the climate are changing?

A.2. What climatic events/disasters/hazards have you been experiencing in in this community recent years?

A.3. Around what time in the year do you experience such events? (Encourage discussants to use seasonal calendars to recall their experiences)

A.4.Which of the climatic events have you been experiencing frequently in the last five years?

A.5. Please rank the climatic events/disasters in order of frequency of occurrence.

A.6. How severe have these events/disasters been in terms of:

a. Occupation/livelihoods

b. Household duties
c. Health
d. Access to communal infrastructure (water and sanitation, health, market facilities etc.)

A.7. What do you consider to be the causes of these climatic events? (Encourage discussants to list many possible causes and rank them in order of importance to them?

B.GENDER ROLES AND RESPONSIBILITIES

B.1. List the roles/responsibilities performed men in the household?

B.2.Have these roles changed over time as a result of climate variability?

B.3. Are women now sharing in roles/responsibilities that were previously performed by men in the household?

C.4. What are the main livelihood activities engaged in by men in this community? Have there been any shifts in your livelihood activities because of climate change?

C.RESOURCES AND ADAPTATION

C.1.What are the main types of resources mostly owned and controlled by men in this community?

C.2. Do you have access to early warning information? If yes, from whom and by what means?

C.3. On the average, how long does it take between the prior warning and the actual incidence of flooding/sea erosion?

C.4. What actions do you take to reduce the impact prior to flooding/sea erosion events when they are forewarned?

C.5. Do you consider these actions to be effective in reducing the impact of floods/sea erosion? If no, how would you like to be alerted about imminent flooding/sea erosion?

C.6. Do you receive any support from the National Disaster Management Organisation (NADMO) before, during or after disasters? If yes, what kind of support do you receive before, during and after disasters?

C.7. What difficulties do you normally encounter in accessing relief services from NADMO and other organisations?

C.8. Are you aware of any disaster mitigation plan of the city authorities of Accra your community? If yes, what mechanisms do the city authorities adopt to engage with you on disaster preparedness and response?

C.9. Are your inputs considered in the development of disaster mitigation plans by the city authorities? If not, what barriers do you face in participating in this process?

C.10. Is there a formal/informal leadership structure in the community? What is the composition of the community leadership? Are women proportionally represented on the community leadership? If not, what are the reasons for this state of affair?

C.11. How do city authorities disseminate information in the community regarding the prevention of disasters? Do you feel that this information dissemination process takes the needs and priorities of women into account?

C.12. Are there any social networks in the community that assist you in taking action against flood/erosion prevention and control? If yes, how useful are these networks in building your capacity climate related against disasters?

C.13. What coping strategies do you adopt in dealing with the following situation and what reasons inform the choice of these strategies?

Predicting and preparing for disaster

d. Protecting properties
e. Storing essential items
f. Teaching children

Managing strategies

g. Safety of family members
h. Ensuring food security
i. Protecting assets
j. Household work
k. Managing finances
l. Alternative employment.

Recovery strategies

f. Re-building houses
g. Securing an income
h. Repaying borrowed money
i. Treating affected family members
j. Restoring other aspects of life e.g. children's education.

D.CLIMATE CHANGE & LIVELIHOOD SECURITY

D.1.What effects do climate change related disaster have on you in terms of the following:

a. Housing
b. Occupation
c. Marketing
d. Trading sites
e. Income and savings
f. Lives and Health

D.2. What factors compound your situation e.g. lack of medical facilities, lack of uncontaminated drinking water etc.?

Appendix 5: Interview Guide for Local Authorities

1. Are there any considerations in the Local Government Act (ACT 462) for incorporating gender in policy development and implementation at the local level? If yes, what are these considerations?

2. Does the assembly have any climate change related projects/programme specifically targeting vulnerable communities? If yes, do these projects/programme consider gender as a priority issue?

3. Does the city authority use gender disaggregated approach in planning and in the implementation of climate change related projects/programmes?

4. To what extent are women's representatives involved in the development and implementation of climate change related projects and programmes of the city authority?

5. Is there any working collaboration between the city authority and the National Disaster Management Organisation in disaster prevention and management activities?

6. Is there any working collaboration between the city authority and the Ministry of Gender, Children and Social Protection in climate change related activities?

7. Does the assembly have a climate change desk? If yes, what are the functions/roles of this desk with respect to assisting vulnerable communities to deal with climate change related disasters?

8. What challenges does the assembly face in the development and implementation of climate change related projects for vulnerable communities?

Appendix 6: Interview Guide for the National Disaster Management Organisation (NADMO)

1. Does NADMO have any policy guideline regarding collection of gender-disaggregated data in its disaster prevention and management activities? (Request a copy of this policy/guideline)

2. Has there been any working collaboration between NADMO and the Ministry of Gender, Children and Social Protection with regard to disaster prevention and management in vulnerable communities?

3. What forms of climate change related activities does NADMO undertake in vulnerable communities and to what extent are women or their representatives involved in these activities?

4. In what ways does NADMO take into consideration the needs of women, children and physically challenged in the provision of disaster relief services in poor communities?

5. Is there a gender desk/unit in NADMO? If yes, what are the roles/functions of this unit with respect to disaster prevention and management in vulnerable communities?

6. Was NADMO involved in the development of the National Climate Change Adaptation Strategy and the National Climate Change Policy? If yes, what was the level of involvement and what inputs did it make into these policies?

7. What challenges does NADMO face in incorporation gender consideration it its disaster prevention and management activities?

8. What climate change related disasters mostly affect vulnerable communities in Accra and what factors, in your opinion, are responsible for such disasters in such locations?

9. What challenges does the organisation face in dealing with climate change related disasters in vulnerable communities?

Appendix 7: Interview Guide for the Ministry of Gender, Children and Social Protection (MGCSP)

1. Was the Ministry involved in the development of the National Climate Change Adaptation Strategy and National Climate Change Policy? If yes, to what extent was this involvement?

2. Is there a climate change desk/unit in the ministry? If yes, what are its specific roles/functions with respect to working/engaging with vulnerable communities?

3. Is there any working collaboration between the ministry and the National Disaster Management Organisation with respect to disaster prevention and management in vulnerable communities? If yes, please explain in detail the nature of this collaboration.

4. Did the ministry participate in the development of the National Climate Change Adaptation Strategy? If yes, what specific inputs did your ministry make into this policy? If no, what were the reasons for the non-participation of your ministry?

5. Does the ministry undertake any specific climate change related activities in vulnerable communities? If yes, what are these activities (Request reports of activities)

6. What specific responsibilities/roles does the ministry play in the dissemination of climate change related information to vulnerable communities?

7. What challenges does the ministry face in incorporating gender in its activities?

Appendix 8: Interview Guide for the Environmental Protection Agency (EPA)

1. What are the main functions of EPA with respect to climate change activities?

2. Does the National Climate Change Adaptation Strategy (NCCAS) provide any targets for women's involvement or capacity building? If yes, what are these targets?

3. Does the NCCAS contain any gender specific projects? If yes, what are these projects? If no, why?

4. Were vulnerable women's groups or representatives engaged/consulted in the development of NCCAS and the National Climate Change Policy? If yes, what was the composition of the team that developed the NCCAS and was gender consideration taken into account? (Request for list of participants for different consultation, workshops and meetings carried out to develop the NCCAS)

5. Does the NCCAS make explicit connections/linkages between gender vulnerability/needs assessment and project profiles and implementation mechanisms?

6. Was there involvement of local government authorities in the development of the NCCAS? If yes, how was the nature of this involvement?

7. Is there a gender desk in the EPA? If yes, what are the specific roles/functions of this unit/desk in relation to gender and climate change?

8. Does the agency undertake any specific climate change related projects/activities in vulnerable communities? (Ask for copies of project reports)

9. Is there any working collaboration between EPA and the Ministry of Gender, Children and Social Protection? If yes, what form does this collaboration take in particular reference to gender and climate change?

Appendix 9: Interview Guide for Ghana Meteorological Services Agency (GMSA)

1. Is there any specific policy guideline which mandates the agency to disseminate weather/climate information to vulnerable communities?

2. Does the agency take gender into account in the dissemination of weather related information?

3. What means does the agency use in disseminating weather/climate information to vulnerable communities?

4. What climate change related disasters/hazards are likely to be affect vulnerable communities in Accra for the next 10 years?

5. What challenges does the agency face in incorporating gender into its information dissemination activities?

Appendix 10: Interview Guide for People's Dialogue on Human Settlements (PDHS)

1. How long has your organisation been operating in this community?

2. How many years has your organisation been involved in climate change related activities in this community?

3. What aspects of climate change activities is your organisation involved in this community?

4. Is gender an important consideration for your organisation in the development and implementation of climate change related activities? If yes, what aspects of your climate change related activities involve gender?

5. What challenges does your organisation in incorporating gender in its climate change related activities?

6. What factors, in your opinion, contribute to make women more vulnerable to climate change related disasters in this community?

7. Has your organisation been involved in any climate change related activities of any other state institution(s)? If yes, name the institutions and the kind of activities involved in.

8. What are the most common environmental hazards found in this community and how are they perceived by men and women?

9. What are the most common climate change related disasters that affect men and women in this community?

10. In what ways do these climate change related hazards affect the livelihood of :
    1.Women
    2.Men
    3.Children
    4.The physically challenged

11. In what ways do men and women cope with the effects of climate change related hazards?

12. What challenges does your organisation generally face in mainstreaming gender in its climate change related activities?

Appendix 11: Results of Mann Whitney U test on Strategies Implemented by Male and Female Survey Respondents to Protect Water Sources from Climate Hazards.

	Constructing high storage tanks	Constructing gutters around water source for easy drainage	Constructing water sources with concrete	Raising foundation of water sources	Do nothing
Mann-Whitney U	14525.000	14350.000	15137.500	15225.000	15137.500
Wilcoxon W	29925.000	29750.000	30537.500	30625.000	30537.500
Z	-1.120	-1.262	-.287	-.109	-.714
Asymp. Sig. (2-tailed)	.263	.207	.774	.914	.475

Appendix 12: Mann Whitney U test Results for Strategies Implemented by Male and Female Survey Respondents to Protect Houses from Climate Hazards.

	Constructing temporarily dykes or trenches to divert water away	Cleaning up blocked drains	Bailing water out of room	Rely on family members for support	Temporal relocation	Lodge with friends/relatives	Do nothing
Mann-Whitney U	13475.000	14700.000	14962.500	14787.500	15225.000	14875.000	15225.000
Wilcoxon W	28875.000	30100.000	30362.500	30187.500	30625.000	30275.000	30625.000
Z	-2.397	-.789	-.482	-.915	-.113	-.968	-.306
Asymp. Sig. (2-tailed)	.017	.430	.630	.360	.910	.333	.760

Appendix 13: Mann Whitney U test Results for Strategies Implemented by Male and Female Survey Respondents to Protect Personal Belongings from Climate Hazards

	Bailing water out of room	Rely on family members for support	Keep personal effects in friends' house	Sell off personal effects	Keep personal effects on high platforms	Keep personal effects in nearby community	Do nothing
Mann-Whitney U	15225.000	15137.500	14875.000	15137.500	14700.000	15225.000	14962.500
Wilcoxon W	30625.000	30537.500	30275.000	30537.500	30100.000	30625.000	30362.500
Z	-.112	-.234	-.618	-1.416	-.789	-.141	-1.173
Asymp. Sig. (2-tailed)	.911	.815	.537	.157	.430	.888	.241

a. Grouping Variable: Sex

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