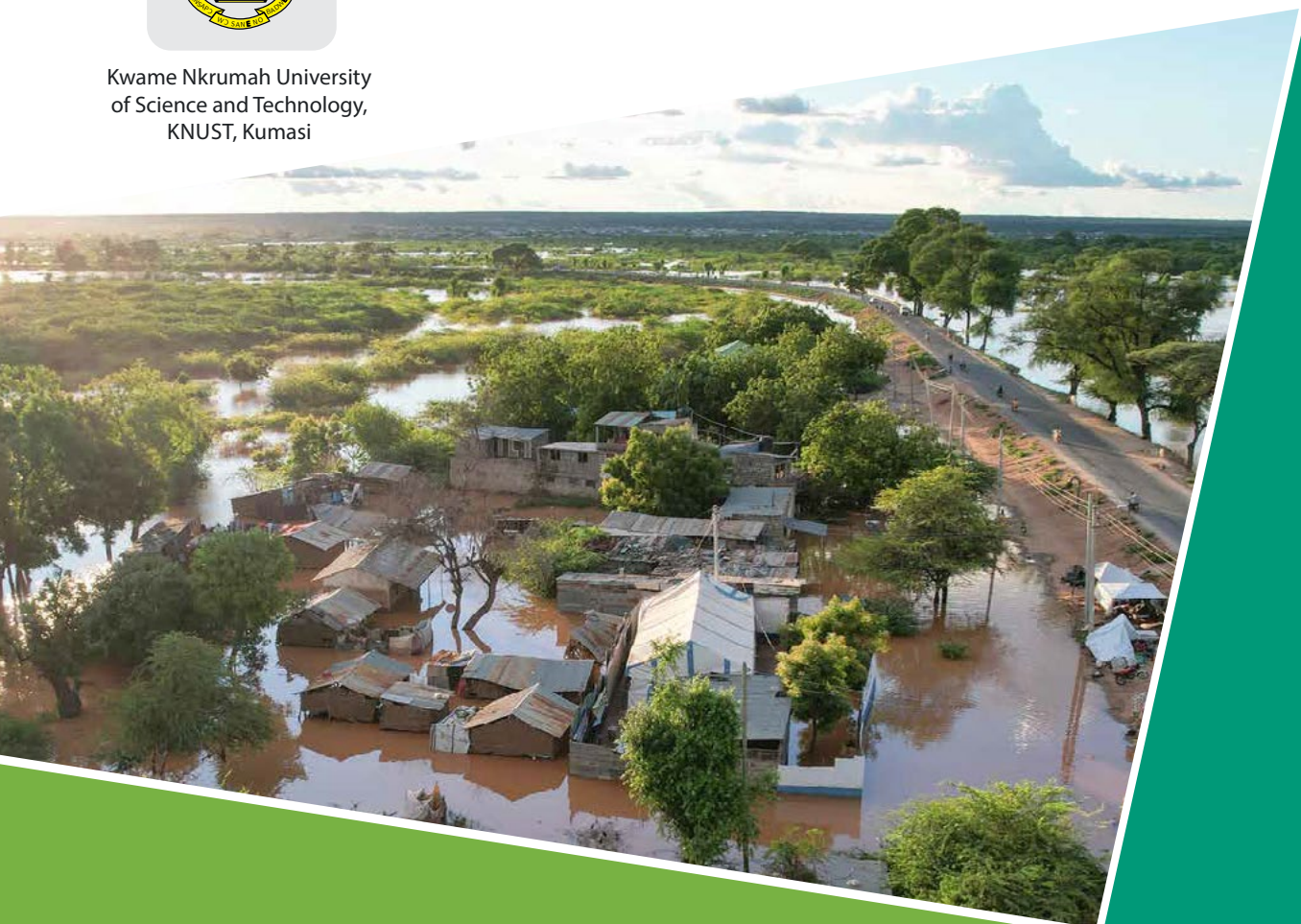




Kwame Nkrumah University
of Science and Technology,
KNUST, Kumasi



FLOOD LANDS DEVELOPMENT IN KUMASI AND ITS IMPLICATION FOR SUSTAINABLE DEVELOPMENT

NELGA RESEARCH REPORT

RESEARCH TEAM

Prof. John Tiah Bugri
Prof. Sylvana Rudith King
Prof. Divine Kwaku Ahadzie
Dr. Patrick Opoku
Dr. Eric Simpeh
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Implemented by





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EXECUTIVE SUMMARY

Flooding has been occurring unabatedly around the world, causing enormous ripple effects such as loss of lives and properties, increasing the vulnerability of communities as roads, drinking water sources, and electricity are damaged, and disrupting economic activities. Flooding also causes mass migration and population displacement. Flooding caused by poor land management has affected more than 2.5 billion people over the last two decades, killing approximately 500,000 people and causing an estimated economic loss of US\$700 billion.

Flooding issues in Ghana have been exacerbated by rapid population growth and increased urbanization, combined with the ravages of climate change, creating new flood prone zones and transforming flood lands into unplanned habitable development sites. Despite various attempts to reduce perennial flooding to avoid that disastrous state of affairs, there has been little attention paid to the rationale behind the development of flood lands. This research project provides an update on flood lands development in Kumasi and its implications for sustainable development. The project's overarching aim was to investigate the rationale for people acquiring land and living in flood-prone communities, as well as institutions that assist people to acquire such lands on the blind side of planning regulations. Specific objectives included to:

- determine the category of people who acquire land in flood prone areas in urban areas;
- establish the reasons for people acquiring and living on flood-risk lands;
- ascertain the awareness of people to the risk associated with living on flood-risk lands;
- know the preparedness of people to combat the risks associated with flood-risk lands;
- identify the stakeholders/institutions responsible for providing and preparing the people for such risks, and
- through the outcome of the research and by way of recommendations, create awareness of people living in flood prone areas about flood management and resilience.

To achieve the objectives of the study, a sequential mixed method approach was adopted. The survey included 513 households, with respondents drawn from seven communities designated by the National Disaster Management Organization (NADMO) as high flood prone areas in Kumasi. Using the KNUST Ethics Policy, due diligence was adhered to in the research process.

The key findings emanating from the study are:

- The category of people who acquire land in flood-prone communities are mostly Ghanaian migrants from outside the Ashanti Region but from Ghana; they are mostly women, young people aged between 18 and 45, and mostly working in the informal sector. Individuals in any of these categories who are unable to obtain their own land live in flood-prone communities in rented housing. It was also evident from the study that people from all income groups in Ghana acquire land in flood-prone communities. Flooding, on the other hand, has the same effect on both the high and low-income groups, though it affects them differently, and the coping strategies for the various groups differ.
- A number of motivations for purchasing land in flood-prone areas were identified, with affordability being the highest. Others deliberately acquire flood land, believing they can manage the associated challenges, while others are simply unaware of what they have acquired in terms of the vulnerability and type of land.
- Residents in flood-prone communities are aware of the impact of flooding (risks associated with flooding), and the majority of them have learned how to cope with the situation through experience.
- The respondents were dissatisfied with the level of assistance they receive from Government authorities and related stakeholders and regard the majority of them as either of little or no importance to them. This raises serious concerns about flood management and the provision of assistance

to flood victims. While the respondents see the city authorities as unconcerned, the city authorities also see the flood residents as uncooperative.

- Residents constantly monitor the weather and begin preparing for rain when they notice changes in the cloud from bright to dark colour. For many residents, this has been the primary indicator that they should begin preparing for the rain. It is worth noting that no one mentioned listening to the weather forecast.

It is obvious that managing flooding issues cannot be done in isolation without looking at land management in general, and which involves bringing together a number of stakeholders, each with a different role to play. As a result, there is a need to foster effective collaboration among all stakeholders involved in land and flooding issues. Although some of them indicated during the key informant interviews that they collaborate and work closely together, it appears that the impact of this collaboration is minimal. These include: physical planners, city engineers, the NADMO, local government management, traditional leaders (chiefs), and many others including the flood land residents and flood victims. Part of the haphazard development along river banks and in flood-prone areas is due to a lack of collaboration among stakeholders to work together to solve the problem. It is therefore the responsibility of local governments to ensure that this occurs, and they should be at the forefront of this effort.

It is recommended that the key stakeholders play more active roles in addressing the flood issues by ensuring that regulations are adhered to, larger drains are provided in the communities and intensive education about flood related events are carried out to educate citizens and to prepare them for floods. The stakeholders also need to forge a strong collaboration that can allow them to work closely together to resolve the issues, as land and flood related events are interdisciplinary and require joint efforts to address them effectively.

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ACRONYMS AND ABBREVIATIONS

APFM	Associated Programme on Flood Management
BBC	British Broadcasting Corporation
DAAD	Deutscher Akademischer Austauschdienst
GFDRR	Global Facility for Disaster Reduction and Recovery
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLSS	Ghana Living Standard Survey
IPCC	Intergovernmental Panel on Climate Change
KMA	Kumasi Metropolitan Assembly
KNUST	Kwame Nkrumah University of Science and Technology
MMDA	Metropolitan, Municipality and District Assembly
NADMO	National Disaster Management Organization
NELGA	Network of Excellence on Land Governance in Africa
SDG	Sustainable Development Goals
UN	United Nation
UNECE	United Nations Economic Commission for Europe
WMO	World Management Organisation
BMZ	German Federal Ministry for Economic Cooperation and Development (BMZ)



CHAPTER ONE: GENERAL INTRODUCTION

1.1 Introduction

Land plays a crucial role in economic and human development as an asset for individuals and communities, although limited in supply as population increases. It is central to any development. Individuals, households, societies, governments, among others, are very particular about land ownership, land use, land management as well as investing in infrastructure development now and in the future (UN-HABITAT, 2012), making land acquisition an important aspect of all stages of development. Rapid urbanization in developing countries has brought many challenges to land acquisition including access and rights to land for development (UN Habitat, 2008).

Flooding as a result of poor land management in the past two decades affected more than 2.5 billion people, killing about 500,000 and an estimated economic loss of US\$700 billion. This has been exacerbated in the last few decades with rapid urbanization, climate change and pressure on land. UN-HABITAT (2012) mentioned floods to be responsible for half of the world's disasters, constituting 84% of all disaster related deaths. Floods trigger other problems including the spread of diseases such as cholera, diarrhea, typhoid, scabies, malaria and contaminating water supply sources, mostly in urban poor settlements like slums (UN-HABITAT, 2012). Objectively, the problems flooding poses to society are as a result of vulnerability especially among women, children and the aged. Land acquisition challenges and land management practices, development of slums, socio-economic and financial conditions of households compel development within high-risk zones, including flood-prone zones. The risk of flooding as a result of uncontrolled development also leads to vulnerability, displacement of people, destruction of properties and assets, and environmental degradation. These factors, coupled with the effects of climate change, point to a future where these hazards could increasingly threaten national economy, its population, with negative implications for the attainment of the Sustainable Development

Flooding as a result of poor land management in the past two decades affected more than 2.5 billion people, killing about 500,000 and an estimated economic loss of US\$700 billion.

Goals specifically and for sustainable development in general. The need therefore to address the root causes of all these problems is very imminent in recent years as flooding has social, political and economic consequences for individuals and communities and creates financial, social, psychological burdens and physical trauma.

1.2 Problem Statement

Flooding is indeed a growing phenomenon in most cities in developing countries in Africa. The West African coastline which is low lying is no exception, notably in urban settlements of Ghana, Nigeria, Gambia, Liberia and Sierra Leone that are experiencing rapid and unprecedented urban growths as a result of many factors including rapid population growth and rural-urban migration. In 2015, UN reported the population of the sub-region as 357 million people, which was a five-fold increment from that of 1950 (UN, 2015). The population of West Africa in 2022 was estimated to be 429,081,000 (World Bank, 2023), an increase of over 100 million people since 2015. It is therefore not surprising that wet and flood-prone lands have become alternative land for development and habitation, particularly for vulnerable groups in society.

In addition to rapid population growth, the effects of climate has changed weather patterns including rainfall patterns in many West African countries, resulting in flooding gradually becoming the order of many urban settlements. The West African region experiences torrential rainfalls that become destructive when it rains. As a result of flooding, stagnant water abound today in communities in major cities (in homes, markets and streets) after any heavy downpour. Flooding results in submerging of buildings and other properties, destruction and loss of livelihood assets, drowning of people and displacement of communities. The excessive flood waters also collapse bridges and wash away not only bitumen on tarred roads, but also wash away

entire roads cutting settlements off from major communities and amenities.

As mentioned above, one major cause of flooding in major cities in West Africa is limited access to land due to over population of the urban centres and challenges in accessing prime land in the urban settlements. Consequently, people go in for unauthorized lands while others go in for non-prime lands such as wetlands and flood-prone areas. Others choose to develop properties in unauthorized lands such as waterways, thus exposing those properties to risks from flooding. Furthermore, human activities such as the dumping of refuse into drains are other major factors blocking drainage systems and as a result of causing overflow of drains with the slightest rainfall.

Generally, the coastline of West Africa is low-lying (Addo, 2013) and therefore susceptible to flooding with majority of the inhabitants being vulnerable to flood. Many cities in the West African region have also developed without consideration of the risks that climate change will induce. During the rainy season in The Gambia in 2010, flood affected 35,000 people and in Liberia, flood left part of Monrovia, the capital city, under water in 2017. In Sierra Leone, floods and mudslides along with their associated risks stemming from various drivers and pressures that have created the conditions in some major cities, are major urban planning issues cities like Freetown are facing today. The city's population has increased rapidly with limited alternative living arrangements and safe land for housing. Residents (mainly the urban poor but not exclusively) have been forced to settle in risk-prone areas along coastal and river bed lands, as well as the mountain slopes, thus also creating climate refugees (Mansaray, Huang and Kamara, 2016). Freetown was planned to take 45,000 people but it had a population of 1,272,000 people in for the same year out of the country's population of 7,548,702 (Statistics Sierra Leone, 2022). The expansion of informal settlements, of which Freetown is home to 61 of such settlements (Hitchen, 2012), coupled with little to no enforcement

of urban planning regulations, building regulations, have led to drastic land use and land cover changes, which are themselves exacerbating the risk of floods and mudslides (Mensah and Ahadzie, 2020).

According to Nyakundi et al., (2010), floods cause natural threats to life, health and population. The number of reported homeless persons following floods is particularly high because of the vulnerability of dwellings to rain and flood. The destruction of roads and other infrastructure could delay on-going development initiatives and create transportation problems. Damage to infrastructure also causes long-term impacts, such as disruptions of clean water and electricity supply, transport, communication, education and health care (Borrows and Bruin, 2006). In addition, high cost of relief and recovery may adversely affect investment in infrastructure and other developmental activities in the area and in certain cases may cripple the frail economy of West African countries.

Flooding can be highly traumatic for individuals and communities in particular where deaths, serious injuries and loss of property occur. Healthwise, flooding can lead to deterioration of health conditions owing to injuries and waterborne diseases. Where health and sustenance of households are concerned, female household members become the key victims of flood related events and this, to a large extent, is extended to children and the aged in households. This is mostly due to women's care role at the household level. For example, where water sources get polluted in the course of flooding, it adds to the responsibilities of women to get clean water for household members. According to Aboagye (2012), flood alters set of resources available to households and when this happens the woman suffers most in an attempt to sustain the family. Children, pregnant women and nursing mothers suffer most in households affected by flood. Flooding becomes more devastating to female headed households that have to ensure life is restored to all family members in addition to finding alternative livelihood resources to sustain

households. Evidence in literature shows that flood has more negative impact on women than men. In The Gambia, for example, the 2010 flood affected 3,218 children and 174 pregnant women (IFRC, 2011). Flooding therefore has gender implications and so any discussion related to flooding and physical location cannot leave out the discourse associated with gender.

Notwithstanding the above problems associated with flooding, it appears in this era where nations are experiencing negative effects of climate change, it is not clear whether city authorities have mapped out flood-prone areas in fast-growing cities to guide land tenure and protect citizens. It is also not clear whether residents with properties in flood-prone areas have the capacity in flood management and resilience that can make it more manageable for them to survive in flood-prone areas. This research was set out to investigate some of these issues. The research was interested in what informs citizens in selecting areas for settlement or habitation and whether they have choices to make with regards to land acquisition or housing rentals at specific locations, and examining whether citizens have knowledge on areas liable to flooding in the cities they live in and the devastating effects flood can cause them. It therefore sought to investigate how flood-prone lands are acquired, who is affected most and what motivates people to acquire such places and how city authorities prepare these people to be aware of the implications of living in such flood-prone areas.

1.3 Research Questions

The research sought to explore the following broad and specific questions;

- What is the economic status of land owners in flood-prone areas in urban settlements?
- What are the motives for acquiring and living on flood-risk lands?
- What is the level of awareness of people regarding the risk associated with living on flood-risk lands?

- What is the preparedness level of flood residents to combat the risk associated with living on flood lands?
- Which stakeholders are responsible for providing and preparing the people for flood risks?
- What recommendations can be put forward for efficient management of flood lands?

1.4 Research Objectives

Based on the above research questions, the broad objective of the research was to determine the motivating factors that drive individuals to acquire and settle in flood-prone communities and whether they have the skills to manage and survive in such areas in times of flood. The specific objectives include the following:

- To determine the category of people who acquire land in flood prone areas in urban settlements.
- To establish the reasons for people acquiring and living on flood-risk lands.
- To ascertain the awareness of people about the risk associated with living on flood-risk lands.
- To know the preparedness of flood residents to combat the risk associated with living on flood lands.
- To identify stakeholders responsible for providing and preparing the people for flood risks.
- To make recommendations for efficient management of flood lands

1.5 Relevance of the Study

This research covered three NELGA thematic areas, which are urban settlements, climate change and gender. These three themes specifically focus on some of the UN Sustainable Development Goals (SDGs) (Goals 3, 5, 6, 8, 10, 11 and 13), thus, emphasizing the relevance of the research. Goal 3 is about good health and well-being, which flood conditions do not provide and therefore helping

flood victims to know how they can build resilience and manage with the situation could go a long way in addressing health related issues due to flooding. Goal 5 is about gender equality which the research is interested in as gender forms a focus of the study because women and men are impacted differently by flood, with women being the most affected within households due to their care responsibilities. Evidence abound to show that women are the most affected during flood situations. Goal 5 also relates to Goal 10 which is about addressing issues of inequalities. The research tried to find out who has access to land in flood prone areas, why and whether that has implication for social exclusiveness or inclusiveness. Goal 6 is about clean water and sanitation. Evidence shows that flood situations interfere with clean water supply and sanitation leaving households for days without potable water as existing water sources get contaminated. Further, Goals 11 and 13 are about sustainable cities and communities and climate change, respectively. It is evident that in addition to human actions, climate change has also exacerbated the effect of flood in urban settlements, which has implications for the rapid growing urban centers in Africa today. Goal 8 is on decent work and economic growth. One of the effects of flood is its destructive effect on livelihoods. The research is concerned about decent and habitable settlements that can ensure the promotion of economic activities of the residents.

In view of the fact that addressing the menace of climate change is a gradual global process involving everybody, particularly those in developing countries, this research work aimed at finding out the extent to which inhabitants of flood-prone areas in cities of West Africa are capacitated in flood management and resilience skills that can help them minimize the negative impact of floods. Thus, the research is intended to provide information to city authorities and inhabitants of flood-prone areas as to what to do to protect lives, properties and livelihoods during floods. The research therefore addressed a number of the global, regional, national and local

sustainable development agenda and that of West Africa in particular.

Land choices and management are the decisions and actions taken by individuals, communities, governments, and organizations on how they use, develop and care for land. Land choices and management in flood-prone areas are critical for reducing the risk of flooding and other disasters associated with flooding. When municipalities, other local governments and individuals make informed decisions about where to build homes, businesses, and infrastructure, they can avoid construction in high-risk flood-plain areas. Regulatory measures such as zoning laws and building codes play a significant role in this regard. Thus, this research would become very relevant in providing local governments with information regarding how land choices are made by individuals.

Though discussions on flood is a topical issue, literature shows that very little has been done about flood lands in West Africa. The study aimed at drawing the attention of international and national governments and agencies to this issue and how it is related to social exclusiveness, access of the poor to land in the urban centers and building sustainable cities, among others.

Floods trigger spread of diseases such as cholera, diarrhea, typhoid, scabies, malaria and contaminating water supply sources mostly in urban poor settlements (UN-HABITAT, 2012). Evidence shows that one of the areas affected most by flood is fresh water. Finding solutions through this research to ensure the preparedness of potential victims of flood (people living in flood prone zones) as this could help in reducing pollution of water sources and ultimately national expenditure on health and destruction of livelihoods.

The high rate of urbanization in Africa has implication for increase in demand for land and this may worsen in the years to come. This suggests that the use of flood lands will be in high demand and city authorities

need to know about the implications to enable them to prepare for that. This research therefore would provide the requisite information to city authorities regarding the impacts of extreme weather events associated with settlements in flood prone areas and management of such situations to ensure that the flood victims are equipped with skills to help them cope with the situation.

1.6 Participating Countries

Initially, the research was designed as a West African project for the English speaking NELGA member participating universities in the following West African Anglophone countries;

- Nigeria
- Liberia
- Ghana
- Sierra Leone
- Gambia

The participating universities were involved in the initial literature review. However, they could not continue with the research due to logistical, administrative and bureaucratic problems related to transfer of moneys from the NELGA Secretariat at KNUST, Kumasi to member universities in the network. This led to several delays of going back and forth in attempt to resolve the problem until GIZ decided to use a different approach to reach out to the various partner universities on the project. The outbreak of COVID-19 also delayed project implementation. As a consequence, only Ghana was able to complete the research project. This report therefore covers only the project outcome for Ghana, although the other partner universities were encouraged to go ahead with the same study in their respective countries.

1.7 Ethical Concerns

KNUST recognizes that it has an obligation to all its stakeholders to observe and maintain high ethical standards in all transactions. Consequently,

the research considered ethical concerns based on the guidelines provided in the KNUST Ethics Policy document of 2018 for research. The research team explained the purpose of the research to all stakeholders and respondents, including the enumerators. The enumerators were taken through the KNUST Ethics Policy document of 2018 and were admonished to respect the rights of the respondents. Only respondents who agreed to be interviewed were given the chance to do so. In addition, the enumerators took photographs of only those who agreed to be photographed, with the approval that the photographs of their habitats and environment could be used for the report. Also guided by the KNUST Ethics Policy (2018), the research team were aware of the need for confidentiality to ensure the protection of confidentiality of the respondents, and this was duly observed. Confidentiality was of particular concern to the public servants that had to be interviewed and so they wanted to be sure they were protected.

1.8 Organization of Report

The report is organized into eight chapters. Chapter one covers the introduction of the research project and what is contained in the entire report. Chapter two presents the literature review while chapter three covers the methodology and four covers the demographic data gathered. Chapters five, six and seven present the findings of the study and chapter eight, which is the last chapter, presents the closure to the report. The last chapter is presented in three parts; summary of findings, recommendations and conclusion.

1.9 Challenges of Data Collection

In some of the flood-prone communities, the residents have had several individuals visiting them for data collection and so research fatigue had set in thereby discouraging them from participating in the research. This made them uncooperative during the interviews. A resident at Kwadaso exploded and said;

“You people are always asking these questions but you don’t do anything about it, you just take the money and ‘chop’ but don’t do anything for us. We don’t have any time to answer you guys.”.

In response, the research team assured the interviewees that they would be revisited for feedback and sharing of findings which was done. The research team pledged to provide training in flood management and resilience to affected communities.

Time allocated for data collection conflicted with availability of residents in the study communities as residents working outside their residential communities had to go to their work places during working hours, during which time the enumerators go round to administer questionnaires. This prolonged the data collection period as enumerators had to make several visits to the communities.

The quality of data that was collected was however, not compromised by these challenges as measures were taken to address them properly.

CHAPTER TWO: FLOODING AS A GROWING PHENOMENON

2.1 Introduction

Chapter two covers a brief literature review related to flooding in the context of land management. It discusses flooding as a phenomenon generally. It covers the nature and causes of flooding and the various types of flooding that exist. The legal instruments in Ghana governing land acquisition is also outlined in this section.

2.2 Floods

Flooding has become a global and growing phenomenon. According to Lal et al. (2012), floods happen when water overflows from its normal boundaries or accumulates in areas that are usually not submerged. Flooding, according to Tucci (2007), occurs when rivers, streams, and storm-water tunnels cannot contain the volume of water discharged into them and subsequently overflows into areas that the population uses for their activities. However, it poses a high risk and can be very disastrous when it overflows into the space that the population uses for residential purposes, transport, recreation, commerce, industry and among others. Kumi-Boateng et al. (2020) stated that due to the fast changes in population expansion, urbanization trends, and climate change, it is one of the most prevalent and dangerous geohazards. It is a natural hazard that occurs when water overflows from its normal channels and covers the surrounding land. Flooding is the submergence of a dry area that is usually not covered by water. Although water is necessary for human living, excessive amounts can have negative effects on the environment and community.

Floods happen when water overflows from its normal boundaries or accumulates in areas that are usually not submerged.

Floods are caused by natural elements or a mix of natural and human factors (Tingsanchali, 2012) high floods and high tides, etc., and human factors such as blocking of channels or aggravation of drainage channels, improper land use, deforestation in headwater regions, etc. Floods result in losses of life and damage properties. Population increase results in more urbanization, more impervious area and less infiltration and greater flood peak and runoff. Problems become more critical due to more severe and

frequent flooding likely caused by climate change, socio-economic damage, population affected, public outcry and limited funds. Flood loss prevention and mitigation includes structural flood control measures such as construction of dams or river dikes and non-structural measures such as flood forecasting and warning, flood hazard and risk management, public participation and institutional arrangement, etc. This paper describes concepts, policy, plan and operation on integrated urban flood disaster and risk management. In most developing countries, flood disaster management activities are handled by government. Participation of nongovernmental agencies and private sectors are very limited. Activities are exercised rather independently without proper coordination or integration. Flood disaster management in developing countries is mostly reactive responding to prevailing disaster situations (emergency response and recovery. It is a natural occurrence that may occur at any time and in a wide range of areas around the world. Flood has been identified as one of the impacts of climate change and is one of the water-related impacts of climate change. Within the past few decades, flooding has become a global pandemic that stifles economic and social development. This global phenomenon has led to loss of lives and economic damages in many countries including Ghana (Asumadu-Sarkodie et al., 2015).

Flood disasters have increased over the years, particularly with the advent of climate change where climatic affects are in excesses, leading to direct, and indirect impacts on societies including agriculture productivity and subsequently, food availability, accessibility, utility, and stability in communities (Atanga & Tankpa, 2021). Flood disasters have become more frequent, having both direct and indirect effects on society (ibid); Gaisie et al., 2022). There are several effects of flooding, that ranges from loss of properties to loss of lives. The IPCC (2022) reports that the sensitivity to water-related consequences of climate change and extreme weather conditions are

already being felt in major sectors and are expected to worsen in the near future.

2.3 Types of Flooding

According to Petersen (2001), floods can be classified into four types based on characteristics of the flood event. These are flash floods, which are of a few hours' duration, single event flood of long duration, multiple-event floods and seasonal floods.

Flash floods, as the name suggest, happens in a flash. According to Broga et al (2011), flash event flood lasts for a few hours and is mostly associated with short, high-intensity rainfall rates, mainly of convective origin that occur locally (Borga et al., 2011). Flash floods are said to be similar to river floods except that it occurs with little or no warning over a relatively small area for a short period of time (Petersen, 2001; Dhar & Nandargi, 2003; Dhar & Nandargi, 2003). Single event flood of long duration is caused by widespread torrential rainfall that last days to weeks over a drainage basin with varied intensities, leading to devastating floods. Unlike flash flood which happens without warning, single event floods happen in a gradual process over time. Due to its nature, it allows enough time for evacuation and protection of properties and lives. It is mostly common during the raining season. When the moisture content of the air is particularly high, such severe rains are coupled with cyclonic disturbances, such as slow moving or stationary thunder storms, cyclonic storms, low pressure zones, depressions and other occurrences. According to Dhar & Nandargi (2003), if these disturbances move slowly, a region may experience significant flooding as a consequence of concentrated high rainfall, averaging 10 to 15 mm/hr.

Additionally, a series of meteorological disturbances, such as low pressure or depressions and low humidity, travel together without much of a pause to cause multiple events floods. Intermittent rain gradually raises the level of water bodies and eventually causes them to overflow into surrounding space. Rainfall

is an associated cause of both single and multiple event floods, the precipitation need not always be heavy, when it comes to multiple event floods. Due to the way that the flood occur, it is possible to be predicted or be expected in the same way as single-event flooding (Dhar & Nandargi, 2003; Petersen, 2001). Seasonal floods as the name suggests are floods that occur due to seasonal precipitation. Dhar & Nandargi (2003) specified that seasonal floods are induced by significant precipitation across a drainage basin during different seasons. Because of their seasonal nature, they are most common during the rainy season. Seasonal floods are a feature of many tropical rivers that often occur during rainy seasons (Testad et al., 2013).

Similarly, Gautam & van der Hoek (2003) and (Petersen, 2001) classified floods based on the source type. These are rainfall flood, snowmelt flood, sea surge or tidal flooding, and dam brake flood. Gautam & van der Hoek (2003) again stated that floods can broadly be classified as river floods and coastal and estuarine floods. It can be noted that classification of floods based on the source falls under the broad category of flood classified by Gautam & van der Hoek (2003), that is river floods, caused by rainfall, snow and ice-melt, ice jams, landslides and coastal and estuarine floods, caused by coastal storm surges, tides, earthquakes.

2.4 Causes of Flooding

Causes of floods can be associated with natural factors such as heavy rainfall, high floods and high tides, as well as human factors such as blocking of channels or aggravation of drainage channels, improper land use, deforestation in headwater regions (Mensah and Ahadzie, 2020; Tingsanchali, 2012) high floods and high tides, etc., and human factors such as blocking of channels or aggravation of drainage channels, improper land use, deforestation in headwater regions, etc. Floods result in losses of life and damage properties. Population increase results in more urbanization, more impervious area and

less infiltration and greater flood peak and runoff. Problems become more critical due to more severe and frequent flooding likely caused by climate change, socio-economic damage, population affected, public outcry and limited funds. Flood loss prevention and mitigation includes structural flood control measures such as construction of dams or river dikes and non-structural measures such as flood forecasting and warning, flood hazard and risk management, public participation and institutional arrangement, etc. This paper describes concepts, policy, plan and operation on integrated urban flood disaster and risk management. In most developing countries, flood disaster management activities are handled by government. Participation of nongovernmental agencies and private sectors are very limited. Activities are exercised rather independently without proper coordination or integration. Flood disaster management in developing countries is mostly reactive responding to prevailing disaster situations (emergency response and recovery. Tucci (2007) states that for floods to occur, meteorological and hydrological conditions both usually coexist in time and space. The severity, extent, duration and rate of occurrence of floods depends on the factors causing it.

2.4.1 Natural causes of Flood

According to Chang et al. (2009), natural causes of flooding are those attributes, processes, or occurrences of the earth that are governed by nature and can produce floods; hence, processes that are not directly influenced by humans. These are some natural causes of flooding: heavy and prolonged rainfall, the nature of relief or the drainage basin, the absence of vegetation cover along river basin and river discharge capacity.

Heavy and prolonged rainfall, which results in rise in water level of rivers and other water bodies beyond their carrying capacity is considered one of the most prevalent causes of flood. This is ascertained by Van Alphen & Lodder (2006) and explained urban flooding

to occur when urban streams breaks its bank and flow onto floodplains as a result of prolong rainfall.

Drainage basin or nature of relief that can lead to flooding and it is a natural cause of flooding. Rivers flow slowly in low lying areas or flat land, making it difficult when water level increases suddenly—the carrying capacity is overwhelmed leading to flooding. A steep river valley increases the speed at which large volume of water enter a river resulting in rise in the river level and subsequent overflow.

The absence of vegetation cover is an essential factor among the natural causes of flooding. Forest cover intercept rainfall and slows down rain drops impact and as a result, surface run-off is reduced and deep infiltration encouraged. Olang (2011) increases between 30 and 47% were observed in the peak discharge. In the entire basin, however, the flood peak discharges and volumes increased by at least 16 and 10% respectively during the entire study period. The study successfully outlined the hydrological consequences of the eminent land cover changes and hence the need for sustainable land use and catchment management strategies. Olang & Fürst, 2011 posit that within the sub-catchments of Nyando River basin, in Kenya, the land cover changes have increased peak discharges and flood run-off volumes. It is quite evident that densely vegetated river basins experience less floods as compared to areas with little or no vegetative cover due to its ability to intercept part of the precipitation that can generate runoff and reduce the amount of water that flow into nearby rivers or streams. Urban streams mostly lack dense vegetation cover, increasing the tendency of flood occurrence.

The carrying capacity or discharge capacity of water bodies are considered a natural cause of flooding. According to Sharma (2021), intense and prolong rainfall causes flooding when the existing river channels, sewage system and draining canals do not have the adequate capacity to contain the volume of rain falling or the volume of water discharged into it.

2.4.2 Human Activities

The magnitude and frequency of floods is significantly influenced by the action and inaction of human being in diverse ways (Mensah & Ahadzie, 2020). Human activities in water catchment areas drastically intensify floods, making human actions associated with land use change very important. Tucci (2007) posits that human causes of flooding can be categorized into structural and non-structural measures. Non-structural measures are those that occur as a consequence of the permanent phenomena of city growth onto flood plains, whereas structural measures are those that occur as a result of the permanent phenomenon of city expansion onto flood plains. The following are some human causes of flooding: urbanization, deforestation, river channel alteration and population pressure.

2.4.3 Urbanization

Since the 1960s and soon after the first national census was carried out in Ghana, population has been on the increase and at a very rapid rate. Table 2.1 presents the population figures of Ghana over the years and specifically that of Kumasi.

Table 2.1: Population of Ghana and Kumasi since 1960

Year	Kumasi Population	Ghana Population	Kumasi Population	Ghana Population
1960	108,800	6,726,400	221,000	6.85 M
1970	206,900	8,559,313	349,000	8.74 M
1980	336,100	12,296,848	452,000	11.06 M

Year	Kumasi Population	Ghana Population	Kumasi Population	Ghana Population
1990	534,810	15,976,220	696,000	14.77 M
2000	1,006,871	18,912,079	1,187,000	19.28 M
2010	1,730,249	24,223,431	2,010,000	24.78 M
2020/2021 due to Covid-19	2,069,350	30,280,811	3,348,000	32.83 M
2023**	n/a	n/a	3,768,000**	33.01 M**
References	Data Sources:		Data Sources:	
	<ul style="list-style-type: none"> · La Verle Berry (1994). <i>Ghana: A Country Study</i>. Washington: GPO for the Library of Congress. ed. Online at https://countrystudies.us/ghana/ · Ghana Statistical Services (2010, 2021) PHC District Analytical Reports 		<ul style="list-style-type: none"> · United Nations (2023). World Population Prospects · WorldData.info (2023) 	

** Current data not definite but based on estimations as the year had not ended the time this data was presented.
n/a: Not Available M = million

Population of Kumasi in 1960 was slightly over 200,000 people, when the population of Ghana was about 7 million. By 2020/2021, the population of Kumasi rose to almost 3.5 million people, while that of Ghana in the same year was about 32.83 million. The current population of Kumasi is about 15 times what it used to be in 1960, and this comes with other developments such as provision of corresponding services and infrastructure to serve the growing population. The process of rapid urbanization therefore put pressure on natural resources especially land which is the key resource for development. The consequences of urbanisation are manifold and affecting among others, land use in the urban space. Kumasi has an undulating landscape which facilitates natural drainage of runoff water into streams and rivers. However, with rapid urbanisation and increase in population growth, leading to high demand for land, land in the urban centers and particularly in Kumasi has become scarce than ever before with development taking place at places where hitherto would not be suitable and therefore used for habitation. Urbanisation has led to increase in impervious surface areas through

over concretization or tarring of urban surfaces, thus reducing infiltration rate of rain off water into the ground and acceleration of runoff to ditches and streams. Neto (2001) posited that floods occur when there is substantial surface-water runoff onto dry ground as a result of prolonged precipitation, and the extra water is unable to percolate into the soil due to severe tarring or concreting of the earth's surface. This suggests that human actions are contributing factors to flooding in the urban space.

Population pressure is considered the dominant human cause of floods in the world and mostly in urban areas. There is an increase pressure on nature to sustain the increasing population and its demand on the environment for natural resources and other basic necessities of life such as food, clothing and shelter. To be able to sustain the increasing population and its accompanying demand, there is an increase in agricultural practices and urbanisation. Using the United Kingdom (UK) as an example, this view is affirmed by Stevens et al. (2016) using population and dwelling house data. The adjusted record shows no trend in reported flooding over time, but

there is significant decade to decade variability. This study opens a new approach to considering flood occurrence over a long time scale using reported information (and thus likely effects on society, who states that the increase in the total number of reported flood event in the 20th Century in the United Kingdom appears to be a function of gradual increase in exposure due to urban expansion and population growth. This experience is true for many other countries including Ghana (Mensah & Ahadzie, 2020).

2.5 Effects of Flooding

Flooding has a wide range of consequences, including loss of livelihood, property, infrastructure, lives and renders many people homeless (Mensah & Ahadzie, 2020). Floods become devastating when the level of danger is great. As a result, it is likely to be devastating if it happens in places with a high concentration of human activities and towns. There is the argument that flooding has some positive effects aside the common negative ones. According to Few et al. (2004) and Nyakundi et al. (2010) the ability of local people to resist the impact of disasters has not been given adequate attention. A descriptive cross sectional study sought to investigate community perceptions and responses to flood risks in low and high risk areas of the Nyando District, Western Kenya. A total of 528 households, six government officials and have project managers of Community Based Organizations (CBOs, what constitutes a flood catastrophe is still a contentious question since what appears to be devastating at one end is not the same at the other. The following are some of the positive and negative consequences of floods. Floods on one hand, serve as a technique of keeping the ecosystem's hydrological cycle in balance by removing surplus water from precipitation. When rivers overflow onto the immediate flood plain, nutrients are dumped onto the flood plain, creating an ideal habitat for plants to thrive. This protects water bodies from silting because the presence of such plants in flood plains prevent top soil erosion into water bodies. Furthermore,

nearby farming communities can benefit from alluvial soil along river banks because it contains essential nutrients that can boost crop productivity. Flooding enriches floodplains by incorporating nutrient-rich silt as well as terrestrial biomass into the top soil. Similarly, materials washed into river canals aid in the renewal of aquatic life in the river.

Floods, on the other hand, are among the most prevalent and catastrophic natural disasters. Flooding has had a disastrous effect on humanity throughout the years, and it is expected to worsen as a result of continued changes in climatic circumstances. Floods, according to Neto (2001), were among the most damaging types of natural disasters in terms of both human damage and socio-economic losses. Again, the severity of the harmful effects of floods is mostly determined by a variety of variables, including a rise in activity and population in flood-prone areas, as well as the frequency, intensity, and extent of flooding. Flooding has a variety of impacts that might occur immediately or later.

Firstly, the floodplain has seen a rise in the concentration of human habitation and economic activity in recent years as a result of its suitability for farming, weak land-use management, and population expansion. Because of the concentration of human activity in such places, floods offer additional societal issues whenever they occur, particularly when they are of great scale. The immediate societal effects of floods include the loss of human lives and the degradation of victims' health conditions as a result of disease outbreaks. Neto (2001) stated that flooding becomes devastating when it occurs in places with a high human density. The author contended that in such cases, lives are lost, property is damaged, and communities are exposed to health risks. Further, flooding again has the potential to cause widespread migration and population relocation. This occurs when floods and its related detrimental impact on well-being continue in a place for an extended length of time. People are obliged to migrate or shift to other locations where they can enhance their well-being.

Similarly, Van Alphen & Lodder (2006) said that when flooding happens in places with dense populations, people are displaced as a result of settlement damages and disruptions in economic activities.

Secondly, economic activities usually slow down or come to a halt when normal lives of people are disrupted as a result of the consequence of flooding. People form the core labor of all sectors and their absence affects the demands and supply of goods or services in the market. The trickling down effect of livelihood loss can also be felt on the economic activities of adjacent non-flooded areas. Eventually, there will be shrinkage of purchasing and production capacity of people and firms.

Furthermore, the economy of a region affected by recurring flooding may be crippled because revenue that would have been used to undertake infrastructure and other development opportunities must be diverted into relief items, infrastructure rehabilitation, and health care provisions. Similarly, flood-prone locations do not entice investment, particularly in the private sector, which bodes ill for successful economic growth and development. According to Adelye and Rustum (2011), during flood occurrences, food and cattle are swept away in some cases. This, in turn, undermines victims' livelihoods, particularly if they rely on it for a living. Poaponsakorn et al. (2015) also revealed that the 2011 Thai flood had a detrimental influence on the money and salary income of households residing in inundated areas. Floods inundated much of the area intended for economic activity while also disrupting wage employees' working hours.

Flooding, according to Theiling (1994), also has a harmful influence on the ecosystem. He claims that the quality of water is harmed due to contamination from agricultural pesticides, industrial and residential garbage swept into rivers during large floods. During major flooding, the fauna and flora in the flood plain are also lost.

2.6 Incidents of Flooding in Ghana

Ghana is one of the West African countries most vulnerable to several weather-related disasters (Tschakert et al., 2010, Amoako (2012)) and these happen mostly in the urban centers. According to Kim et al. (2017) urban infrastructure may become more vulnerable to flooding. Flooding mitigation strategies must be developed such that the failure of infrastructure does not compromise people, activities, or other infrastructure. "Safe-to-fail" is an emerging paradigm that broadly describes adaptation scenarios that allow infrastructure to fail but control or minimize the consequences of the failure. Traditionally, infrastructure is designed as "fail-safe" where they provide robust protection when the risks are accurately predicted within a designed safety factor. However, the risks and uncertainties faced by urban infrastructure are becoming so great due to climate change that the "fail-safe" paradigm should be questioned. We propose a framework to assess potential flooding solutions based on multiple infrastructure resilience characteristics using a multi-criteria decision analysis (MCDA, many of the global risks of climate change are concentrated in urban areas. This was also confirmed by Owusu and Obour (2021), who noted that urban flooding is one of the major hydro-climatic disasters that is becoming more common and severe, affecting regions all over the world. As mentioned earlier, flooding has major economic, social, health, cultural, and environmental consequences that threaten urban lives, livelihoods and sustainable development.

Amoako (2012) noted that urban flooding is a serious and growing phenomenon that affects both developed and developing countries. Ahadzie & Proverbs (2011) the organizational and structural themes emerging from Ghanaian Newspapers with respect to the management of flooding in the last 10 years are identified, analyzed and reported. The findings reveal that the Ghanaian flood risk management strategy is currently in need of further

development. It is contended that, with an increasing population and growth in human settlements, the worst effects of flooding might be ahead. This requires detailed analysis and policy direction towards developing and promoting a holistic risk management plan for flood recovery and response. This risk management plan should embody a robust and well-packaged educational programme towards raising awareness and understanding of safety measures one should adopt in the event of a flood. Ahadzie & Proverbs, 2011 in their study on emerging issues of the management of flooding in Ghana indicated that “as noted by UNECE, Africa has the world’s second largest area of undisturbed tropical forest inducing an average annual rainfall of between 250 mm and 500 mm, and sub-Saharan Africa lies in this high induced area. Thus, as Ghana’s population

and human settlement activities grow, the country may become increasingly vulnerable to floods”.

Flooding in Ghana has been a long-standing issue that has caused a significant amount of damage to both property and human life. BBC News reported on 4th October 2022, the massive impact of floods for Ghana between 2015 and 2020. The report revealed that between 2015 and 2020, floods killed 510 people in Ghana, with 309 injured from flood, 54,744 were houses destroyed alongside 136,563 acres of farmland. Within the period under review, Ghana record 1,446 flood events. Karley (2016) and Asumadu-Sarkodie et al. (2015) narrated some historical flood events that happened in Ghana. Table 2.2 presents a chronological order of some of the reported incidence of flood in Ghana.

Table 2.2: Major Floods in Ghana

Year of Reported Flood Incidence	Region	Effect/Impact
1971	Western	Caused homes to collapse and left hundreds of people homeless
1995	Greater	
1997	Greater Accra	Forced the closure of numerous institutions throughout the city
1999	Upper West; Upper East; Northern; Bono East, and Volta	300,000 persons were adversely affected
1999	Volta; Greater Accra; Central, and Western	Resulted in many deaths
2005	Upper East; Upper West, and Northern	20 people lost their lives
2007	Upper West; Upper East, and Northern Regions	307 persons were harmed
2010	Greater Accra	35 people perished
2010	Western	3 bridges fell
2010	Northern	Settlements were flooded
2010	Eastern	Displacement of 2,800 people in 120 villages
2010	Volta	Destroyed 850 homes, businesses, farms, and roads
2011	Greater Accra	Caused major property damage in much of Accra and some of its neighbouring communities

Year of Reported Flood Incidence	Region	Effect/Impact
2011	Eastern	105 farmers were stranded on their farms for three days due to ten hours of severe rain, which also drowned five (5) people at Akyem Osoroase Krobonu in the Atiwa District
2011	Greater Accra	14 fatalities from a rainstorm that hit Accra on November 1 which affected 43,087 people
2013	Greater Accra	The Kwame Nkrumah Circle, Darkuman Kokompe, Obetsebi Lamptey Circle, as well as a piece of the Graphic Road, Santa Maria, and the Dansoman Roundabout, were all flooded
2014	Greater Accra	The city's surroundings, including Adabraka, Awoshie, the Kwame Nkrumah Circle, Mallam, North Kaneshie, Abeka, Dansoman, and Odorkor, were all affected by floods as a result of the severe rainfall
2015	Greater Accra	A death toll of over 152 lives and damages to countless properties
2016	Kumasi	Flood displaces 200 persons in Kumasi destroying over 50 houses
2021	Kumasi and other parts of Ashanti Region	Death of 6 people including an infant in torrential downpour and massive flooding
2022	Central	Flash flooding
2022	Greater	Flash flooding
2023	Greater Accra	Heavy downpour lasting several hours that caused flooding in parts of Accra

Source (compiled from Asumadu-Sarkodie et al., 2015; Daily Graphic, 2015; Ghana Web 2019)

2.7 Legal Instruments in Ghana Governing Land Acquisition

Despite the fact that Ghana has made conscious efforts to curb the development of flood-prone areas and destruction of wetlands through a number of enactments such as the Environmental Protection Act (Act 490), Land Use and Spatial Planning Act (Act 925) and the National Land Act (Act1036), flood is still threatening lives and properties and wetlands are still under threat. They are target for commercial and residential development especially in the two largest cities in Ghana where land is scarce. In places like Accra and Kumasi, encroachment of such lands is very common, leading to illegal development of such

places in most cases as the law prohibits development of such lands. Even when such legislations exist, there are frequently insufficient enforcement mechanisms, therefore statutory laws frequently fails to guarantee non-encroachment on such lands. Some community members perceive these lands as being wasted (waste lands) without paying attention to its environmental and socio-economic implications if developed. Often, wetlands are the last areas to be developed in urban settings (Payne, 1997; Brook & Dávila, 2000). The inability of the appropriate state institutions to deal with housing supply shortages and unaffordable housing for the urban poor has also led to the development of wetlands that are also flood-prone lands in the form of slums by the poor (Konadu-Agyemang, 2001). Besides, the National Building Regulations LI 1630 amended and

the Building Code (2018) do not provide specific guidelines for flood resilient construction (Simpheh et al 2023). Population growth and rural urban migration has been identified as some of the reasons for wet and flood lands encroachment (Twumasi-Ampofo et al 2018).

2.7.1 The Local Government Act of Ghana, Act 936 of 2016 (Roles of the Assemblymen)

The Local Government Act of Ghana is a legislative framework that outlines the structure, functions and responsibilities of local government institutions in the country. It establishes the legal basis for the establishment and operation of local government units, including district assemblies, municipal assemblies, and metropolitan assemblies. The act aims to promote decentralization, local governance, and community participation in decision-making processes.

The role of Assemblymen is defined in the Local Government Act of Ghana, specifically in Act 936 of 2016. This act, titled “Local Government Act, 2016,” provides the legal framework for local governance in Ghana and outlines the roles, functions, and responsibilities of various actors within the local government system, including Assemblymen. The role of Assemblymen is crucial in fostering participatory democracy, promoting grassroots development, and ensuring that local governance is responsive to the needs of the people. They serve as a vital link between the local government and the community, facilitating effective communication, representation, and decision-making.

Assemblymen, also known as Assembly Members, are elected representatives who play a pivotal role within the local government structure established by the Local Government Act. As such, assemblymen are local government representatives who are elected by the residents of electoral areas to serve on district, municipal or metropolitan assemblies. They play a significant role in representing their constituents’

interests and contributing to local decision-making processes.

2.7.2 Responsibilities and roles of Assemblymen

The responsibilities and roles of Assemblymen amongst others include: representing their constituencies, participating in decision making and legislation formulation, being instrumental in local development, facilitating community engagement, playing an oversight function, acting as mediators and reporting to their constituencies.

- First and foremost, Assemblymen represent their people by serving as the voice of their constituents within the local government. Assemblymen are elected to represent the interests, needs and concerns of the residents within their respective electoral areas. They serve as a link between the local community and the local government, ensuring that the voices of their constituents are heard and considered in decision-making processes. Secondly, Assemblymen participate in the decision-making processes of the local government assembly. They contribute to discussions, debates and deliberations on various matters, including budget allocation, development projects and policies that affect the local community.

Moreover, Assemblymen are instrumental in terms of development by identifying and prioritizing local development projects and initiatives that address the specific needs of their electoral areas. They collaborate with other assembly members and stakeholders to ensure that development efforts align with community aspirations. Through community engagement, Assemblymen serve as a bridge between the local government and the community. They gather input from their constituents, engage in public consultations, and convey information about government programs, policies, and initiatives to the people they represent.

In addition, Assemblymen play an oversight functions by monitoring the implementation of projects,

policies, and decisions made by the local government. They help ensure that resources are utilized efficiently and transparently for the benefit of the community.

- Assemblymen are also instrumental in conflict resolution and may assist in resolving local disputes and conflicts that arise within their electoral areas. They act as mediators and work towards maintaining harmony and cohesion in their communities.
- More so, Assemblymen are accountable to their constituents for their actions and decisions. They are required to provide regular updates on their activities and report back to the community on the progress of development projects and other initiatives.

In summary, assemblymen are integral part of the decentralized governance system in Ghana, helping to empower local communities, enhance citizen participation, and drive sustainable development at the grassroots level. Their role contributes to fostering a sense of ownership and responsibility among citizens for the well-being of their communities but they are not supported financially to play their roles effectively.

Considering the assemblyman's role and responsibility to consult and maintain close contact with his/her electoral area, as well as liaise between his/her people and the District Assembly on developmental issues, they play a critical role in times of crisis and are the first point of contact in the event of flooding (Ahadzie et al., 2020). As a result, Ahadzie et al. (2020) stated that they are the best people to mobilize the community and launch community-based flood risk management initiatives.

2.8 Summary of the Review

This section provides a summary of the systematic review of issues relating to accessing land in flood-prone communities and its implication for sustainable development. The reviewed literature pertaining to the types of flooding revealed that floods can be classified into four areas, namely flash floods, single event floods, multiple-event floods and seasonal

floods. The literature with respect to causes of flooding revealed that causes of flooding can be associated with natural factors, human activities and urbanisation due to population growth and in-country migration. In terms of the effects, flooding has a wide range of consequences, including loss of livelihood, property, relocation of people, and, in extreme cases, death.

The review regarding incidents of flooding in Ghana divulged that there have been major floods in Ghana in the past that have caused a significant amount of damage to both property and human lives. The review focused on flooding events that occurred between 1971 and 2023 and was presented in a chronological order based on the year of reported flood incidence, region, and its impact. The review also covered briefly the regulatory and legal instruments governing land acquisition, as well as the responsibilities and roles of assemblymen in providing and preparing the people for flood risk management. It was noted that through the assemblymen/women play crucial roles in their electoral areas, they are not supported financially by the local government when it comes to expenditure because they are not spending officers and this has implications for their effectiveness in their electoral areas.

The discourse about flooding cannot be complete without discussing land management. Land management involves the planning, development and use of land for various purposes, such as agriculture, urban development, forestry and conservation. The way land is managed can have a profound impact on flood risk and the consequences of flooding. Land management practices can affect the amount of runoff generated during a storm event, which in turn can affect the severity of flooding downstream. Poor land management practices can affect flooding in several ways (Sugianto et al., 2022). Forests play an important role in regulating water flow. Trees absorb water through their roots and release it back into the atmosphere through their leaves. When forests are cleared through deforestation, more water runs off the surface of the land and into streams and rivers, which can lead to flooding. Thus, with increased physical development taking place, there will be more water runoffs and if not managed could lead

to more flooding. Agricultural practices such as plowing and tilling can compact the soil, making it less able to absorb water. This can lead to increased runoff and flooding during storm events but urban agriculture is done on a very small scale in the cities of Ghana. Further, as cities and towns grow as a result of urbanization, more and more lands are covered by pavement and other impervious surfaces. This reduces the amount of land that can absorb water, which can lead to increased flooding.

In addition to the above specific land management practices, there are a number of other factors that can affect flooding, such as climate change, topography and geology. However, land management plays a significant role in determining the severity and frequency of flooding events, on one hand. On the other hand, land management can also be used to reduce flooding risk, (Schilling et al., 2014). Planting trees and other vegetation can help to absorb water and reduce runoff. Planting trees and other

vegetation in riparian areas (along streams and rivers) can be especially effective at reducing flooding risk. Using sustainable agricultural practices such as cover cropping and no-till farming can help to improve soil health and reduce runoff. Creating green spaces in urban areas are useful for reducing flood risk. Green spaces such as parks and gardens can help to absorb water and reduce flooding risk in urban areas. Building floodplains help in reducing the effects of flooding. Floodplains are areas of land that are designed to flood during heavy rainfall events. Building floodplains can help to reduce flooding in downstream areas. By understanding the relationship between flooding and land management could help in developing strategies to reduce the risk of flooding and protect our communities. In a nutshell, flooding cannot be appreciated without understanding the management of flood lands.

CHAPTER THREE: RESEARCH DESIGN

3.1 Introduction

Having gone through the literature review related to flood lands and how urbanization, climate change and haphazard development have exacerbated the effects of climate change, this chapter presents the methodology for the research. The methodology briefly covers the following areas;

- Desk studies
- Household and Institutional surveys
- Observation
- Validation Workshop

3.2 Household and Institutional Surveys

The research involved the use of mixed methods of both qualitative and quantitative research methods. Household and institutional surveys were preceded with a reconnaissance survey, design of instruments for both qualitative and quantitative surveys, training of enumerators and a pilot survey which are discussed below.

i. Reconnaissance Survey

The research began with a reconnaissance survey to understand flooding issues in the various metropolitan, municipality and district assemblies (MMDAs) (i.e. the local governments) in Kumasi. Table 3.1 shows the dates each of the local governments was visited for the reconnaissance survey. The research team used the opportunity to interact with key stakeholders in each of the seven MMDAs to understand the issues better and how best to approach the research.

The research began with a reconnaissance survey to understand flooding issues in the various metropolitan, municipality and district assemblies

Table 3.1: Dates for Reconnaissance Survey

	Name of Local Government/Institutions	Meeting Dates with Officials/Management
1.	Oforikrom Municipal Assembly	3rd February 2021
2.	Kumasi Metropolitan Assembly.	3rd February 2021
3.	Asokore Mampong Municipal Assembly	8th February 2022
4.	Suame Municipal Assembly	22nd February 2022
5.	Lands Commission	9th February 2022.
6.	Old Tafo Municipal Assembly	22nd February 2022
7.	Asokwa Municipal Assembly	16th February 2022
8.	Kwadaso Municipal Assembly	22nd February 2022
9.	Oforikrom Municipal Assembly	3rd February 2021
10.	Kumasi Metropolitan Assembly.	3rd February 2021
11.	Asokore Mampong Municipal Assembly	8th February 2022
12.	Suame Municipal Assembly	22nd February 2022
13.	Lands Commission	9th February 2022.
14.	Old Tafo Municipal Assembly	22nd February 2022
15.	Asokwa Municipal Assembly	16th February 2022
16.	Kwadaso Municipal Assembly	22nd February 2022

Source: *Researchers' Field Notes, 2022*

The research team visited all the seven local governments in Kumasi where they had meetings with management of the assemblies to introduce the research project to them, to obtain permission to carry out the research in their communities, to seek their cooperation and to engage them as key informants in discussions related to access to land in the flood-prone communities and other flood related issues. The discussions helped the research team to better understand flood issues in Kumasi. The outcome of these interactions led to the MMDAs providing a list of all their communities liable to flooding in order of severity of flooding (refer to Map 2). The reconnaissance survey therefore helped the research team in;

- introducing the project to key stakeholders in the Kumasi Metropolis and adjourning district assemblies

- knowing the views of key stakeholders concerned with the research project and getting inputs from them towards the design of the fieldwork
- seeking formal approval from assemblymen and community elders to conduct the study in their communities
- firming up criteria for the selection of communities for the research (e. g. what factors will one consider in selecting communities for the study? Is it environmental, wealth of owners of properties, spatial location, intensity and frequency of flooding, etc.)
- confirming sample size for the research
- identifying some of the obstacles that may hinder progress of data collection and the possible plan to mitigate such obstacles.

The outcome of the reconnaissance survey helped the research team to plan and design the research

instruments for both the quantitative and qualitative surveys.

ii. Training of Enumerators

The outcome of the reconnaissance survey helped in the design of the fieldwork, which led to the training of enumerators for data collection. Subsequently, there was a two-day training of ten enumerators in data collection. The training was to ensure that the enumerators understood clearly the questions in the instruments and could interpret them accurately in the local language. They were also trained in the use of Kobo Collect tool for data collection. The first training was held on 9th March 2022.

iii. Pilot Survey

After the training of enumerators on 9th March 2022, a pilot survey was carried out in a flood-prone community (but not one of those selected for the survey) on 10th March 2022. The pilot survey helped in exposing the gaps in the instruments designed for data collection and it also exposed some of the challenges the enumerators could be confronted with in the interpretation of some of the key/technical words in the local language which is Twi. After the pilot survey, the enumerators met up with the research team again on 11th March 2022 to share the outcome of the pilot survey and their experiences and to complete the training that was started on the 9th of March 2022. The pilot survey therefore helped in addressing pertinent issues related to the survey, interpretation and the gaps in the instrument. Further, the pilot survey helped in determining the best time to administer the questionnaire to selected households using the Kobo Collect tool. This was important for planning the field data collection as it helped in knowing the number of days required to complete the exercise.

iv. Household and Institutional Surveys

Household surveys were carried out in 7 flood-prone communities (see Table 3.2 below) in 7 MMDAs in Kumasi throughout the month of May 2022. A total of 513 households were covered in the survey. The

respondents were both landlords (35%) and tenants (65%). Some houses were occupied by only tenants.

The research team collected data from management of land sector agencies and other key stakeholders at the various MMDAs using key informant interviews. The research team designed semi structured instruments that were used for the institutional surveys. Key stakeholders/state actors interviewed included the following among others;

- Chief Executives of the MMDAs
- Municipal Coordinating Directors
- Development and Physical Planning officers of the & MMDAs
- Staff of the Environment and Health Unit of MMDAs
- MMDA Engineers
- Private Estate Developers
- Staff of the Land Registry Division
- Relevant staff of the Lands Commission in Kumasi (i.e. the staff of the Survey and Mapping Division, staff of the legal division, etc.)
- Assemblymen and women of the 7 MMDAs
- Landlords
- Flood Victim at Deduako (Mr. Richard Nyarko), and also Presiding Member of Oforikrom Municipal Assembly

3.3 Observation

The use of observation skills for data collection was relevant in the flood research. These were mainly visual, videography and photography, and using observation checklist that was prepared for data collection. The enumerators observed among others marks on walls showing flood levels during the last flooding in homes, visual observation of damaged properties as a result of flooding and evidence of coping strategies adopted by the residents. The enumerators also took photographs of other properties (apart from properties in homes) that were affected by flooding including roads, public

buildings such as churches, schools, and bridges. The enumerators used videography to capture how residents with broken bridges had to cross a river from one community to the other. These observations provided additional evidence to support the data collected. The observations also made it possible for the research team to appreciate the problems better.

3.4 Validation Workshop - Stakeholder Consultations

On completion of the data collection and the initial data analysis, there was a validation workshop held on 28th June 2022 at the Assembly Hall of the Asokwa Municipal Assembly in Kumasi that brought together a section of the stakeholders that provided data for the research. This included community members from the 7 selected study communities, their assembly members and unit committee members, municipal and district Chief Executives, local government engineers, physical and development planning officers and representatives from the land sector agencies as well as the other key stakeholders mentioned above. The research team shared the preliminary findings with the stakeholders for their inputs and to allow them to provide further explanation for areas that were not clear. The outcome provided additional input for the research.

3.5 Profile of Study Area - Kumasi

Kumasi, the second most populous city in Ghana, is situated in the wet, semi-deciduous south-east ecological zone in the south-central part of Ghana (see Map 1). It is located between latitudes 6°38'N

and 6°45'N and longitudes 1°32'W and 1°41'W. Kumasi experiences two distinct periods of rainfall, known as major and minor wet seasons. The major rainy season takes place from March to July, while the minor rainy season occurs from September to October. However, with the dawn of climate change, the seasons no longer fall within these given periods. The city has an average annual rainfall of 1,374.8 mm (Campion & Venzke, 2013), with the month of June receiving the highest average monthly rainfall of 214 mm, but this has also changed due to climate change and so the heaviest rainfall could come before or after June.

Kumasi, a rapidly expanding city in Ghana, has a population of approximately 1,730,249 (GSS, 2014). The city encompasses a land area of 254 square kilometers, with more than 80% of it being utilized for diverse urban purposes. Due to its geographical position, the city previously possessed very rich and dense flora and inland water features such as rivers, open space, riparian zones, wetlands and parks. These elements improved its hydrological conditions and added to its picturesque landscape. However, the increasing population growth and rapid urbanisation, contributing to haphazard development in the city has had a negative impact on the natural land covers, particularly rivers and floodplains. This has resulted in hydrologic issues, such as the presence of extensive impermeable surfaces and higher quantities of runoff. Consequently, excessive rainfall in the wet seasons leads to destructive flood disasters that impact numerous suburbs of the city.

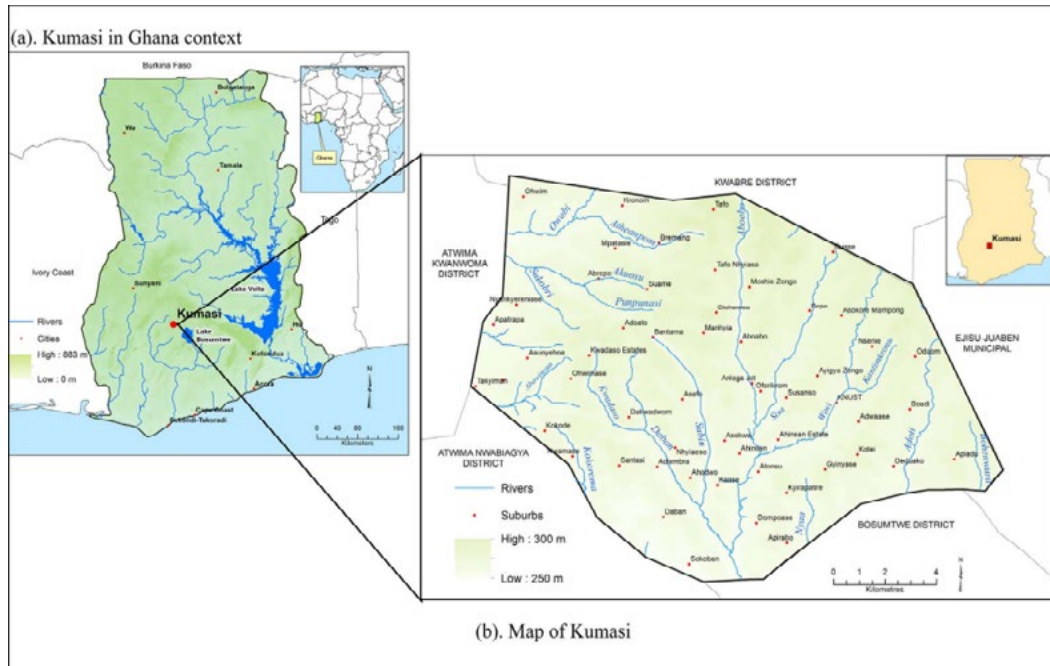


Figure 3.1: Map of Kumasi showing Research Locations

Source: Amoateng et al., (2018)

3.6 Research Communities in Kumasi

Kumasi has mapped out the flood-prone communities in all its metropolitan, municipal and district assemblies (MMDAs) as shown in the flood hazard map (refer to Figure 3. 2). As a result of the undulating topography of Kumasi and its surrounding towns and villages, Kumasi has over the years benefited from the natural drainage of water runoff. Consequently, the budget for drainage for Kumasi was always very minimal until about a decade ago when as a result of rapid population growth and climate change, water runoffs have become intense thereby creating flooding all over the city. Besides, the drainage systems created decades ago when population was less and the effects of climate change were rarely felt, remain the same drainage systems being used as at today. These drainage systems have outlived their usefulness and can no longer carry the volume of water runoffs that pass through them. The result is the overflowing of drains during the rainy season

and consequently causing flooding which has also affected a large number of communities, particularly the low-lying areas, those that have rivers and streams passing through them and those with wetlands. With the above events, Kumasi, which previously relied on its undulating topography to prevent flooding now has to rely on larger drains to prevent flooding but which are non-existent. However, the inability of the city planning authorities to provide such additional and larger drains has plundered the entire city into another flood-prone region in Ghana. All the flood-prone areas in Kumasi have all been mapped, which made selection of communities for this research easy.

3.7 Criteria for Selecting Research Communities

The following criteria were used in selecting communities in Kumasi for the research;

- Communities in MMDAs in Kumasi that experience flooding severest

- Community must be a flood-prone hotspot in Kumasi
- Hotspots must have experienced flooding a number of times

severity. Jointly with the planning authorities in the 7 MMDAs in Kumasi, and considering the timeframe for the research and available resources, the project team agreed to select only the severest flood-prone community in each of the 7 MMDAs in Kumasi for the research as shown in Table 3.2 (also see Figure 3.2).

Based on the above criteria, the 7 MMDAs provided lists of flood hotspots in their districts in order of

Table 3.2: Research Community

Name of Research Community	Metropolitan/Municipal/District Assembly
Deduako	Oforikrom
Adompom	Tafo
Breman East	Suame
Kwadaso East	Kwadaso
Asabi	Asokore Mampong
Turba	Kumasi MA
Ahinsan and Kuwait	Atonsua

Source: Field Survey, 2022

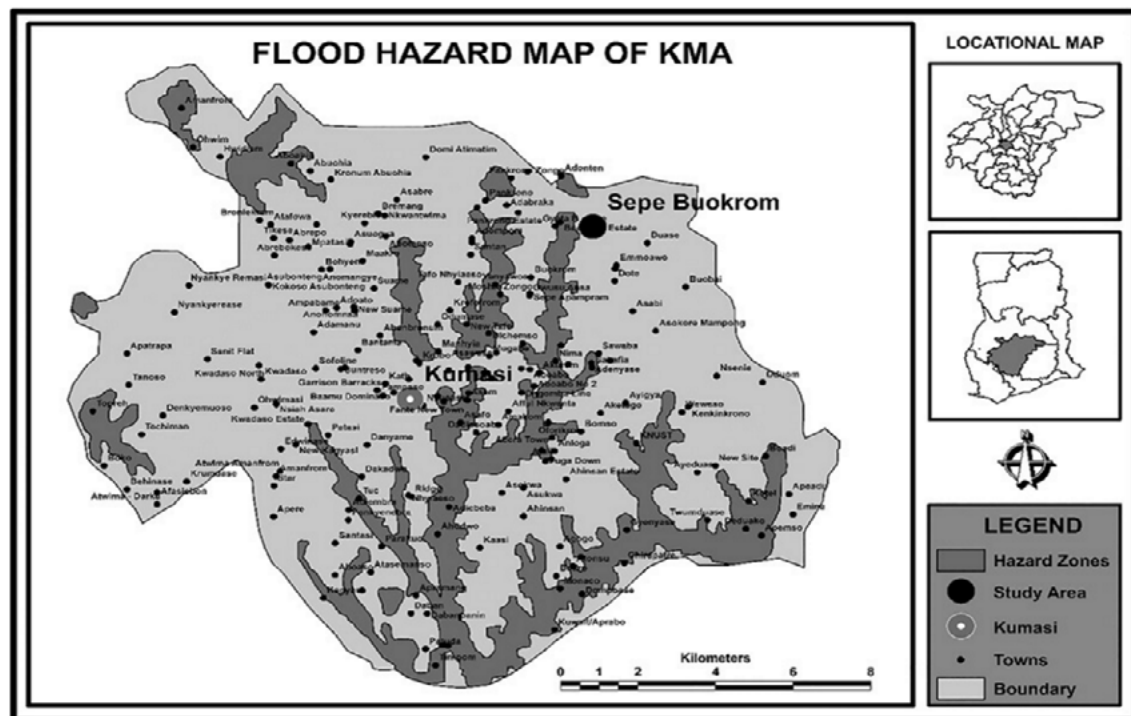


Figure 3.2: Flood hazard map of Greater Kumasi

Source: Kumasi Metropolitan Assembly (KMA), Kumasi

CHAPTER FOUR: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

4.1 Introduction

Chapter 4 presents the findings on the demographic characteristics of the respondents covered in the household survey covering, among others, age, sex, marital status, educational background, income and places of origin of the respondents. Chapter 4 also addresses Objective 1 of the research study, which seeks to identify the category of people who acquire land in flood-prone areas.

4.2 Demographic Characteristics of Respondents

This section presents data on the demographic characteristics of the respondents in the seven communities in Kumasi and its surrounding districts selected for the research. According to the UN-Habitat report (2017), the capacity of different urban populations to cope or adapt is influenced by a number of factors such as age, gender, labour, education, health and the nutrition of the individuals (human capital). The report notes that a critical asset like labour is linked to investments in human capital. Health status determines people's capacity to work; education and skills determine the returns from their labour. Thus, information about the demographic characteristics of the flood-prone dwellers help in appreciating their status, capabilities and challenges.

information about the demographic characteristics of the flood-prone dwellers help in appreciating their status, capabilities and challenges.

4.2.1 Number of Respondents Interviewed

The total number of respondents interviewed was 513 as presented in Table 4.1. The table shows the number of persons interviewed per community, which is based on the sample size used.

Table 4.1: Number of Respondents Interviewed

Name of Community Studied	District Assemblies selected	Number of respondents per community
Deduako	Oforikrom	71
Adompom	Tafo	73
Breman East	Suame	33
Kwadaso East	Kwadaso	84
Asabi	Asokore Mampong	83
Turba	Kumasi MA	70
Ahinsan and Kuwait	Atonsu	99
Total		513

Source: Authors' Field work, 2022

4.2.2 Age and Sex of Respondents

Figure 4.1 presents the age and sex of the respondents. Although an insignificant proportion of the respondents (0.9% non-respondents) were unwilling to disclose their ages, the data indicate that residents between the 18 to 45 age cohorts (72.1%) form the majority of people in the flood-prone

communities in Kumasi, followed by those in the age cohort of 46 to 60 years (19.3%). The data showed very few people (7.9%), both males and females above the age of 60 years who lived in such flood-prone communities, and about twice the number of women as compared to the men. The above suggests that relatively young people form the majority of residents living in the flood-prone communities in Kumasi.

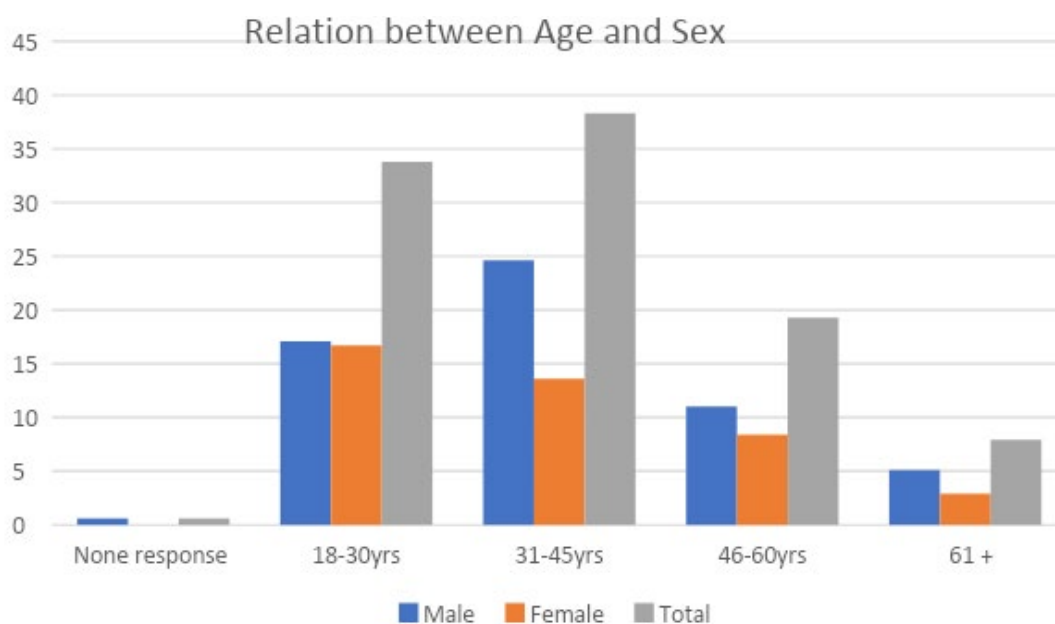


Figure 4.1: Relationship Between Age and Sex

Source: Feld Survey, 2022

The proportion of females and males interviewed out of a total population of 531 were 58.4% and 41.6%, respectively. The highest proportion of males covered in the study was in the age cohort of 31 to 45 years.

4.2.3 Marital Status and Sex

Figure 4.2 presents the marital status of the

respondents. It is evident that approximately 60% of the respondents were married while 40% were not. Out of the 40% who were not married, a few were co-habiting (1.4%), while 5.3% of them were divorcees and 3.5% were widows. The married people with children indicated they have between 3 and 4 children each living with them.

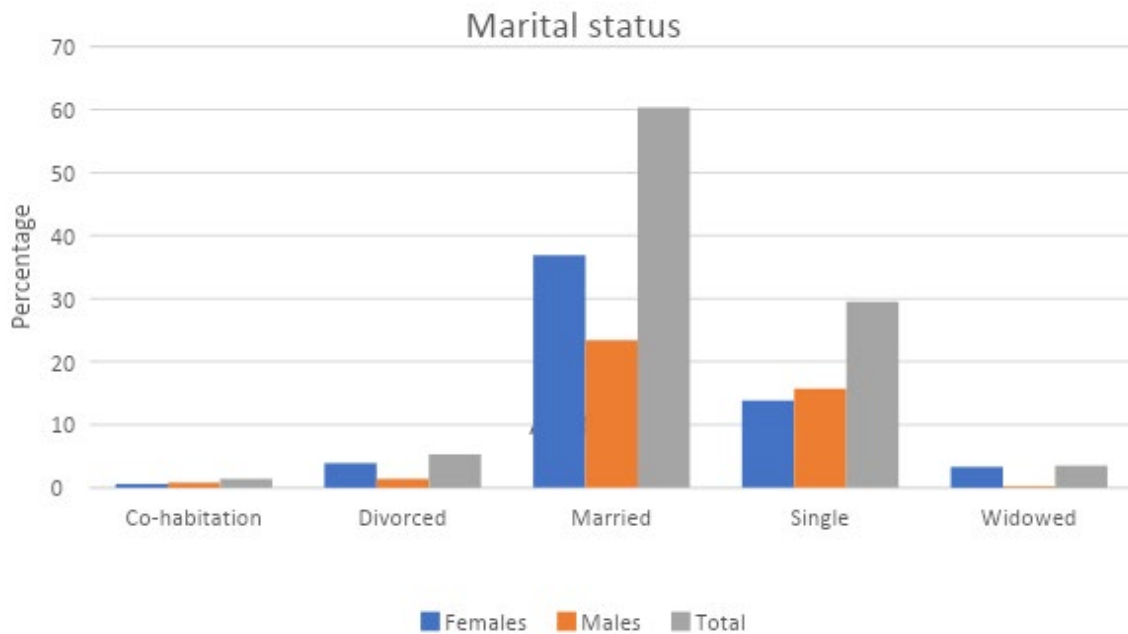


Figure 4.2: Marital Status of the Residents

Source: Field Survey, 2022

4.2.4 Level of Education Attained by Respondents

Figure 4.3 presents the level of education attained by the respondents covered in the survey. About 76% of the respondents have had one form of formal education or the other, stretching from the basic to tertiary levels while the rest have not. Over half of the respondents (52.5%) have had up to either

junior or secondary school education. A proportion of 7.5% had education up to the primary school level and 9.6% of them have had education up to tertiary education. An insignificant proportion of 3.3% of them have had other forms of education. From the above therefore, the majority of the residents of the flood-prone communities have had some level of formal education.

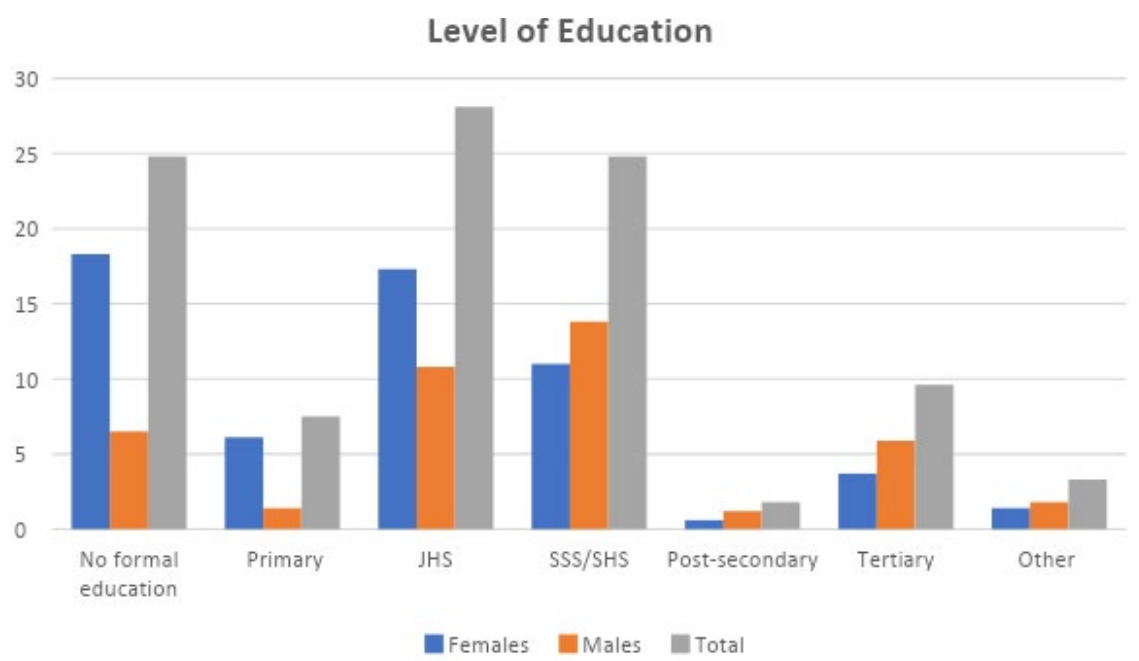


Figure 4.3 Level of Education Attained by Respondents

Source: Field Survey, 2022

The data show that the females were the least educated among the residents of the flood-prone communities and so up to the junior high school level, there were more women than men, and from senior high school level onwards, there were more men than women who have attained higher educational levels. Of those without any form of education, women form 18.3% compared to 6.5% of the men. In other words, there were about three times more women uneducated than men. More women (17.3%) than men (10.8%) were recorded as having had only basic level of education.

The above data suggests that educational background of an individual could have little or no influence on where they choose to reside but imparting knowledge to flood victims could be better appreciated by those

who have had higher level of education than those without it. The above also suggests that knowledge required to reside in flood-prone communities differ from what the basic educational institutions provide and therefore residents in such communities would remain ignorant about the implications of flooding and flood management unless the awareness is created amongst them.

4.2.5 Origin and Sex of Respondents

Figure 4.4 presents the origin and sex of the respondents. The research team used the categorization used for the 2021 Ghana Population and Housing Census (Ghana Statistical Service, 2021).

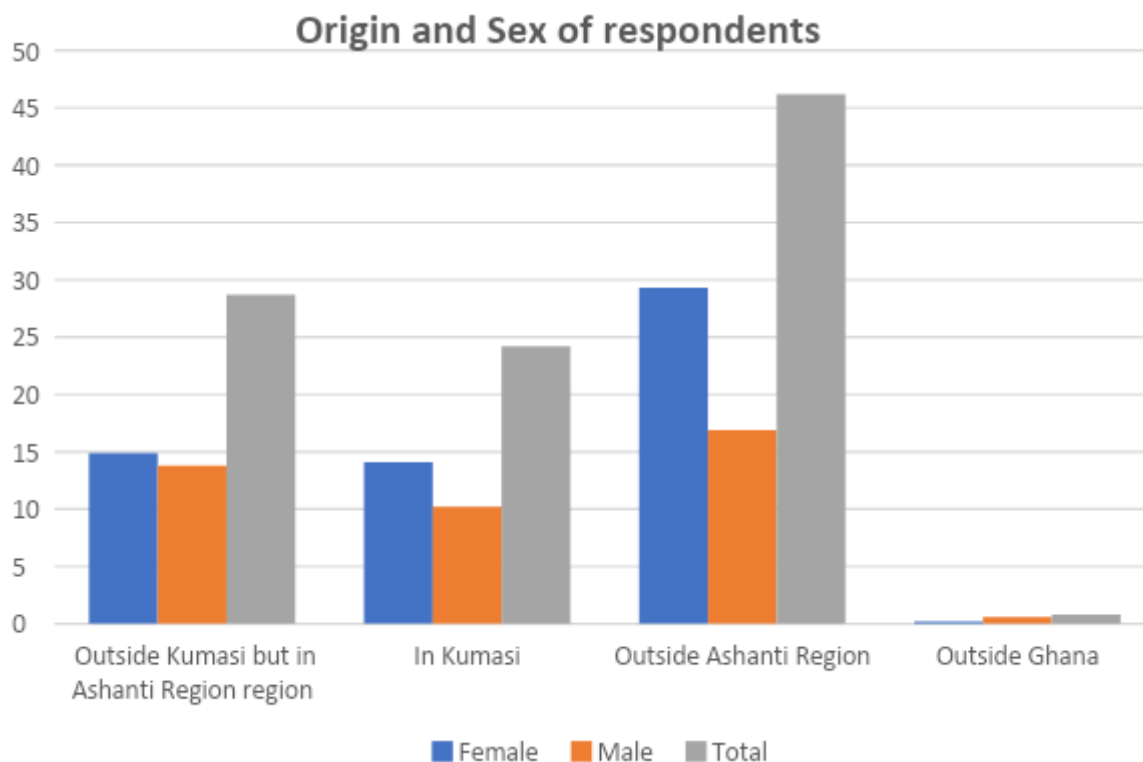


Figure 4.4: Origin and Sex of Respondents

Source: Field survey, 2022

Figure 4.4 shows that 28.7% of the respondents residing in the flood-prone communities in Kumasi originated from outside Kumasi but were from the Ashanti Region and 24.2% originated from Kumasi while the highest proportion of the residents (46.2%) were non-indigenes of Kumasi that originated from outside Kumasi and outside Ashanti Region. Similar to the GLSS (2017), which indicates more movement to the urban areas than rural areas, in-country migrants constituted a higher percentage of people residing in flood-prone communities in Kumasi, with the female proportion being 29.3% and males being 16.9%. These were non-indigenes who had come from other administrative regions other than Ashanti Region where Kumasi is located. About 29% of the residents also came from outside Kumasi but from the Ashanti Region, perhaps as a result of rural-urban migration, while 24.2% originated from Kumasi. From the data provided, flood-prone communities appear to provide non-indigenes an easy residential

settlement as they constitute 75.8% of the inhabitants in the settlements.

As a result of the concentration of economic opportunities in the southern part of Ghana, in-country migration is rife due to rural-urban migration to the southern part of the country. Table 4.2 presents a cross-tabulation between the ages of the respondents and their places of origin. The table shows that about 19.1% (being the highest proportion) of the residents from outside the Ashanti Region were in the age cohort of 30 to 45 years, followed by those in the age cohort of 18 to 30, forming about 14.7%. Thus, a proportion of 34.8% of the economically active age group (18 to 45 years) migrated to Kumasi from other regions of the country. Further, the data show that female migrants (non-indigenes) staying in flood-prone areas in Kumasi were slightly more than the males. This could however be explained by the time the survey was conducted as

those who were available at home during the period of the survey were the ones interviewed. The above notwithstanding, flood lands and properties in flood-prone communities provide shelter/accommodation

for migrants. The survey took note of migrants with newborn babies in wooden structures at Kwadaso and Ahinsan, among others.

Table 4.2: Place of Origin of Respondents and their Ages
(in percentages, where n = 513)

Age	Place of origin (hometown)				Total
	Outside Kumasi but in Ashanti Region Hainan	In Kumasi	Outside Ashanti Region	Outside Ghana	
Non-response	0.0	0.2	0.4	0.0	0.6
18-30yrs	9.6	9.2	14.7	0.4	33.8
31-45yrs	11.4	7.3	19.1	0.4	38.3
46-60yrs	4.9	5.1	9.4	0.0	19.3
61 +	2.9	2.4	2.6	0.0	7.9

Source: Field survey, 2022

The data indicate a higher mobility among the youth (72.1%) between the ages of 18 and 45 years, residing in flood-prone areas in Kumasi compared to those in the age brackets of 46 to 60 years (19.3%) and those above 60 years (7.9%). These statistics are not abnormal as the youth are more mobile and economically active than the aged. The information is also consistent with the GLSS report of 2017, which underscores the movement of young people to urban areas in search of job opportunities, better education and health services, marriage as well as good social amenities.

4.2.6 Livelihood Activities

From the field survey, 68.8% of the respondents were engaged in various livelihood activities while 31.2% were not and so in terms of earnings, only the 68.8% of those working could contribute to the sustenance of their households, among others. Although the majority were engaged and working in various

places, about 11% worked in the formal sector of the economy with secured income whereas 88.8% worked in the informal economy without a secured income. Income from a secured source could be used as a collateral for housing loans or accessing land for development. The generally low income of the flood land residents could tend to perpetuate their stay in flood communities. Some of the livelihood activities of those working in the informal sector include: selling of foodstuffs and household plasticwares, sewing, carpentry, welding and driving. Those in petty commerce formed a proportion of 44.4%, and in agriculture, 1.5%. Industry and the service sectors employed the largest number of people (54%) living in the flood-prone communities. Industry (i.e. carpentry, welding, etc.) employed 16% and services (i.e. hairdressing, barbering, etc.) employed 38%. As a livelihood strategy, 10.5% of those working were also engaged in secondary employment. Some of the respondents were engaged in sand weaning in all the communities either for their own use or for sale.

4.2.7 Regularity of Income Earned by Respondents

As mentioned above, the residents worked in both the formal and informal sectors and therefore earnings vary between the formal and informal sectors. In the informal sector, income was earned on daily, weekly or seasonal basis while in the formal sector, income was earned on monthly basis. Figure 4.7 presents the type of income the residents of the flood-prone communities earned.

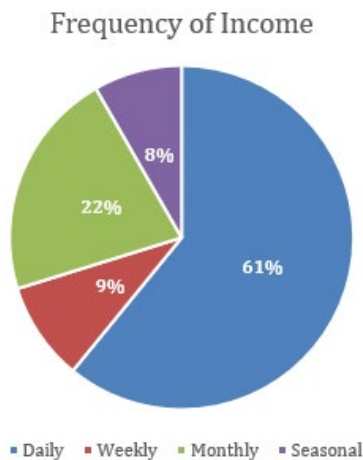


Figure 4.5: Type of Income of Respondents

Source: Field Survey, 2022

The majority (60.9%) of the respondents earned daily income, while 9.3% earned weekly income and 21.5% earned monthly income. A few of the residents (8.3%) earned seasonal incomes. Those in the informal sector earned daily income.

4.2.8 Income of Respondents

The data show that about 38% of the respondents earned above 60 Ghana Cedis (GHC) a day while an insignificant proportion of 6.1% earned above GHC100 a day (refer to Figure 4.7). According to the Ghana National Housing Policy (2015), housing is affordable when it takes only 30% of household income. This makes income a key variable that determines individual's access to shelter. There is

therefore a direct relationship between household income and the quality of housing. The survey shows that 20% of the residents earned an average daily income of 55 Ghana Cedis (almost 50 cents or 1/2 of a US Dollar¹) (refer to Fig 4.8). This is followed by those earning an average of 15 Ghana Cedis daily, constituting 17.8% of the flood residents. A proportion of 6.1% of the respondents earned above GHC100 daily, implying that about 94% of the residents in the flood communities earned less than 100 Ghana Cedis per day. The Daily Minimum Wage for Ghana as at 2023 was GHC14.88, which is a 10% increment of the 2022 figure of GHC13.53. Assuming those who earned the amount 100 Ghana Cedis, 55 Ghana Cedis and 15 Ghana Cedis worked thirty days in the month, their monthly income would be 3,000 Ghana Cedis, 1,500 Ghana Cedis and 450 Ghana Cedis per month, respectively. Further, assuming that those who earned minimum wage in Ghana worked for thirty days in a month, their income would be 446.4 Ghana Cedis. It is not likely that the respondents would work regularly for thirty days in a month, suggesting that they could be earning less than what is quoted above. As mentioned above, 68.8% of the residents were engaged in various livelihood activities and of this proportion, the majority (88.8%) were in the informal sector, suggesting that their income might not necessarily be regular or enough to acquire land or dwelling place. The findings also show that of those working, about 18% were likely to be earning just the minimum wage of 450 Ghana Cedis per month. However, with all the uncertainties surrounding the informal sector and the kind of livelihood activities the residents were engaged in, it is not likely that these 18% of those working earned a regular amount of 450 Ghana Cedis every month. Apart from this 18% of the respondents whose income was about the minimum wage in Ghana, there were also about a third (31.2%) of those interviewed who were unemployed. The low level of income of the two-thirds of the residents in the flood-prone communities would automatically influence their decisions regarding shelter and access to land, which also include decisions such as residing

1. 1 US dollar was equivalent to and 12 cedi as at November 2023 (Exchange-Rates.org)

at areas that would be affordable to them. According to Mensah & Ahadzie (2020), it is the poor that are often hit hard by frequent occurrence of flood, as

their income is low and getting housing in a better location becomes a challenge.

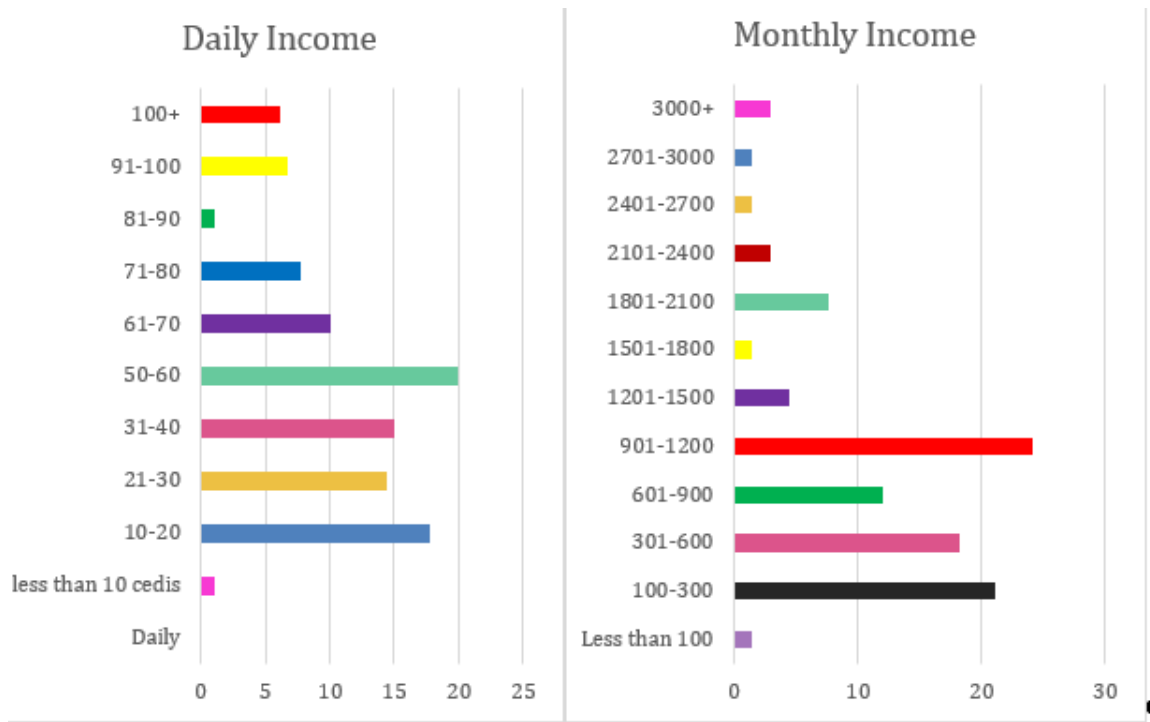


Figure 4.6: Daily and Monthly Incomes of Respondents

Source: Field Survey, 2022

4.3 Shelter/Housing

Having looked at the demographic characteristics of the respondents, this part of the chapter addresses the first objective of the study, which tries to understand the category of people who resides on the flood communities and why they do so.

4.3.1 Category of People Who Acquire Land in Flood-Prone Areas

Objective 1 of the research seeks to answer the question of category of persons who acquire land in flood-prone areas. Under normal circumstances, one would expect that individual property developers would avoid acquiring land in areas prone to risk such

as areas known for flooding. However, the research has proved that this is not the case as there are several other circumstances that drive individuals' decisions regarding the choices they make in life. The research found that there were certain motivating drivers attracting individuals to acquire land in flood-prone areas as the landlords covered in the research ranged from high income earners to very low-income earners. Some of the lower-income earners lived in wooden structures in the flood-prone areas. The Deduako community has modern houses as well as slum dwellings (refer to Plates 1 and 3(A)) and all income groups reside in this community. The building types and the level of education of residents reflect coexistence of all categories of income groups as landlords.



Plate 1: Both High and Low-income Housing Types at Deduako

Source: Field Survey, 2022

The Presiding Member² of the Oforikrom Municipal Assembly, for example, has his house at Deduako, where he lived. The Deduako Community was selected because it was considered as the severest flood-prone community in the Oforikrom District Assembly. The demographic data collected show that all manner of people buy land in flood-prone areas as land in such places are cheaper than the

flood-free areas suggesting that affordability is one of the driving factors that made people to access land in such places. The findings suggest that factors influencing decisions for acquisition of land seem to be more important in identifying who does not acquire land in flood-prone areas or not. From the field survey, 35% of the respondents were landlords. The houses of some of the respondents can be

² The Presiding Member is a member of the local government of Ghana and is elected from among the members of the Assembly but he is not a member of the Executive Committee. S/he presides over General Assembly meetings and controls deliberations and ensures good conduct and good behaviour at Assembly meetings. The Presiding Member is consulted in the selection of members to be appointed to Urban or Zonal or Town Councils.

classified as first-class houses with all the necessary amenities. During a key informant interview, one of the physical planning officers mentioned some of the reasons why individual developers choose flood lands for development as follows;

- the desire to live in urban settlements
- flood lands are less expensive
- being daring-testing the regulatory systems of the assembly to see if after putting up structures on those areas, the assembly would demolish them or not

For some of the respondents, though not a choice, they were compelled by circumstances beyond their control to accept land allocation in the flood zones. The cost of flood lands being cheaper than prime lands could be counter-productive in the long run since the risk involved could be higher. Traditional authorities as custodians of stool lands are a major culprit in pushing private developers including migrants onto flood zones as those lands are sometimes given out to clients/buyers as compensation for those whose lands have been resold. Though illegal, multiple sale of land is a common practice in Ghana and victims, where they are lucky, are compensated with another piece of land that may not be of equal quality and value as the one that was taken away from them to be resold. Where the traditional leaders are unable to refund the cost of the land, they provide a substitute by giving the prospective buyer another piece of land. It is also rare for moneys already spent acquiring a piece of land to be refunded and the only option left is to give out any unsuitable land to the prospective developer to replace what he had lost. Findings from the research also showed that clients tend to accept these lands after losing land litigation cases. Below are some comments from two of the respondents who said;

“It is not that I don’t know this is a water-logged area but I lost my original land to my competitor and I was compelled to accept a wetland as compensation, otherwise I would have no land at all.”

“This is not my original land. My first land was not in a flood zone but when it was resold due to my inability to develop it within the stipulated time frame, I was given another area which was later found to be on a road. I complained again and this is my compensation. In this area when your land is resold, it is either you accept this kind of compensation or you lose it forever.”

It can be concluded that the decision to acquire land in a flood-prone community is driven by several factors. The high demand and the scarcity of land in the flood-free areas also drive prospective buyers to accept land in the flood-prone areas that are associated with risks.

4.3.2 Types of Housing in Flood-Prone Communities

The flood-prone communities have housing that are similar to that found in any other part of the city of Kumasi or any urban settlement in Ghana and in flood-free locations, but they vary in type from community to community (refer to Plate 1 above). At Ahinsan (Kumasi), which is an old traditional township, the traditional compound houses dominated the housing types, and at Kwadaso where the flood-prone community appears to be a recent phenomenon, temporary wooden structures were being used for shelter although they did not dominate the entire community. Other housing types were after found there. The compound houses at Ahinsan had several households per house. In one large house, for example, there were thirty households. At Kotei-Deduako, which is next door to the Kwame Nkrumah University of Science and Technology (KNUST), and therefore experiencing rapid development irrespective of the location of land, there were modern storey buildings located close to the river that flows through the community. This includes decent and modern sandcrete large and small houses that could be considered as first-class houses, right to wooden structures that could be considered as third-class dwelling units found in slums. The wooden and temporary structures were

however dominant at Kwadaso and most of the occupants were migrants from the northern part of the country, who were engaged in menial jobs in the informal sector in the city.

4.3.3 Number of Households per Housing Unit

Table 4.3 presents the number of households per housing unit in the flood communities studied.

Table 4.3: Number of Households per Housing Unit (N=491)

No. of Persons per House	Frequency	Percentage
1 -2	53	10.8
3 - 4	140	28.5
5 - 6	138	28.1
7 - 8	63	12.8
9 - 10	34	6.9
10+	63	12.8
Total	491	100

Source: Field Data, 2022

The research tried to examine the room occupancy rate of the residents in the flood-prone communities studied. Slightly more than half of the respondents (56.6%) had between 3 to 6 persons in a room. The average number of occupants per room in the flood communities in Kumasi was 4 and a little over a quarter of the residents (28.5%) had 4 occupants per room. About 19.7% of them had an occupancy rate of between 7 to 10 people, and so for this 19.7% of the residents, there were about 8 occupants per household, averagely. As such, for every household that was affected by flood, about 8 individuals were likely to suffer the risk and this number increases when there are several households living in one house as was observed in the Ahinsan Community in Kumasi. According to the Housing Policy of Ghana, the maximum room occupancy rate for Ghana is 2 persons per room (Ghana Statistical Service, 2014) like many other national statistical offices, includes data collection, compilation and analysis as well as dissemination of statistical information in an accessible and user-friendly manner. In order to satisfy the needs of users, GSS is required to analyse and interpret statistics in a form that makes it easily understandable for people to appreciate the value of the statistical information. There is also the need to disseminate widely all the statistics produced by

GSS so that all data users including potential data users can have access to them. Ghana, like many other developing countries, relies mainly on survey and population census data for planning at the national and the sub-national levels. Detailed analysis of such data provides users with a wealth of information for planning and policy formulation. Analysis of the 2010 Population and Housing Census data on topical issues, therefore, provides information for effective planning at all levels. Several reports, including six monographs, were prepared using the 2010 Census data and published in 2012 and 2013. The published reports from the census data was a collaborative effort between the GSS and Local Consultants from research institutions and universities in Ghana, with funding from the Government of Ghana and various Development Partners (DPs). The zoning guidelines and planning standard of the Town and Country Planning Department (TCDP), (2011) of Ghana recommended maximum occupancy rates of 1.5 persons per room in low density areas to 2 persons per room in high density areas. The high occupancy rate in the flood communities increases the number of household members who become victims of flooding and therefore increases also the number of people at risk.

4.3.4 Duration of Stay in the Flood Communities

The respondents had lived in the flood-prone communities for a varied number of years as shown in Figure 4.7 below.

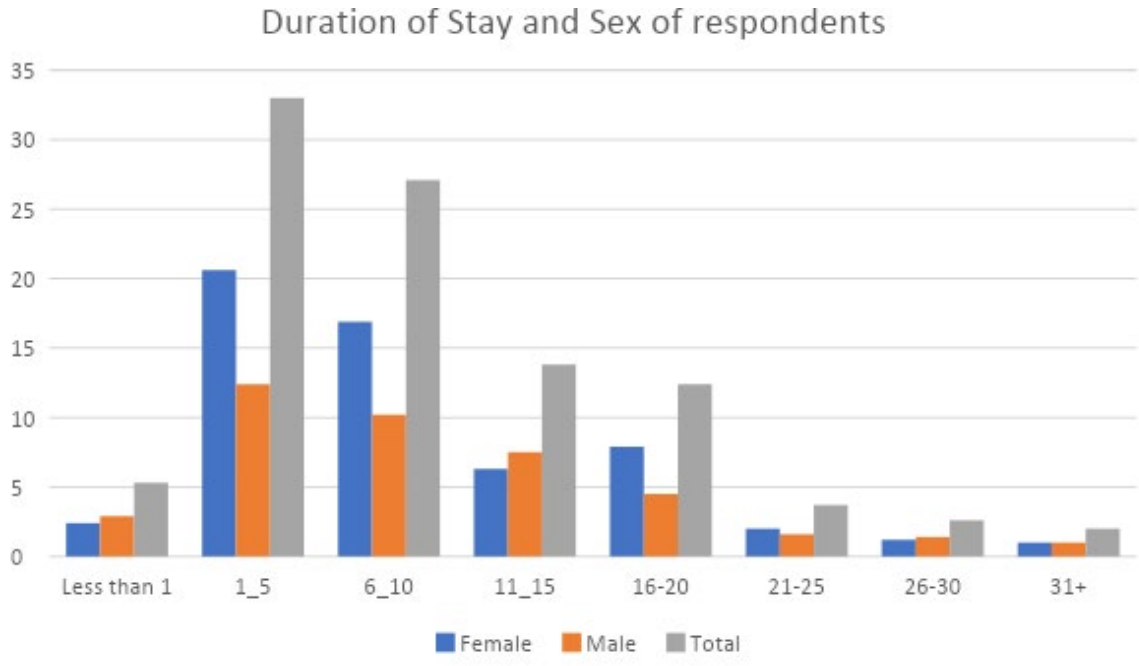


Figure 4.7: Duration of Stay in the Flood Communities

Source: Field Survey, 2022

Figure 4.7 shows that about a quarter of the residents (27.1%) had been living in the flood communities for an average of 8 years and for 13.8% of them, for 11 to 15 years. An insignificant proportion of 4.6% of the residents had lived there for 26 years and beyond, while 5.3% of the residents had lived there for less than a year. 8.3% have lived there for 20 to 30 years. With the duration of stay in these flood-prone communities, it is suggestive that majority of the residents, with the exception of those who had lived there for less than a year (5.3%), might have experienced flooding in one form or the other over the years. Some of these residents indicated that the incidence of flooding set in about a decade ago, which confirms earlier assertion that the natural undulating topography of the place helped in draining off runoff waters until when such features were no more recently. The Physical Planning Officer

of the Kwadaso Municipal Assembly mentioned that the effect of flooding was due generally to poor and non-resilient construction practices in the flood-prone areas which both the poor and rich landlords did not consider while constructing their houses. The Physical Planning Officer stressed that the developers of flood lands generally do not seek professional advice to guide them in flood resilience construction. From the above reasons provided by the Physical Planning Officer, it could be suggested that regulatory systems refraining individuals from developing flood land could be weak if some people could be bold enough to dare the local governments and utilize such spaces for physical development with impunity. In the past building construction practices in the country did not take into account the design for buildings in flood prone areas.

4.3.5 Tenancy in Flood-Prone Communities

Both landlords and tenants alike experience flooding in their flood-prone communities so landlords are aware of what the tenants go through during flooding. As mentioned above, there are more tenants (forming 65% of the respondents) in the flood-prone communities than landlords (forming 35% of the respondents) (refer to Figure 4.8). Some of the tenants indicated that their landlords who were unable to withstand the threats from the floods, vacated their houses to live in other areas that are not flood prone and only pay them seasonal visits to check on the housing conditions after the floods. Some of the tenants also mentioned that their landlords no longer had the 'courage' to demand rents from them due to the deplorable housing conditions they lived in as a result of the floods.

As a consequence of the flooding, there were a number of abandoned houses in flood-prone communities at Kwadaso, Atonsu Kuwait, among others. Some landlords ignored housing maintenance due to recurrent nature of flood devastations in those areas and the cost involved which only went to waste during the next rainy season. From the key informant interviews, some of the landlords preferred to offer their houses for sale as shown in Plate 1 below. The

survey therefore identified a number of abandoned houses/structures in the flood zones. It was observed that the owners had deliberately abandoned these houses/structures to avoid investing more money in maintenance work. One of the abandoned houses was not completed before the owner gave up the building.

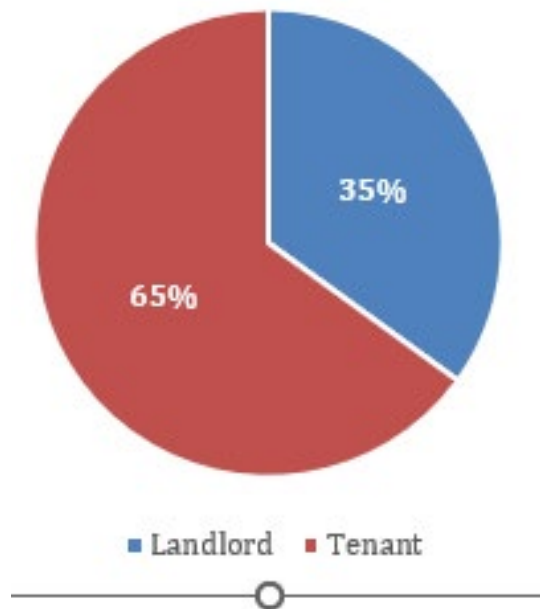


Figure 4.8: Housing Status (Ownership) of Respondents

Source: Field Survey, 2022





Plate 2: Properties on Flood-Prone Communities Labelled for Sale

Source: Field Survey, 2022

Although both landlords and tenants suffer from the effects of flooding, the tenants have less responsibility in ensuring that flood management is sustained to protect their rented houses/accommodation. Some of the tenants shared the following comments;

“At first, a lot of people used to stay in this house as tenants. However, the frequent occurrence of flood has driven them away. Now, we are not even asked to pay rent again and hardly do we see our landlord here.” (An Interviewee, 2022)

“Even our landlord has left to rent a place elsewhere. We live here alone and take all major and minor decisions concerning the house ourselves. I can now say with confidence that we are responsible for the house.” (An Interviewee, 2022).

One of the landlords in the flood-prone communities also said;

“I now live with tenants as family members. I do not charge any rent. It is very difficult charging rents from people you share the same pains with.” (An Interviewee, 2022)

A frustrated landlady also said the following;

“Previously, I lived with two tenants in this house, both of them now left without taking their remaining deposits for rent because of the flood”.

The above suggests that landlords who have invested in properties for income generation may be unable to earn income from such properties located in flood-prone areas due to the risk associated with the location.

4.3.6 Preparedness of Residents to Combat Risks Associated with Flooding

This section addresses Objective 4 which seeks to assess the preparedness of flood residents to combat the risk they experience with living on flood lands. The session looks at preparedness towards flooding.

According to the respondents, they have learnt from experience that the formation of dark clouds in the sky are possibilities of an incoming rain. The darker the clouds, the more likely it is that it could rain heavily and so they observe the weather at all times

and begin preparing against the floods before even the rain sets in. This warning signal when observed early enough allows them a little time to put things in order in their houses, such as storing away their belongings and clearing the path for the runoff water to pass to prevent massive destruction in their homes. Some of them make special storage tables that are very high above the ground and higher than normal tables where they store their belongings. Some of them also send their valuable items to other places before the rain starts. For those who are away from home before the cloud gathers, the appearance of dark clouds is a signal for them to get back home as quickly as possible to prepare for the flood. The clouds prompt them to act swiftly to avert any disaster.

They have observed over the years that flooding often occurred at night and so once it starts raining, many of them said they stayed awake to observe the trends of the rainfall to know whether they have to vacate the house or not. They stay awake to monitor the intensity of the rainfall and to determine whether it was going to be destructive or not so that they know which action to take. Thus, when the rains start, residents in the flood-prone communities have less sleep at night. Close monitoring and observation therefore are some

of the strategies the residents use to get ready for the floods and to protect themselves. Ability to observe the early warning signs helps them in safeguarding their properties. As part of their preparedness to reduce the negative effects of flooding, the MMDAs said they desilt some of the rivers in the communities prior to the commencement of the rains. This exercise is however expensive because they have to hire excavators for that.

4.3.7 Actions Taken by Flood Victims Immediately after a Flood

Figure 4.9 presents data on what flood victims do immediately there is flooding. Most of the residents (73.3%) immediately move out of the flooded homes. Victims who do not experience intense level of flooding move around in the flood in their homes to rescue some personal items before moving out. Those who move out immediately there is flooding wait for the water level to subside before going back to their homes. About 10% move to their relatives in other communities for days until the situation restores to normal.

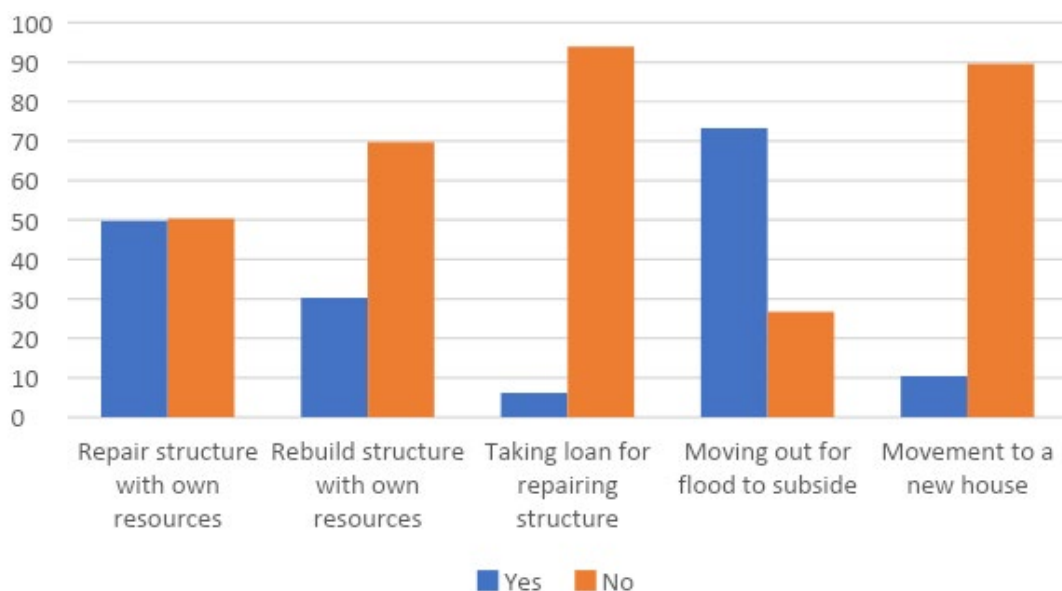


Figure 4.9: Actions Taken by Flood Victims Immediately after a Flood

Source: Field Survey, 2022

CHAPTER FIVE: FACTORS INFLUENCING ACCESS TO FLOOD-PRONE LANDS IN KUMASI

5.1 Introduction

The research is specifically interested in identifying why and how individuals have access to flood lands for development. The chapter addresses Objective 2. It looks at factors that influence the decisions of residents to acquire land in flood-prone areas or rent accommodation in such places. From the survey and the key informant interviews, a number of factors were mentioned as influencing decisions to acquire land in the flood-prone areas in the city of Kumasi. The landlords were important respondents in providing responses to questions related to access to land in the flood communities. The research team sought additional information and explanations from key informants. The chapter also examines factors that exacerbate flooding of the communities studied and the impact of climate change on access to land acquisition.

5.2 Access to Flood Land

5.2.1 Affordability of Land

The field data showed that a number of factors influenced choices the respondents made in accessing land. The first and foremost was affordability. Many individuals would prefer to acquire a piece of land that is reasonable and affordable to them. They are also conscious of the fact that acquiring land in flood-free areas was the best option if they had the means to make that choice. The prices of land, to a large extent, influences where an individual would like to buy it. Although the data gathered did not cover cost of land, it was noted from the key informant interviews that the cost of land in the flood-prone communities were fairly cheaper than those in the prime areas and therefore the flood-prone lands become more attractive to the average individual and low-income groups in the research communities. The demographic data presented above show that the majority of the residents were young and economically active individuals in the age brackets of 18 to 45 years and about 56% of them were earning not more than GHC60 per day

from the informal sector. With this background, it is not surprising to find many of the respondents in the flood-prone communities being tenants (65%), although the research shows that any category of individuals has equal opportunity to acquire land in the flood-prone communities, which is demonstrated by the variety of building types found there—from first class housing types to the slum dwellings of vulnerable groups. For these individuals, affordability becomes the main factor influencing where to access land or have tenancy in any settlement.

5.2.2 Availability of Land

To some of the respondents, accessing land depended on its availability irrespective of the location. The location of a piece of land determines its quality, type and suitability for development. Discussions with the key informants revealed that many of the prospective developers in the flood-prone areas acquired their pieces of land without any prior knowledge about what to look out for due to lack of technical know-how or some level of indigenous knowledge (e. g. presence of wetland plants) to determine which piece of land was liable to flood or not. As such, for some individuals, acquisition of land was done out of ignorance about the land market and so even where they were capable of acquiring a piece of land in an area that was not threatened by flood, they end up in flood prone-areas. For such prospective landlords, availability was the only factor considered in the acquisition of land.

Further, the key informant interviews revealed that it is not common to find prospective private buyers/ developers from a low-income group seeking technical advice as to the suitability, type and quality of land prior to acquisition when it is for personal/ private residential development and this has been the general practice over the years. Although the MMDAs have the expertise to provide technical advice to the prospective buyers, they are not consulted during the process of land acquisition because that also involves an additional cost.

It was mentioned that land owners and the chiefs in particular do not assist the prospective developers to make the right choices in terms of the quality of land when it comes to its acquisition, which is also expected as they are those selling and would give the land to anyone willing to pay for it. In events where land owners know about the poor status of the piece of land they want to sell out, they keep the information away from the buyers. It was mentioned that some land owners sell their land during the dry season when the buyer is unable to verify whether or not the type of land being offered for sale is liable to flood or not, suggesting that some level of dishonesty is associated with the land market when the buyer is ignorant about the quality and suitability of the piece of land being offered for sale.

5.2.3 Urbanization and Climatic Conditions

A number of the landlords interviewed indicated that at the time they acquired the piece of land which they later developed, there was no evidence to indicate that the land was liable to flood or was going to turn into a flood-prone area. However, with time the effects of urbanization, coupled with rapid population growth, severe climatic conditions and other factors, the respondents began to experience flooding. They mentioned that with a change in the volume and flow of runoff waters that eventually led to flooding of some communities which hitherto were not liable to flood, some of the communities changed from hitherto flood-free communities to become flood prone. Although some of these areas were close to river banks, it never proved a risk to them until the last few years. With pressure on the land, coupled with human activities, areas along the river bank like at Deduako, for example, which were not considered as flood prone about ten to fifteen years ago, have all turned into flood zones, with flooding affecting properties that were developed several years ago. Other reasons the physical planners mentioned included poor construction and land use practices, which many individuals take for granted,

particularly when they ignore building regulations. This was very common in Asokore Mampong District and was creating conflict between residents and the management of the District Assembly. The physical planning officers noted that the building code of Ghana is not comprehensive enough to guide developers as to what to do in terms of flood resilience construction, and therefore even those in the construction industry do not consider it when developing flood lands. This is currently affecting particularly traditional houses at Ahinsan, some of which have been in existence for over thirty years and have all these years withstood the weather vagaries until recent times. These houses have now been exposed to flooding as a result of heavy overflows of narrow drains due to heavy rainfalls and other factors mentioned earlier. Some of the landlords indicated that they would have declined acquiring land in the flood-prone areas if they knew the area was eventually going to be prone to flooding.

5.2.4 Conscious Decision to Acquire and Develop Flood Lands

The research found that acquisition of land in flood-prone areas for some people was a choice they made; a choice that can be said to be a deliberate. The following is what one of the landlords said in attempt to explain why he chose to acquire land in a flood-prone area;

“By the time I saved enough money to build a house, although there were prime lands in other areas that were very good and flood-free locations than this one in terms of the topography, I noticed that options available for areas to acquire land were far away for me to live there at the time I needed it. The flood-free lands were isolated and far away from other human habitats, with very few people living there. And so, for security reasons and proximity to the city center and other services, I decided to settle on this left-over piece of flood-prone land in this community to at least be close to other people” (A Landlord, 2022).

Similar to the above comment a landlord made, a number of other reasons were provided for such choices. According to some of the key informants (experts), prospective buyers sometimes came across as very desperate to buy land and would be prepared to take anything without waiting to find out more about the quality, type and suitability of the land they are interested in, on one hand. These persons are often those that landlords harass with constant increases in rent. On the other hand, some of the prospective buyers were aware of the status of the land but insisted on acquiring it out of desperation when they are unable to find an alternative for a similar price or for a particular usage. Also, others who were very much aware of the poor status of the land ignored these conditions and because they were interested in a particular location, they insisted on buying it, irrespective of the risks associated with it. Some of the key reasons provided by those who insisted on acquiring such pieces of land included proximity and the capacity to restore/reclaim the land, which often turned out to be impracticable. The respondents mentioned proximity to the City Centre (Central Business District), to workplace or to other services they regularly access, such as schools for their children. Proximity to any of these services they required regularly reduces travel cost, thus, making their location convenient and cost-effective for them, irrespective of the quality of land they have access to. Again, with reference to the quotation above, others preferred to acquire land in the flood-prone communities for security reasons because flood-prone areas in already developed communities with people were considered safe and therefore protected places with a lot of people residing there (high density). This presupposes that they would not be living in isolated places where they could be exposed to insecurity. This choice to acquire land and live in a flood-prone community was also confirmed by some of the Physical Planning Officers in Kumasi during the key informant interviews. Location in relation to other key drivers therefore played a major role in decisions and choices related to land acquisition, particularly for the low income and vulnerable groups.

In addition to the above, some respondents who acquired land in flood-prone areas were also of the view that flooding happens irregularly, perhaps every two to three years in certain areas and even at longer intervals in some other places and so in between the floods, they could manage the situation and find a solution to the problem. These people therefore moved into flood-prone areas with the assumption that they would be able to manage and find solutions to the flood problems when they were confronted with the issue. However, with changes in rainfall patterns as a result of climate change, these individuals have realized that their assumptions could no longer hold. The research however shows that less than 10% of the residents have had training on flood management and resilience skills and therefore not many of them have the know-how to live in the flood-prone areas where their knowledge could help them overcome the risks associated with such places. As part of the key informant interviews conducted, it was revealed that the National Disaster Management and Organization (NADMO) Office in Kumasi provide training for the people living in flood-prone communities regarding flood prevention and management methods, such as eschewing the dumping of refuse in drains, promoting green infrastructure by planting trees and lawns around buildings, elevation of foundation and using of sand bags as buffer. Building the capacity of such people and their children to help them cope with the situation during flooding is critical to avert the risks associated with flooding, particularly in the case where they have made the choice to remain in such communities.

5.2.5 Multiple Sales of Lands

Accessing land from traditional authorities (chiefs) could be a difficult and daunting task as there is little evidence of proof that a piece of land sold to an individual does not have several other 'owners' with titles unless these lands are formally registered with titles and could be verified with the land agencies (in this case the Land Title Registry of the country).

Once there is multiple sale of land, the land goes under dispute for several years before the case is resolved. Such disputes are time wasting and costly. Pieces of lands that go through multiple sales take a while for the courts to establish the rightful owners. Prospective buyers and landlords would do everything possible to avoid going through such process. Thus, once the piece of land is acquired, abandoning it becomes difficult when even the flood threatens because they know it could be difficult to get a replacement or another piece of land. For such land owners therefore, accepting flood lands could be the best option for them until they become victims of flood and eventually, flood refugees.

Development of flood lands also has another dimension related to the way the traditional authorities sell land. Haphazard sale of land by the traditional leaders and haphazard development of pieces of land increases the effects of flooding when it comes. The MMDAs do not have the power to interfere in the sale of land as this is strictly in the domain of the chiefs, but can only provide expert advice to the chiefs if they are ready to accept it. This however rarely happens in Ghana. From the key informant interviews, it was mentioned that even some of the chiefs would not mind paying money to the planning officers to zone unapproved areas for development to enable them sell the land when they are desperately in need of money. This is increasingly contributing to the development of flood lands to the detriment of the victims who do not have the know-how to minimize the risks.

Further, the key informant interview revealed that there were some land owners who were of the view that they have already invested so much money in the acquisition of the property prior to the advent of flooding and so would not be able to let go whereby they will be confronted with the problem of having to start searching for another piece of land to acquire and develop. These landlords, it was noted, would do everything possible to save their land and property built in the flood-prone area as a

result of the investments they have already made to secure their land rights and the cost of their property. Besides, land values appreciate all the time and so moving out of the already acquired flood land to begin searching for a new place could be a tedious task, which landlords try to avoid and therefore would prefer to do with the flood land they already have. Some of the respondents said they accepted land in flood-prone areas as a compensation for land they had earlier acquired and lost through multiple sales by the chiefs. For such prospective developers, they accept the flood land grudgingly because they know they may not be able to get their money back or may not be able to afford higher prices for another piece of land in a better location. Below is what a respondent said in relation to the above;

“It is not that I deliberately chose to live at this place. I was denied of the land I purchased from the traditional authorities and this land is what they gave me in compensation.”

5.3 The Impact of Climate Change on Access to and Land Acquisition

The research has observed that young people (between the ages of 18 and 45 years) who have migrated from the rural areas to the urban centers in search of employment and belong to low or middle-income groups were more likely to acquire land and settle in flood-prone communities, or were only capable of renting accommodation in such places, and which most of them did. However, with the advent of climate change that has impacted on the rainfall patterns, leading to torrential and intensified rainfalls and thereby causing regular flooding in hitherto areas that were not experiencing flooding, it is likely that such low-lying lands and flood-prone communities that were available for the vulnerable and migrants will soon be no longer habitable, as these places are the most affected and destroyed by floods. In some of the communities, such as Deduako,

the residents, particularly the landlords mentioned they acquired their land when they had seen their friends acquiring land in this very community and therefore assumed it was a good decision they made. At that time (was about 10 years ago, they indicated), there was no indication that the place could get flooded one day, although they were not too far away from the river. Some of the respondents said they were only experiencing flooding every four years and felt it was possible for them to live there while there were no floods and thought they could cope when the flood sets in. They therefore felt safe acquiring land over there for development, but the floods have now driven them away from their homes. Someone who had lived at Deduako for almost 40 years testified that he had experienced flooding three times in the last 10 years—this person lived on a high land in that community.

5.4. Factors Exacerbating Flooding of the Communities

5.4.1 Human Actions

The research revealed that the bulk of the problems associated with flooding in Kumasi are caused by human actions despite the intensity of rainfall as a result of climate change. This research has affirmed similar assertions other studies have come out with (Mensah and Ahadzie, 2020, Echendu, 2020, Echendu, 2022). The key informant interviews revealed that individuals throw garbage in drains that choke the rivers and gutters. The residents dump all kinds of household refuse, including damaged electronics in the rivers and with time, the rivers get blocked and are unable to flow freely. Some do so deliberately when the rain begins to fall so that the rain could wash them away. The MMDAs indicated that even when they arrest people and send them to court for these wrongful actions, certain individuals of high ranking in society belonging to the social networks of those arrested intervene and demand that the

case be dropped, thus no one gets prosecuted for these wrong doings. Inability to enforce laws therefore has been a major problem exacerbating efforts to manage the effects of flooding in the flood prone communities. The Asokore Mampong District Assembly mentioned this as one of the major challenges they have been facing and that trying to prosecute the culprits often led to conflict between them. Kumasi has two major rivers flowing through the city, the Subin and the Oda rivers, with their many other tributaries. These two major rivers run through many of the communities in Kumasi as shown in Map 2, and serve as the illegal dumping sites for garbage. When the rivers get choked, it is expected that the Assemblies would dredge them to allow for free flow of the river to avoid overflows and hence flooding. This is done at a cost which should not have been the case if citizens were acting responsibly and so the issue is not just about the flooding but the human actions that trigger flooding to occur where it should not. Some of the Assemblies ensure that the rivers and streams are dredged or desilted prior to the rainy season. From the interviews, it was noted that the dredging is done when there is an influential person that suffers from flooding and therefore can influence the local government authorities to undertake the dredging. To confirm the above, this is what one of the Presiding Members of one of the local governments, who bought his land ten years ago, at a time when the area was not experiencing any flooding had to say;

"I started experiencing flooding only about 3 years ago and my house got completely flooded 2 times already. I had to ask the Assembly to dredge the Oda River that overflows to our place and it was dredged" (A Presiding Member of one of the MMDAs studied, 2022).

Majority of the residents in the flood-prone communities are not influential and would not be in a position to influence the dredging of the rivers in Kumasi, bearing in mind that over half of them were tenants who could not afford land and were mostly the vulnerable.

Another effect of the human actions that came up was the disregard for building regulations. Both tenants and landlords would prefer to go into construction without any building permit in the flood-prone areas. The planning officers mentioned that developers would prefer to construct their buildings either at weekends or at night to avoid being stopped by the responsible authorities. Inability of the local governments to enforce regulations are the major reasons why some of these problems occur in the flood prone communities.

5.4.2 Lack of Coordination among Key Stakeholders

Another factor responsible for flooding, which is also related to urbanization is lack of coordination among key stakeholders in the land sector agencies although the planning law in the country entreats them to work as a team to avert some of these challenges. These stakeholders include: NADMO, the Environmental Protection Agency (EPA), the Land Use and Spatial Planning Authority (LUSPA), the Ministry of Sanitation and Water Resources, and the National Fire Service and the MMDAs, among others. Issues related to flooding are multi-agency related and must be addressed as such through collaboration between all the stakeholder agencies. The traditional leaders who are the custodians of the land give out land without consulting the planning authorities. Some of them, according to the data collected, collude with the planning authorities to rezone flood-prone land for development, as mentioned earlier. Thus, the sale of land is done haphazardly and without any control. Private developers do not consult experts for technical advice when they want to develop their properties. With the support of the chiefs, business persons will always pay more to acquire any piece of land even in flood-prone areas for development. The city authorities are also unable to prosecute individuals who build in waterways. These challenges of management and administration have exacerbated the frequency of flood experiences residents in Kumasi go through. It is considered as 'business as

usual' when in fact more and specialized skills are required, such as the expertise of hydrologists and engineers as is done in other jurisdictions to work on the land prior to building construction and beyond to protect it from flooding. Further, with rapid urbanization and increase in population, more and more urban land is being used in providing residential accommodation without making room for the flow of water. Some residential developers build in water ways that obstruct the flow of water and which ends up causing flooding when it rains heavily. These are common occurrences in all the urban centres in Ghana today. Such developers often fail to seek permission from the planning authorities before embarking on their development project.

It was mentioned that one critical human action is the type of construction taking place without bearing in mind implications for the environment. An example is affluent residential developers would want to have concrete grounds in their houses, when in fact, concrete floors are not permeable, thus increasing the volume of water that has to find its way into a drain somewhere else as it cannot soak away into the ground. Poor construction practices therefore have not helped in reducing the risk associated with flooding. With good coordination among the key urban managers, flooding could be under control.

5.4.3 Rapid Rate of Urbanization

Increased and rapid rate of urbanization put pressure on existing land and thus raises the price of land. There is also the scarcity of land in the prime areas and this pushes latecomers to the flood-prone areas.

In some communities where the entire area has been developed, the flood-prone areas become the only available place where residents and non-residents desiring to live in certain locations have access to for development. According to some of the chiefs interviewed, in the past, land along water bodies such as rivers or any piece of land prone to flooding was not given out for sale as it was considered unsuitable for development and habitation.

As mentioned earlier, residents of flood-prone communities often do not consult the local government authorities and its physical planning departments that approve of building permits. Some of the physical planning officers interviewed indicated that persons who acquire land in flood-prone communities do so illegally and construct their houses at the blind side of the planning authorities as mentioned above. It was also reported that the planning officers who visit such communities are sometimes attacked by the residents which makes it dangerous for them to go there to demand that the right things are done. The residents of such communities are protective of each other and behave illegally towards any person who goes there to demand their permit or to correct them because they rely on their strong social networks there for protection even when they go wrong. The slow pace of physical development in the communities such as the reconstruction of damaged bridges and widening of gutters, have also compounded the problems of the effects of urbanization for the flood communities.

CHAPTER SIX: INDIVIDUALS' EXPERIENCES OF FLOOD INCIDENCES

6.1 Introduction

This chapter addresses Objective 3 of the research which seeks to ascertain the awareness of residents of the risks associated with living on flood-prone lands. The chapter discusses residents' experiences about flood and the various coping strategies they adopt during such times. The chapter also discusses the duration and effects of the flood.

6.2 Experience of Flood

Figure 6.1 and Table 6.2 present information on residents' experience of flood.

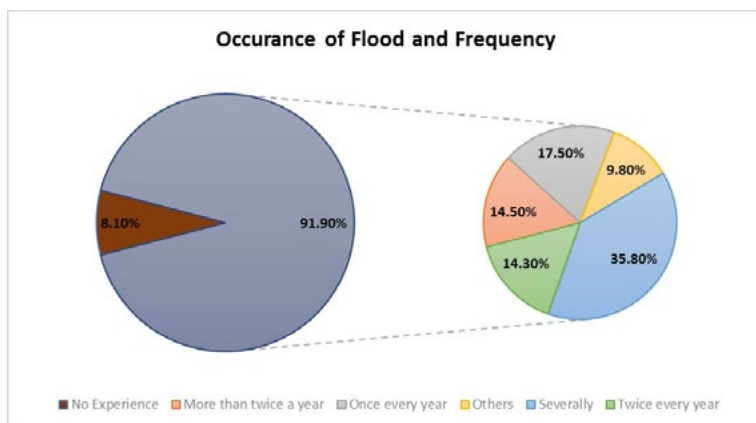


Figure 6.1: Occurrence of Flood

Source: Field Survey, 2022

The survey found that the majority (91.9%) of the respondents had experienced flooding in their respective communities since they moved to settle there. Only about 8.1% of the residents claimed they have had no experience of flooding in the areas because they had not lived there for a long time to experience it during the rainy season. These are residents who had lived in the flood prone communities for less than a year. Regarding the frequency of the flood experiences

they had witnessed, 35.8% said they experienced it severally, 14.3% said they experienced it twice a year while 14.5% said they experienced it more than two times in a year. About 17.5% said they experienced flooding once in a year. It is important to mention here that there are two rainy seasons in the country, one being major and the other minor rainy season and so it is not surprising that many of the respondents experience flooding more than once a year. Thus, most of the residents (81.1%) interviewed experienced flooding in their communities at least once a year depending on the intensity of rainfall. To them, thick clouds were warnings of incoming flooding and which would get them to prepare for it (refer to item 4.3.6). The respondents who were victims recounted that whenever it rained heavily, they found themselves caught up in nature's web of disaster which destroyed their properties to the extent of driving them permanently into poverty as they lose several of their personal belongings. For these vulnerable groups replacing the lost properties was often another challenge for them. A number of the victims had different encounters to share about their experiences, some of which are presented below;

"Any time I see the clouds forming, I perceive a battle between nature and I. I have to run quickly to save the situation by re-organizing the room to mitigate the effects on me. Even if the flood will not get to the room level, I have to leave my room to escape the issue of road blockage from the floods and getting trapped in the floods" (A interviewee and a flood victim, 2022).

"As a market woman, any time it is cloudy, I have to quickly pack my goods in the market and struggle for transport to get home to sort things out before the rain comes. Most of the time, I am unable to save the situation due to the distance from the market to the house. When this happens, I lose my income for the day for not selling anything in the market and for as long as I remain in the house." (An interviewee and a flood victim, 2022).

"I am psychologically ok until I see the weather changing. Anytime I see clouds I become ill because rumblings

of the rain are like a knock of flood at my door." (An interviewee and a flood victim, 2022).

"The last time there was flooding was when I had given birth; only three days before the flood. I live in a wooden structure and was acting like as a sponge on the water. The water just entered the room and I had to wait with my kids on a nearby story building for the water to subside" (A interviewee and a flood victim, 2022).

"My mattress was like a canoe on a river, I was suspended on the mattress on the water in my room since my mattress was new and had the plastic cover as protection which prevented it from getting soaked but supported it to float. I have had surgery at that time and was vulnerable walking through the water to escape. I just had to stay and cope" (A interviewee and a flood victim, 2022).

"I am simply afraid and uncomfortable whenever the weather is cloudy especially when I am away from the house" (A interviewee and a flood victim, 2022).

The above experiences demonstrate the devastating and traumatic moments residents of the flood-prone communities go through when there is flooding. Apart from the destruction it causes, it also to a large extent, causes psychological problems for the victims, especially those with children or are sick, indicating that such deplorable places are not decent enough for habitation if nothing is done to minimize the risk to ensure sustainable development of both the communities and the people.

6.3 Effects of Flood

About 79% of the respondents who were flood victims said in an event of flooding, the rain water enters their rooms, while 21.6% only experience the flooding on their streets and compounds. These 21.6% of the residents who experience flooding only in their compounds and streets/roads said they become restricted in movement as mobility becomes impossible when the streets and compounds got flooded. These people however did not lose so much

properties compared to those who experienced the flooding in their rooms. The majority (79.4%) who suffered from destruction of their properties as a result of water entering their rooms had their belongings soaked as they were unable to protect their properties within the limited time they often had to take care of themselves and their properties. With the floods usually coming in the evenings and throughout the night, sleeping was disrupted, and this affected them as they went through the next day's activities. The flood washed and carried all kinds of debris into the flooded homes, leaving footprints of dirt, mud and in some cases scorpions and snakes which have other implications on the health of the residents.

Flooding in the flood-prone communities also affected other social services in the communities, such as schools playgrounds, churches/mosques, and market areas which all suffer the same fate as the

residential properties. The survey reveals that about 97.4% of flood victims had their roads flooded, while 40% and 6% claimed to have witnessed flooding in schools and market places, respectively. According to the residents, when the roads got flooded while they were away from home, the impact is worse for them as they are unable to protect their properties from being destroyed or washed away by the flood.

6.4 Number of Times Flooding was Experienced and its Duration

Table 6.1 and Figure 6.2 below present the number of years they have lived in the flood communities. Almost all the interviewees have experienced flooding in their communities but this is dependent on how long an individual has lived in such communities.

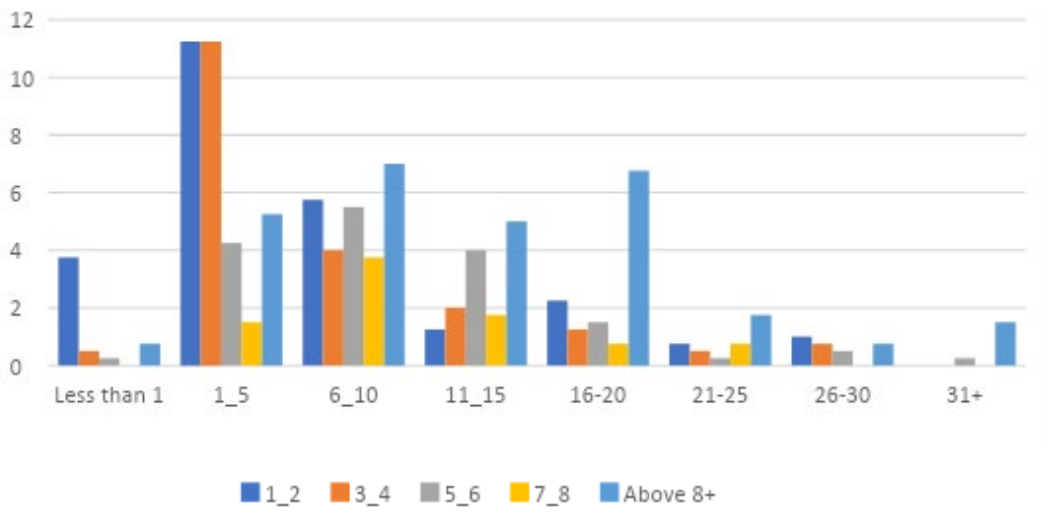


Figure 6.2: Duration and Stay in Flood Communities and Flood Occurrences

Source: Field survey, 2022

Table 6.1: Respondents' Duration of Stay in the Flood-Prone Communities

Duration of stay in Flood Community (in years)	Percentage
Less than 1	5.1
1-5	33.0
6 – 10	27.3

Duration of stay in Flood Community (in years)	Percentage
11-15	13.8
16-20	12.4
21-25	3.7
26-30	2.6
31+	2.0
Total	100

Source: Field survey, 2022

Table 6.2: Number of Flooding Experienced

Number of flooding experienced	Proportion of people (in %)
1-2	26
3-4	20.25
5-6	16.5
7-8	8.5
Above 8+	28.75

Source: Field survey, 2022

Those who have resided in the communities for ten years or more have admitted that flooding excessively is a recent phenomenon. Those settlers who have been living there for over twenty years indicated that they were not experiencing flooding when they initially moved to these communities until about a decade or less ago. However, settlers who have moved in the last five years also said that flooding was a normal thing they experienced during the rainy season. With reference to Table 6.2 therefore, incidence of flood has been very frequent within the last five years. The residents admitted flooding became more frequent when people started building more houses, particularly in the water ways. A few of the respondents had these to buttress their points;

"This is where I started life as a young man and in this house. There was nothing like flood or anything of the sort here. However, as the housing density begun increasing, flooding also started but it was not severe. Now flooding has taken over the land as the owner and we are desperate now." (An interviewee, 2022)

"All these places were not identified with flooding in the past but things are now changing. I personally think it is the climate change, coupled with poor environmental management" (An interviewee, 2022).

Averagely, flood water lasts a day. However, an extra two days are needed to clean rooms and wash clothing to get things back to normal. Flooding therefore creates at least three days opportunity cost to victims which also has implications for their engagement in economic activities.

6.5 Intensity of Flooding

Intensity of flooding was measured based on the levels of flooding using the height of the human body to measure it averagely. Severity was used to define intensity as that was what made it easy for the interviewees to understand and respond to the questions posed. The variables used to describe intensity were 'very severe', 'severe' and 'not severe', with 'very severe' being the most intensive. Flooding

is considered 'very severe' when the water level in the house after flooding is above waist level. This is often considered to be at the window level of their rooms, according to the victims. Flooding is considered to be 'severe' when the water is at knee level and 'not severe' when the water is at the feet level. This way of defining the variables was used as a proxy to make it easy and convenient for many of the households to be able to describe the severity of the flooding situation they experienced. The results of this measurement are shown in Figure 6.3. The intensity of a flood was

linked to the volume of water that outflows in the area. Among the residents, the intensity of flooding during the dry season or when flooding has receded is usually measured by the water level rise that has left marks on the walls in the houses as shown in Plates 3 (A& B). Residents were also able to tell the intensity by the speed at which the water flowed. Some of the residents marked where the water reached during the last flooding on their walls to remind them of how far the water levels could reach in their rooms.



Plate 3 (A): Level of Flood Water Marked on the Walls of Houses

Source: Field Survey, 2022



Plate 3 (B): Level of Flood Water Marked on the Walls of Houses

Source: Field Survey, 2022

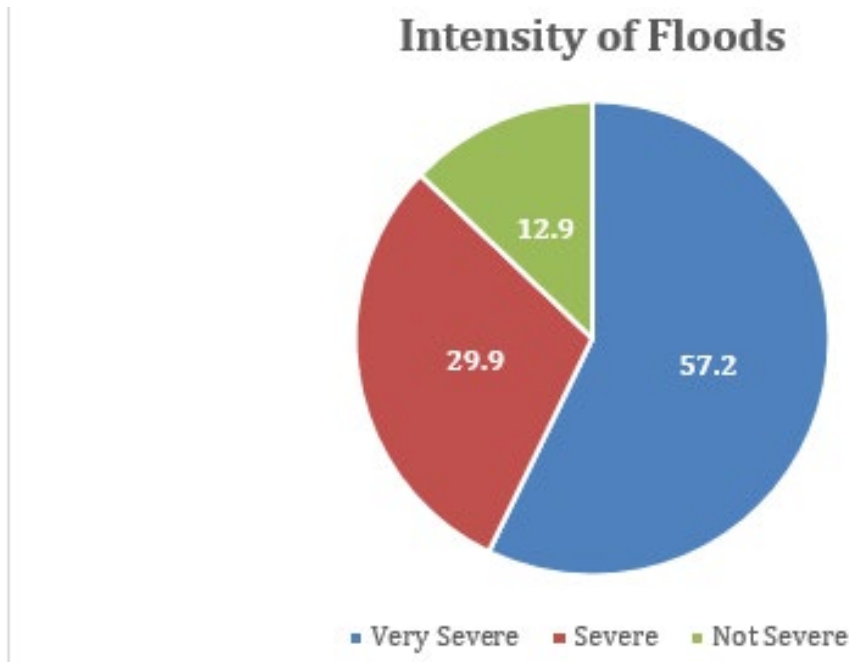


Figure 6.3: Intensity of Floods

Source: Field Survey, 2022

Figure 6.3 shows that majority (57.2%) of the flood victims rated the flood situation they have experienced as very severe in their neighborhood, which means that water that entered their rooms reached window level or up to their waist, and at this point, it became almost impossible for the victims to save or salvage any personal belongings if that was done prior to the flood. About a third of the respondents (30%) admitted flood water reached the knee level. This was considered 'severe', whereas about 13% reported flood water below the knee level or up to the feet, suggesting the intensity was 'not severe'. The 'non-severe' floods were experienced mostly only in the compound of houses, and not in the dwelling rooms. This third type of flooding was the type one could walk through without footwears and also it had little chance of entering dwelling rooms for those who have adopted coping strategies, such as elevating the entrance to their rooms (see Plate 4).



Plate 4: An Elevated Entrance

Source: Field Survey, 2022

6.6 Property Loss During Flooding

The survey shows that almost all flood victims (81.1% of the respondents) lost their properties when there was flood. The overflowing water carried everything in their homes away when flooding was intense. This

include but not limited to electronic appliances (such as television, fridges, sound systems, computer), clothes, various types of furniture, fence walls of houses (see Plate 5), mattresses, floor carpets, livestock, food items, and many more (see Plate 6). Even farmlands in such communities got flooded and crops got destroyed. Apart from personal belongings, the flood also affected livelihoods. Clothes that were not carried away either got decolorized or damaged beyond redemption. The survey took note of houses and church structures that were abandoned as a result of floods. Rooms, especially those with step-downs, accumulated water until they were filled like ponds. About 19% of the respondents said they did not experience property losses during the flood. These were respondents that relied on some form of the coping strategies (such as storing their properties on very high tables they purposely designed and put in their rooms to put their belongings on (see Plate 8)) to avoid the effect of flooding.



Plate 5: Collapse of a Fence Wall



Plate 6: Mattress and a Suitcase with Items that got Flooded

Source: Field Survey, 2022



Plate 7: Some properties lost due to Flooding at Deduaku



Plate 8: A High Table Designed to be Used for Storage in Rooms

Source: Field Survey, 2022

Others were keeping their cooking utensils on high walls for safety and from being carried away by the flood waters (see Plate 3(B)). Physical structures including houses and churches were all not spared from the vagaries of the flood when the intensity of water flow was high. Walls which did not collapse became weakened and with time, they collapsed. Some communities experienced bridges collapsing

(e.g. Adompom in the Tafo District Assembly), cutting such communities from others, and thus, making them feel like they were living on islands. The collapse of bridges resulted in limited vehicular access to these communities and reduced the interdependence amongst them, with consequent economic and social implications for survival. Some interviewees in one of such communities had this to say;

"In a place like this, we have been living on an island since our bridge got destroyed; you cannot move to do your normal routines when it rains heavily. Our leaders have no feeling for us and are irresponsible. The only thing they know is winning an election." (An interviewee, 2022)

"I personally feel I have a life sentence in hard labour. It appears I have just been working very hard to acquire properties for the floods." (An interviewee, 2022).

"My fence walls have collapsed so many times. I have tried concrete walls yet to no avail. Any time the flood comes severely, they collapse again." (An interviewee, 2022).

Some of the facilities used in the houses also suffered from the effects of floods. Individuals using pit latrines in their compounds suffered adversely from flood as the pits accumulated the flood water to become full and overflow to the compound, thus creating health hazard for the members of the house. This water contained some of the faecal matter which contaminates wells for drinking water, the respondents mentioned. Wells are some of the common features found in the flood-prone communities due to the high-water tables in such places. It is very easy therefore for wells in flood-prone communities to get contaminated when flooding occurs. Flooding, therefore cannot be discussed without the associated health implications for the residents.

According to the key informant interviews, apart from the items mentioned above that get destroyed in the event of flooding, children also suffer from flood incidences. They lose their school items, including books, school uniforms and bags. Community schools are closed down to prevent children from attempting to go out in the floods to school. School children therefore enjoyed uncalled for breaks in education. Where the school was not affected by flooding, the children were still unable to go when their school items get washed away or destroyed until such time that the parents were able to replace

them. Migrants who were into urban agriculture using urban wetlands and flood-prone lands for vegetable production suffered severely from the occurrence of floods. Crops were carried away by the flood with raised beds of crops being leveled to the ground.

According to the key informant interviews, having had some experience with flooding, the residents have come to know that once the intensity of the water flow becomes high and fence walls collapse, it increases the chances of properties being easily swept away by the swift flowing water and so they monitor closely the trends and act accordingly to avoid losing their properties and lives. Thus, close monitoring and observation are some of the strategies the residents use to protect themselves from the flood. Ability to observe the early warning signs helps them when there is flooding.

6.7 State of Housing after Flooding and Maintenance

Table 6.3 presents responses from the survey regarding how respondents went about maintaining their houses after flood and the degree of maintenance that had to be done. To assess the degree of maintenance that they undertook in their houses, the following scale was developed and used for the assessment;

- Very high (VH) - Maintenance restored significant part of the house
- High (H) - Maintenance restored about half of the house
- Low (L) - Maintenance restored less than half of the house
- Very Low (VL) - Maintenance was negligible to restore house
- None (N) - No maintenance made

The survey data show that immediately flooding began, the residents moved out of their houses until the water subsided, and 73.3% of the respondents admitted they did that while 10.4% of them said

they moved to different but neighbouring houses within the same vicinity during the period of flood. The results further show that about half (50%) of the residents did the maintenance work using their personal money, while 30% of them rebuilt the structure with their own resources. Evidence also shows that a marginal number of residents (6%) took loans for to repair their structure with about 5% taking the loan for rebuilding their structure. Being faced with issues related to flooding every year, the

landlords and tenants admitted they always had to deal with maintenance issues, confirming evidence from Ahadzie et al (2022), that there is no external support such as from the Government or insurance for flood victims in Ghana to repair flood damages. Since the majority of the residents were tenants, there was always the issue of who maintains the houses to quickly restore them to habitable state for the occupants.

Table 6.3: Maintenance of Houses in the Flood-Prone Communities

Criteria	Total %	Degree of Maintenance				
		VH	H	L	VL	N
Repair structure with one's own resources	49.7	20.9	21.7	2.6	-	4.4
Rebuild structure with one's own resources	30.3	15.8	12.9	1.1	-	0.5
Taking a loan for repairing structure	6.1	1.8	2.2	-	-	0.8
Taking a loan for rebuilding	4.7	0.8	2.9	0.5	-	0.5
Moving out for flood to subside	73.3	29.8	33.6	2.8	0.5	6.6
Movement to a new house within the vicinity	10.4	4.2	5.6	-	-	0.6

Source: Field Survey, 2022

CHAPTER SEVEN: KNOWLEDGE ABOUT FLOODING AND ITS MANAGEMENT

7.1 Introduction

This chapter addresses objective 4 of the research which seeks to explore whether those who experienced flooding had any knowledge about flooding as well as its management to build their resilience. This is important to equip the residents to manage the situation anytime there is flooding. The knowledge also helps the local government and other stakeholders concerned about flooding such as NADMO to know how to deal with flood issues in the communities. Chapter 7 also addresses objective 5, which is to identify stakeholders responsible for providing assistance in times of flood, as well as preparing the residents towards flood risk management.

7.2 Knowledge in Flood Management

The data show that most of the flood victims had some knowledge about flood management from experience (see Figure 7.1). Slightly more than half of the residents (54%) said they had no knowledge about the management of flood, whereas 46% said they had. Of the 46%, about 42.2% said they acquired the knowledge through experience, 1.8% from training they have had, 1.6% from school and 0.4% from other sources. For the majority of the respondents therefore, their knowledge was gained from experiencing the flood. This is partly due to having lived in the flood prone communities for a number of years during which period they experienced flooding severally. The data show that about 40% had lived there between 6 to 10 years, while about 35% of the residents had lived in the flood-prone communities for more than 10 years. In effect, about 75% of the respondents had lived in the flood-prone communities for a minimum of six years. An insignificant proportion of about 5% of the residents had lived in those communities for less than a year. It is therefore not surprising that almost half of those who had knowledge in managing flood said they gained their knowledge from experience.

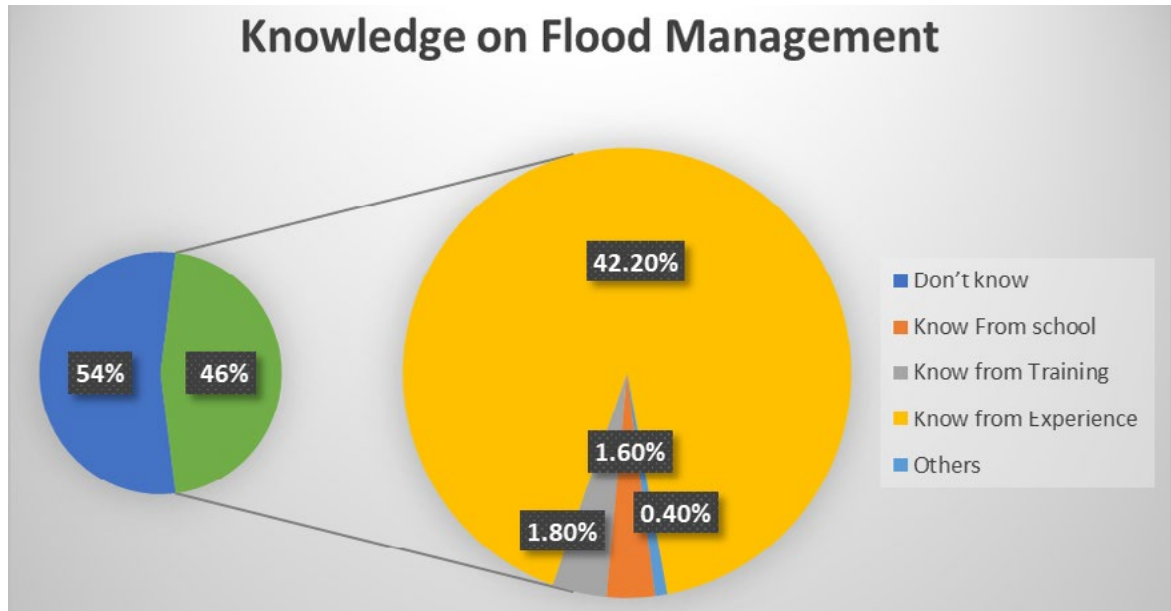


Figure 7.1: Knowledge in Flood Management

Source: Field survey, 2022

*** Note: The proportion (46.4%) of those who said they have knowledge about flood management indicated the source of their knowledge which is presented in the smaller pie chart on the right.

Little or no knowledge in the management of flood tends to increase victims' vulnerability to flood, fear and worsening their social and economic potentials as expressed by some of the respondents quoted below:

"Any time I am buying anything for my house, I think, about it twice. My experience with flooding and previous destruction of my properties restrict me from investing in those things again. I know for sure the floods will come again and there is the fear that I would lose my properties again."

"I have a mental unrest when I experience a continues heavy downpour. It makes me to fear that something terrible is on the way coming again."

Some of the respondents who indicated they gained their knowledge from experiencing flooding made the following remarks when they were further questioned about their knowledge in flood management;

"Where I live now is where I had my first experience with respect to flooding. I have lived here for 10 years now. At that time, I knew nothing and the flood caused a lot

of devastation to my household. I can say for now that I know how to play around it" (An interviewee, 2022).

"It was very hard and unbearable at the initial stages of the flood but with time I know how to manage some few things to endure the situation." (An interviewee, 2022)

7.3 Stakeholders Responsible for Providing and Preparing Residents for Flood Risks

The research sought to find out who were the key stakeholders/institutions readily available to assist flood victims in terms of who to contact immediately there is flooding and provides support to the victims. Objective 5 therefore looked at the importance of key stakeholders/institutions and their contributions to flood management within each of the seven communities studied. It is important to mention here that the antagonistic relationship that have existed between people living in flood-prone communities and stakeholder/institutions—some of which are

state institutions— made the respondents reluctant to respond to these two questions related to who they contact immediately there is flooding and who provides them with the needed support during such moments. The response rate was therefore poor as many of them refused to answer these two questions. The poor response rate however was a good illustration of the poor relationship that existed between the respondents and the stakeholders, which some of the respondents alluded to in the comments quoted above. The analysis was done based on the few respondents who were willing and responded to the questions.

7.3.1 Stakeholders Contacted in Times of Flooding

The research team tried to find out from the respondents who they contacted when there was flooding and who provided them with the necessary support (material, emotional) during such times. Providing support and making contacts refer to two different things here. The flood victims have the notion of who to contact immediately there is flooding, and who they can report the incidence to, but it does not necessarily mean that those contacted immediately there is flooding provide the necessary support (material and otherwise) to cushion them from the harmful effects of flooding. They also have a different perception about who they think could

provide them with the needed support during such times.

The Assemblymen who participated in the validation workshop admitted categorically that although they were the first to respond to the calls from flood victims (see Figure 7.2), they often have nothing to give out to the victims by way of supporting them during times of flood. This is because the Assemblymen are not supported financially or with other resources by their local governments which they could use to assist their community members in times of need.

Community members said they were unaware of who to contact when there was flood. Although they know of NADMO and their work in the communities, the flood victims said they did not know where to contact or locate NADMO and so they were not immediately available to assist them. The residents also said they have not been given any education as to what to do in times of flood. The above submissions however contradict the information provided by NADMO. Further interrogation shows that NADMO has severe budget constraints which makes it non-responsive in most cases and therefore their impact was rarely felt. They were therefore unable to easily reach out to many people in their jurisdiction. As such, only a few of the flood victims could benefit from the services of NADMO and so many of them consider the existence of NADMO as of no or very little use to flood disaster victims in the city.

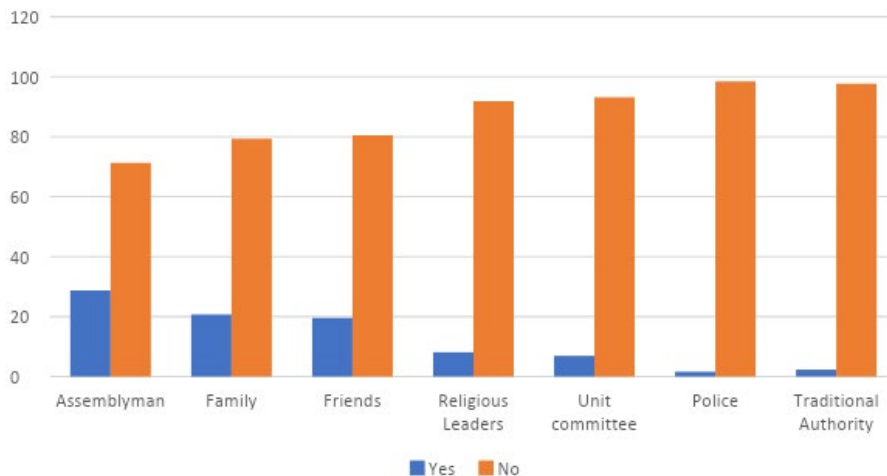


Figure 7.2: Stakeholders Contacted in Times of Flooding

Source: Field Survey, 2022

Figure 7.2 shows that the Assemblymen were mentioned as the ones flood victims contact most (28.7%) in times of flooding. This is because the Assemblymen live in the same communities with the victims and they are the mouth piece of community members, therefore they have the responsibility of representing the people at the local government level. They are easily accessible compared to the other stakeholders. This is followed by family members (20.7%) and friends (19.5%). Only about 8% of flood victims contact their religious leaders. Traditional authorities and the police provide no assistance/support to flood victims and therefore they are rarely contacted during times of flooding as shown in Figure 7.2. The residents do not immediately see any correlation between flood and the job of these other stakeholders, such as the police and traditional leaders. These stakeholders also do not go to the aid of flood victims when flooding occurs and so are considered of least importance to the flood victims.

State institutions responsible for social, legal and political welfare of individuals is often very remote from the flood communities and therefore have little to offer the flood victims or vulnerable groups. It was noted that the flood victims are aware that some of the state institutions are unable to provide them with any assistance as they lack the resources to do so. They consider them as 'struggling-to-survive' institutions. The following are some of the comments the victims made about these institutions;

"I personally know the Assemblyman do not have the capacity to support. I know they receive very little from higher institutions and incapable of supporting us. I therefore do not need to overburden him by going to him for assistance when the flood comes" (Interviewee, 2022).

"My family is not here in Kumasi. I am the one who work here in Kumasi and remit them. It will look very weird should I turn around and call them for support in a situation like this. The need for assistance in times of flooding is between my God and myself." (Interviewee, 2022).

Some of the residents said they refused to contact these social institutions because they have over the years not provided them with any support or if they did, it was insignificant. According to some of them,

such officials only come around the flooded houses to sympathize with the flood victims but with limited assistance that comes in the form of used clothing, mattresses, blankets and soap, which are shared irrationally. Some of the respondents commented as follows;

"I personally think the time and energy used to contact these institutions are not worth the assistance we receive. The last time, I only received GH 2 Cedis worth of soap to wash my clothes after a severe flood that was very devastating. Why should I waste my time calling them again?" (Interviewee, 2022).

"I laughed very loudly when I received an oversize secondhand clothe from one of the institutions the last time there was flooding. What again will motivate me to call them for support should the flood come again? (Interviewee, 2022).

"I even rejected the clothing I received after the last flood. It was too big, so large on me that even two people are not enough to fit into it." (Interviewee, 2022).

It came up during the interviews that most of those who live in flood-prone communities are chastised by state institutions and those who live in other decent places of the city. This is because residents in flood-prone communities are considered as 'stubborn' and 'deviants' and hence, deserve to be ignored by stakeholders when it comes to providing them with any form of support to assist them when the floods come. As noted earlier, many of the respondents have lived in the flood-prone communities for a number of years and have experienced flooding severally and so one would have thought their traumatic experiences with flood should have been enough deterrent to drive them out from such locations. According to the physical planning officers, they are unable to abide by the regulations of city authorities, such as not obtaining building permits before building, dumping of garbage in water ways and building in water ways, among others. The other issue that people wondered was why anyone would want to live in risky locations. With these perceptions about residents living in flood-prone areas, flood victims do not have the confidence to approach the stakeholders/institutions for the relevant support to mitigate the effects of flood on them. Some of them said the following;

“We don’t have any place to move to from here. We just have to endure the situation like that because complaining a lot to them might lead to our eviction from the place.” (Interviewee, 2022).

“It is not that we don’t know that this place is a flood land where we have to live and wait for our things to get destroyed before we go seeking help over and over. It is just that we don’t have any place aside this.” (Interviewee, 2022)

Evidence from the respondents also indicate that many of these flood victims simply do not have an alternative place to move to even though they are not happy about their situation. The data also show that they live in perpetual fear when the rains come. Thus, the decision to remain in the flood-prone communities is driven by a number of factors beyond the control of the residents.

7.4 Stakeholders Providing Support for Flood Victims

When there is flooding, the victims are traumatized and worried about several things as a result of the destruction the flood has caused and the loss of properties and lives. Both adults and children are equally affected by the floods and they all lose personal belongings that makes them go into shock. During these moments, the flood victims need all forms of support including emotional and psychological to enable them recover from the shocks. The support comes in the forms of material and in kind. These include: the provision of temporal shelter/accommodation, food, clothing, among others. Others need health care services while others need support from the state institutions responsible for emergency reliefs (such as NADMO) for other relief items such as blankets.

The stakeholders identified in the communities are unit committee members, religious leaders, neighbours and friends, NADMO, Assemblymen/women, the Police, Chiefs/Queen mothers and opinion leaders. Among these key stakeholders/institutions listed in the questionnaire, this section of the report and analysis presents the case of NADMO, Chiefs/Queen Mothers/Community Opinion Leaders,

Assemblymen/women and family members based on their statutory mandates and responsibilities as the first point of call during crisis. These are also the key stakeholders one would expect to be the first point of contact in providing support for flood victims in their communities. The stakeholders were assessed by the respondents based on their importance to flood victims. ‘Important’ is explained as those who are readily available to provide support of all kinds to ameliorate the problem and trauma caused by the floods. Any form of support better than what is described as ‘important’ is considered as ‘most important’. Any form of support less than what is described above as ‘important’ shows the diminishing value of ‘important’. The following scale was used for the assessment;

- NI – Not important
- LI – Least Important
- SL - Slightly important
- I - Important
- MI – Most Important

The respondents ranked the various stakeholders based on the support they offer flood victims and the extent of management of flood as perceived by victims (refer to Table 7.2).

The contribution of NADMO towards the welfare of flood victims and flood management was ranked in six out of the seven communities as generally ‘not important’. Thus, only in Old Tafo was the contribution of NADMO ranked by 22% (n = 23) of the respondents as ‘important’ compared to the other communities. Though there was a large non-response (58.1%, n = 31) within the Deduako community, about 23% (n = 31) of the residents thought that the contributions of NADMO towards flood victims and flood management were ‘not important’ while 19.4% (n = 31) thought otherwise. Within the Old Tafo community, a non-response close to 70% (n = 23) was obtained, with about 22% (n = 23) of the residents ranking the contribution of NADMO towards the flood victims and flood management as ‘important’. This means that the contribution of NADMO towards flood management was more important to the residents and flood victims of Old Tafo than those of Deduako.

Within the Breman East community, a 33.3% (n = 9) non-response was obtained, with about 67% (n = 9) of the respondents ranking NADMO's contribution as 'not important' towards supporting the flood victims and flood management generally. There were no non-responses within the Kwadaso, Asabi, Dote, and Ahinsan communities on NADMO's contribution to flood management. The results further showed that only one respondents ranked NADMO's contribution as 'not important' to flood management in Kwadaso. This was followed by 70% (n = 10) in Asabi, about 63% (n = 8) in Dote, and 83% (n = 12) in Ahinsan while the proportion of respondents who thought otherwise was negligible.

The contribution of chiefs, queen mothers, and community opinion leaders to flood management and support for the victims is even worse than the trend observed for NADMO. After giving out land for sale, the traditional authorities no longer cared about what the land was used for and what happened to those living on the land. Consequently, the majority of the respondents have ranked their contributions to flood management as 'not important'. This is represented by about 42% (n = 31) with a non-response of 58% in Deduako, 13% (n = 23) with a non-response of about 74% in Old Tafo, 67% (n = 9) with a non-response of 33% in Breman East, 90% (n = 10) in Asabi, about 63% (n = 8) in Dote, and 100% (n = 12) in Ahinsan. None of the respondents ranked the contribution of chiefs/queen mothers/community opinion leaders to flood management as 'important' in Deduako, Breman East, Kwadaso and Ahinsan; and the proportion that ranked them in Old Tafo, Asabi, and Dote as 'important' was virtually negligible. The above data show that flood victims have been responsible for taking care of themselves during moments of flooding and therefore consider these key stakeholders as 'not important' to them during flooding.

With reference to Table 7.2, the respondents ranked the assemblymen as 'most important' by 8.5% (n=8) of the respondents, 'important' by 3.2% (n=3) of them, 'slightly important' by another 8.5% (n=8) of the respondents. Those who ranked assemblymen as 'not important' formed 28.7% (where n=27), which form a high proportion compared to those

that ranked Assemblymen as important of one kind or the other (20.2% where n=19). The non-response for respondents who ranked the assemblymen was 40.4%. This proportion is high compared to those who responded. However, this is far better than other stakeholders that were ranked, suggesting that the Assemblymen were considered to be of importance to the respondents than the other stakeholders. The above notwithstanding, the contribution of Assemblymen to flood management in the various communities has been largely rated as 'not important' within five out of the seven communities studied. These include Deduako 19% (n = 31), Breman East at 56% (n = 9), Asabi at 50% (n = 10), Dote at about 38% (n = 12), and Ahinsan at 58% (n = 12). The two communities, Old Tafo and Kwadaso, have respectively rated the contribution of the Assemblymen as 'most important' (13%, n = 23), with a non-response of about 74% and 'least important' (about 100%, n = 1). Evidence of Assemblymen's contribution being ranked 'most important' exists within some communities, though the results appeared marginal. These communities included Deduako (about 7%), Old Tafo (13%), Asabi (10%), Dote (about 13%), and Ahinsan (8%).

The contribution of family members to flood management was largely cited in four communities as 'not important'. These included Deduako (about 26%, n = 31), Breman East (about 56%, n = 9), Dote (75%, n = 8), and Ahinsan (68%, n = 12). The other three communities in which family members' contribution to flood management played important roles were Old Tafo (with 4% ranked as 'important', about 9% as 'least important', and 4% as 'slightly important'), Kwadaso (100% as 'slightly important'), and Asabi (10% as 'important', 40% as 'least important', 10% as 'most important', and 10% as 'slightly important'). To conclude, the respondents in each of the seven communities had different perceptions about the stakeholders/institutions that are concerned about flood management based on the responsiveness of these stakeholders towards flood victims. Generally, however, the data show that many of the respondents were not pleased with the stakeholders and they did not find them to be important to them when it comes to providing them with the needed support during flood as well as in flood management.

Table 7.2: Importance of Key Stakeholders/Institutions and their Contributions to Flood Management per Community

NADMO		N/R	Important	Not Important	Slightly Important	Total
Communities	Deduako	18	6	7	0	31
	% within Communities	58.1%	19.4%	22.6%	0.0%	100.0%
	Old Tafo	16	5	2	0	23
	% within Communities	69.6%	21.7%	8.7%	0.0%	100.0%
	Breman East	3	0	6	0	9
	% within Communities	33.3%	0.0%	66.7%	0.0%	100.0%
	Kwadaso	0	0	1	0	1
	% within Communities	0.0%	0.0%	100.0%	0.0%	100.0%
	Asabi	0	1	7	2	10
	% within Communities	0.0%	10.0%	70.0%	20.0%	100.0%
	Dote	0	2	5	1	8
	% within Communities	0.0%	25.0%	62.5%	12.5%	100.0%
	Ahinsan	0	2	10	0	12
	% within Communities	0.0%	16.7%	83.3%	0.0%	100.0%
Total	37	16	38	3	94	
% within Communities	39.4%	17.0%	40.4%	3.2%	100.0%	

Chief/Queen mother/Community Opinion leaders		N/R	Important	Least Important	Not Important	Slightly Important	Total
Deduako	Count	18	0	0	13	0	31
	% within Communities	58.1%	0.0%	0.0%	41.9%	0.0%	100.0%
Old Tafo	Count	17	1	1	3	1	23
	% within Communities	73.9%	4.3%	4.3%	13.0%	4.3%	100.0%
Bremam East	Count	3	0	0	6	0	9
	% within Communities	33.3%	0.0%	0.0%	66.7%	0.0%	100.0%
Kwadaso	Count	0	0	0	1	0	1
	% within Communities	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Asabi	Count	0	0	0	9	1	10
	% within Communities	0.0%	0.0%	0.0%	90.0%	10.0%	100.0%
Dote	Count	1	0	1	5	1	8
	% within Communities	12.5%	0.0%	12.5%	62.5%	12.5%	100.0%
Ahinsan	Count	0	0	0	12	0	12
	% within Communities	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
Total	Count	39	1	2	49	3	94
	% within Communities	41.5%	1.1%	2.1%	52.1%	3.2%	100.0%

Assemblyman		N/R	Important	Least Important	Most Important	Not Important	Slightly Important	Total
Deduako	Count	18	1	3	2	6	1	31
	% within Communities	58.1%	3.2%	9.7%	6.5%	19.4%	3.2%	100.0%
Old Tafo	Count	17	0	2	3	1	0	23
	% within Communities	73.9%	0.0%	8.7%	13.0%	4.3%	0.0%	100.0%
Bremam East	Count	3	0	0	0	5	1	9
	% within Communities	33.3%	0.0%	0.0%	0.0%	55.6%	11.1%	100.0%
Kwadaso	Count	0	0	1	0	0	0	1
	% within Communities	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
Asabi	Count	0	0	1	1	5	3	10
	% within Communities	0.0%	0.0%	10.0%	10.0%	50.0%	30.0%	100.0%
Dote	Count	0	1	2	1	3	1	8
	% within Communities	0.0%	12.5%	25.0%	12.5%	37.5%	12.5%	100.0%
Ahinsan	Count	0	1	1	1	7	2	12
	% within Communities	0.0%	8.3%	8.3%	8.3%	58.3%	16.7%	100.0%
Total	Count	38	3	10	8	27	8	94
	% within Communities	40.4%	3.2%	10.6%	8.5%	28.7%	8.5%	100.0%

Family member		N/R	Important	Least Important	Most Important	Not Important	Slightly Important	Total
Communities	Deduako	Count	0	2	1	8	1	31
		% within Communities	0.0%	6.5%	3.2%	25.8%	3.2%	100.0%
Old Tafo	Count	17	1	2	0	2	1	23
		% within Communities	4.3%	8.7%	0.0%	8.7%	4.3%	100.0%
Breman East	Count	3	0	0	0	5	1	9
		% within Communities	0.0%	0.0%	0.0%	55.6%	11.1%	100.0%
Kwadaso	Count	0	0	0	0	0	1	1
		% within Communities	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Asabi	Count	0	1	4	1	3	1	10
		% within Communities	0.0%	40.0%	10.0%	30.0%	10.0%	100.0%
Dote	Count	0	0	1	0	6	1	8
		% within Communities	0.0%	12.5%	0.0%	75.0%	12.5%	100.0%
Ahinsan	Count	0	1	2	1	8	0	12
		% within Communities	0.0%	16.7%	8.3%	66.7%	0.0%	100.0%
Total	Count	39	3	11	3	32	6	94
		% within Communities	3.2%	11.7%	3.2%	34.0%	6.4%	100.0%

N/R: non-response

Source: Field Survey, 2022

CHAPTER EIGHT: DISCUSSIONS, RECOMMENDATIONS AND CONCLUSION

8.1 Introduction

This chapter presents the discussions following the presentation of the findings of the research, lessons and draws some conclusions from the work. The chapter also presents some recommendations based on the findings. Broadly, the research sets out to understand the motivation for the development of flood lands in Kumasi and whether residents of such lands have the skills to manage such spaces efficiently to minimize the risk associated with living there. Based on the above, the objectives of the research were as follows:

- To determine the category of people who acquire land in flood-prone areas of urban settlements.
- To establish the reasons for people acquiring and living on flood-risk lands.
- To ascertain the awareness of people about the risk associated with living on flood-risk lands.
- To know the preparedness of individuals living on flood-prone lands to manage the risks associated with living on such lands.
- To identify the stakeholders/institutions responsible for providing support and prepare the people for such risks.
- To make recommendations to minimize the effects of the flood and the risks so as to improve the lives of people living in flood-prone communities.

The research was carried out in seven communities where flooding is severest in seven MMDAs in Greater Kumasi. The MMDAs provided input and guidance in the selection of the communities for the research. The research brought together key stakeholders including the respondents from the flood-prone communities. The research team employed mixed research methods covering qualitative and quantitative methods for data collection. These included household survey, key informant interviews, focus group discussions and observation for the primary data collection. There was a desk study to understand the nexus between land management and flooding which constituted secondary data.

The MMDAs provided input and guidance in the selection of the communities for the research

The research team trained ten enumerators in data collection using KOBO Collect software. The survey was conducted during working hours and on working days (from Monday to Friday until it was completed) and it covered men and women household heads who were available in their homes during the period of interview. The research team took into account ethical concerns throughout the duration of the research, particularly during the process of data collection. The KNUST Ethics Policy (2018) was used as the reference for the ethical concerns.

8.2 Discussions and Key Findings

8.2.1 Study Communities

The research communities were Deduako in the Oforikrom Municipal Assembly, Asabi in Asokore Mampong Municipal Assembly, Turba in the Kumasi Metropolitan Assembly, Adompom in Tafo District Assembly, Breman East in the Suame District Assembly, Kwadaso East in the Kwadaso District Assembly and Ahinsan/Kuwait in the Atonsu District Assembly. The communities vary in terms of their physical development over the years. One commonality with all of these communities is that they are located in low-lying areas with streams and tributaries passing through them. All the streams, it was noted, were being used for refuse disposal and in Adompom, a toilet had been constructed in the waterway with the sewerage directed into the stream. The stream in the community is now contaminated with faecal matter. Residents who had lived there for over a decade said the stream in the community at the time they moved there was so clean that they could use it for washing and drinking.

The flood map of Kumasi shows that flooding now occurs all over Kumasi compared to what residents experienced and knew about a decade ago or more, and it affects all income and social groups. According to some of the respondents, they would not have acquired the land they have built on if they knew

ten years ago that the area was liable to flood. Other communities in Kumasi that have been identified as flood prone are as follows;

- | | |
|-------------------------------|------------------|
| • Oforikrom (Anloga Junction) | • Parkuo |
| • Asawase | • Apemso |
| • Atonsu | • Adiebeba |
| • TUC | • Pankrono |
| • Aboabo | • Gyenyase |
| • Moshie Zongo | • Akroem |
| • Sepe Buokrom | • Kwadaso Estate |
| • Deduako | • Dompouse |
| • Krofofrom | • Amanfrom |
| • Dakodwom | • Ahodwo |

The Ahinsan/Kuwait community in the Asokwa District Assembly is one of the oldest townships in Kumasi that has been in existence for several decades and exhibits the traditional building types like the compound houses and never experienced flooding all these years until about a decade ago. Many of the original owners of the properties at Ahinsan/Kuwait have passed away and the heirs of these properties are those responsible for the houses as the new owners at the time of the survey. The ownership of these properties has therefore changed over the years. The new ownership has implication for the maintenance of the houses when there is flooding. While Ahinsan/Kuwait community exhibits old traditional building types, fairly newly developed communities such as Deduako which are experiencing flooding, exhibits features of more recent housing types and where all income groups are residing. The lifestyles of residents at Deduako covers that of the lowest to the highest levels of income groups. The building types also reflect socio-economic status of the respondents, not only for those at Deduako, but in all the seven communities. The above presupposes that flood lands are being developed and occupied by all social classes of individuals, and also by both migrants and indigenes of the localities in the city of

Kumasi. Depending on the severity and frequency of the floods, landlords feel reluctant to keep maintaining their houses which gets destroyed again once the next flood comes. This has also shifted the responsibility of maintenance of houses/properties to tenants in the seven communities.

Understanding the relationship between land management and flooding is important for developing strategies to reduce the risk of flooding and protect communities as flooding to a large extent depends on how the land is managed, used and controlled. Rapid urbanization resulting in increase in population, haphazard sale of land, haphazard development and disregard for planning and building regulations, are among a number of reasons mentioned for the development of flood lands in urban settlements. Flood-prone communities therefore exhibit both features of formal and informal urban settlements.

8.2.2 Demographic Characteristics of Respondents

A total of 513 men and women were interviewed. About 72% of them were in the age group of 18 to 45 years. About 60% of the respondents were married while about 30% were single. About a quarter of those interviewed have not had any formal education and this is made up of about 18% of women, compared to 6.5% of men. The females were the least educated among the respondents of the flood-prone communities studied. Women however dominated in terms of attainment of basic level education, forming a proportion of 17.3% compared to 10.8% of men. About 10% of the respondents have had various forms of tertiary level education, comprising 3.7% females and 5.9% males. As mentioned earlier, the flood-prone communities are habitats for all categories of socio-economic groups, ranging from low to high-income groups and social classes and so it is not surprising the respondents are made up of those with tertiary level of education as well as those without any form of formal education.

Majority of the respondents (46.2%) originated from outside the Ashanti Region but within Ghana and 28.7% originated from the Ashanti Region but outside Kumasi. The above suggests that about 75% of the residents in the flood-prone communities were non-indigenes but from Ghana. The research also revealed that 65% of the respondents were tenants with the remaining and 35% being landlords. Slightly more than half of the respondents (57%) had between 3 to 6 household members. Most of them (46.2%) had lived in the communities between 11 to 20 years. About 27% of them had lived there between 6 to 10 years and 33% of them had lived there between one to five years. About 16.3% of the respondents from outside Ashanti Region, comprising 16.3% of the respondents, have lived there for at least 5 years continuously.

About 70% of the respondents were employed mainly in the informal sector as service providers in the case of the males and as petty traders engaged in petty commercial activities in the case of the women. About a third of those interviewed (30%) were unemployed. Only about 11% of the respondents were engaged in secondary occupation. About 61% of those employed earned daily income from their jobs, 9.3% of them earned weekly income and 21.5% earned monthly income. A few also earned seasonal incomes from seasonal jobs. It was noted from the research that majority of the respondents were women, majority of who worked in the informal sector. This presupposes that the level of vulnerability for women living in such places in the city would be high because they are responsible for other financial obligations. Most of the female tenants indicated they are responsible for the maintenance of their homes after each flood, which is an additional cost they have to bear. Flooding also comes with other risk factors that the residents have to go through.

8.2.3 Category and Status of Residents in Flood-Prone Communities in Kumasi

The study shows that all income groups in Ghana are free to acquire land in flood-prone communities. The effect of flooding is however the same for both the rich and the poor, although it impacts them differentially and the coping strategies for the various groups vary. The rich find it easy to relocate when there is flooding in the community while vulnerable groups are unable to easily relocate. Going by the data available, females were the main victims of flooding in the communities studied as they constitute slightly more than half of the people (58.5%) interviewed confirming what is in literature that women are the most affected victims of flood incidences, which leave them more vulnerable than before (UN-HABITAT, 2012). Mothers with children, especially nursing mothers, were hit harder anytime there was flooding because there was always the issue with how to manage in the floods with babies/children.

Young individuals formed the majority of residents living in the flood-prone communities. The youth reside in flood-prone areas where the rent was cheaper and affordable to them although some of them were very much aware of the poor environmental conditions of these communities. Flood lands and properties provide cheaper accommodation for migrants. The data collected indicate that 18 to 45 years age cohorts were the main residents in the flood-prone communities. Given the scarcity of land in urban settlement of Kumasi and more so in the heart of the city where the jobs are located, it is more likely that young and up-coming individuals and families would settle in flood-prone communities. Prospective developers in urban settlements in their prime ages are more likely to find land only at the fringes of the prime land because they are unable to afford the high cost of the prime land. There is evidence in some of the communities confirming the above, where in communities like Deduako and Abompom, housing development is

still ongoing and new housing structures are coming up despite the destructions that come with flooding in these communities.

The research shows that some of the residents particularly those in low-income groups were aware their settlements were prone to flooding and their lives could be at risk but they could not relocate in the absence of any other alternative as a result of their vulnerability. They lived there with the hope of being able to find ways of managing the flood when it occurred. Building resilience to be able to survive in the flood prone communities was therefore critical for the vulnerable groups. According to the private estate developers interviewed, some of these vulnerable groups were those who at one time or the other lost their land through multiple sales and had to accept the flood-prone areas in compensation for what they lost. Apart from affordability, the multiple sales of land by chiefs and landlords push the poor into less prime areas and with the ever-increasing population in the urban centres, coupled with the high demand for land in urban settlements, individuals end up accepting the flood lands. Where they make the attempt to buy land, paying for it in bulk becomes a problem and with time they lose their land to others who are able to pay even double more than for the same piece of land. Consequently, the respondents end up accepting any alternative land that the chiefs offer. These offers often tend to be non-prime pieces of land. It is not surprising therefore that the flood communities have many more young people than aged. The GLSS (2017) notes that there is more movement to urban settlements than rural areas.

In addressing objective 1 that aimed at finding out the category of people who acquire land in the flood-prone communities and what motivated them to do so when such places are risky for human habitation, the research revealed that all manner of persons acquire land/settle in flood-prone communities due to a number of factors as mentioned above. Despite the above, vulnerable groups and migrants dominate in the flood-prone communities studied.

The findings show that more vulnerable groups are likely to be pushed to the fringes of urban settlements but with the effect of climate change, settling in flood-prone communities could now be very risky. Living on flood-prone land is a risk that is likely to further impoverish the vulnerable with the frequent occurrences of flooding which is accompanied with loss of properties.

8.2.4 Factors Motivating Individuals to Acquire Land in Flood-Prone Areas

In addressing objective 2, which sought to understand the motive behind the acquisition of land in flood-prone areas, the research identified a number of them, with the main reason being affordability, as mentioned above. The study noted that many low-income earners prefer to acquire land in such places because it is less expensive. Other factors mentioned include: proximity to the central business district and services, security and social factors such as social networks. Some landlords deliberately choose to acquire flood lands because they are of the conviction that apart from the land being less expensive, they could manage with the flood situation. This has however been proven to be false as many of them are unable to manage the situation due to the lack of know-how. The research has noted that the technical expertise needed to provide shelter in such communities to make them resilient and safe for habitation are limited and very expensive for the vulnerable to access.

Some of the residents indicated that the presence of sand pits in most flood-prone communities is considered as an attraction for construction, and therefore an added benefit for acquiring land in the flood-prone area. Thus, sand weaning though illegal, is one of the informal economic activities the people engage in in the flood-prone communities as was observed at Tuba. The sand pits are created as the flood water washes away the sand from higher grounds to downstream areas where the

sand is deposited in large quantities over time and therefore creating sand pits. The sand is used for housing construction, thus making it cheaper for those building houses there to get sand at probably no cost where the sand weaning is done by oneself. Weaning sand from flood lands however, has its negative effects as it exposes the land to further erosion and severe flooding.

8.2.5 Level of Awareness about Impact of Flood and Flood Management

In response to objective 3 of the research, the results showed that about half of the residents were aware of the risks associated with living in flood-prone communities. The knowledge was acquired from different sources, including from experience by living there (42.2%), school (1.6%) and from training (1.8%). Since many of the respondents have lived in the flood-prone communities for a number of years and had experienced flooding several times, it was not surprising that the majority of them indicated they gained their experience for managing the flood from experiencing it. For a number of them, because they do not have alternative places to move to when the floods come, they have learnt over the years what to do to remain safe. Consequently, the flood victims have adopted various means of coping with the flood; the commonest being the elevating of entrances to their rooms and houses so they can descend into their rooms and houses, and the keeping of personal belongings on very high tables in their rooms. Those who could afford it, built concrete walls around their houses, while others built high foundations. Similarly, those who have toilets in their houses raised the foundations of the toilets very high from the ground to prevent the water from entering (refer to Plate 10), but over time, some of the foundations of these structures get exposed again. While these are coping strategies the residents adopt, it does not necessarily follow that technically, the residents are fully protected from the floods. In summary, it can be deduced from the above

findings that victims of flood are left on their own to solve the flood problems. In terms of objective 3 therefore, the findings indicate that residents in

flood-prone communities are aware of the impact of flooding (risks associated with flooding and adopted strategies that help them to adapt).



Plate 9: Uncompleted abandoned house at Deduako in Stagnant Flood Water, near KNUST



Plate 10: Abandoned Houses After Flood



Plate 11: Adaptions Being made as Coping Strategy - Raised Toilet in a House

8.2.6 Preparedness for Flooding

Dark clouds give residents an indication that it could rain and any form of rain could either be torrential or not. However, in the last ten years when they have experienced different rain patterns, rainfall has been more torrential than ever before. The residents indicated that they watch carefully the weather at all times and begin preparing for the rains when they see the colour of the cloud changing from brightness to darkness. For many of the residents, this has been the main indication they look out for to begin preparing for the rain. Preparing for the rainfall meant putting things that could easily get flooded away by storing them at safe places, such as on the high tables they have made purposely for storage during flooding, or taking them away from the houses to other safe places. They also said they begin creating the path in the compound of their houses to direct the flow of water so that it flows out easily instead of accumulating in the houses. Some of the residents said they create holes in their walls to allow the water to flow out of their houses. Other strategies that those who have been experiencing flooding severally adopted which have been mentioned above included elevating their facilities like the toilets (see Plate 10) and entrances to their rooms as well as having concrete walls. It is important to mention here that no one mentioned listening to the weather forecast which could make life easier for them if they were taken through some training and awareness raising in that. In terms of objective 4 therefore, personal observation of the weather is the main indication that makes the residents begin preparations towards the flood.

8.2.7 Stakeholders and Flood Victims

It was noted that the respondents were reluctant to respond to questions related to which stakeholders/institutions they felt were more important to them in terms of easily accessing them in times of flood and its management, and in providing them with relief or any

other form of support. The non-response rate on the average was about 40%. The stakeholders mentioned that could be contacted to provide support to flood victims are as follows;

- Assemblymen
- Police
- Family
- Religious organizations (churches)
- Unit committee
- Friends
- Traditional authorities
- NADMO

About 29% of the respondents mentioned three of these key stakeholders that they felt could be of help to flood victims. These are unit committee members, religious leaders and NADMO but these stakeholders have not been able to assist flood victims as they do not have the resources to do so. About 17% of the few respondents that answered the question considered NADMO to be an 'important' institution that could be of help to flood victims and could assist with flood management, while 40.4% felt NADMO was 'not important' to them (refer to Table 7.2). The responses varied a lot at the community levels. For example, at Dote, 25% of the respondents rated NADMO as 'important', and 22% of the respondents at Old Tafo also rated NADMO as 'important'. These proportions are slightly higher than the overall average of 17% for all the seven communities put together. What this suggests is that the effects of NADMO is felt more in some communities than others. And so, for those communities that rarely benefit from NADMO, the respondents consider NADMO as 'not important' to them.

The traditional leaders (i.e. chiefs and queen mothers) and community opinion leaders were the lowest ranked stakeholders in terms of providing assistance to flood victims. 52% of the respondents ranked these category of stakeholders as 'not important' to them when it comes to flood management and protecting

flood victims. The question had a non-response rate of 41%, and only 1.1% and 3.2% of the respondents rated them as 'important' and 'slightly important', respectively.

The assemblymen stand out to be the main stakeholder that the flood victims call on in times of flood. This is understandable as the assemblymen are the representatives of the community members³ on the local government and are expected to liaise between the communities and the local government. They are persons who reside in the communities and tend to be the first point of call for the community members, particularly in times of need. It is therefore not surprising that the assemblymen came out as first on the list of stakeholders mentioned above. The above opinion about the assemblymen was however shared by only a third of the respondents who felt the assemblymen were those who provided them with support (material or emotional) in the event of flooding. The assemblymen during the validation workshop lamented that they are unable to assist flood victims financially or in any other form because they do not get that kind of financial support from the local government (the MMDAs) and so whatever they provide to flood victims is from their personal resources or through fund raising, which is not sustainable. The assemblymen complained about the challenges they face in the execution of their functions to the satisfaction of their constituents and the inability of the MMDAs to deal swiftly with physical problems in the communities which they regularly report to them. These make the work of the assemblymen as key stakeholders in the communities very frustrating and presents them as irresponsible leaders in the local communities when in reality and legally, they do not have the mandate to carry out any physical work on their own and also do not have the needed financial support. Some residents in some of the communities said the following about

the assemblymen when they were questioned about which stakeholders assist them most in times of flooding. At Kwadaso, a resident said this about the assemblyman;

"Don't even mention the assemblyman's name to get me angry." (An interviewee, 2022)

Another respondent also made the following comment at Tafo;

"He is always in a car roaming about but is not even doing anything for us so I don't even regard him. Whenever his name is mentioned, the residents start insulting him and divert the issue that is being discussed." (An interviewee, 2022)

Lack of budgetary allocation from the local governments to assist them with their mandates and to help them deal with emergency issues such as flooding in the communities is a major challenge for the assemblymen. All disaster-stricken communities are expected to seek assistance from the National Disaster Management Organization (NADMO), which is also not adequately resourced. The situation also becomes difficult for the assemblymen to explain to the community members. The community members with time and out of frustration, loose trust and hope in the assemblymen who live with the flood victims and see the deplorable and devastating conditions they live in, and the terrible moments they go through during the floods.

Similar to other stakeholders mentioned above, the traditional authorities have not in any way provided any form of support to flood victims and so are of very little or no importance to the flood victims. Consequently, only an insignificant proportion of 2.3% of the residents said they contact traditional leaders when there is flooding. One would have thought since the traditional leaders are the custodians of land, they would be interested in parcels of land under their care where there are problems, irrespective of whether it has been sold out

³ The Assembly Member is the liaison between the District Assembly and the community. He therefore plays a critical role in community development. The Assembly Member participates in the work and activities of the Assembly such as attending meetings and taking part in discussions. One of the roles of the assemblyman is to maintain close contact with the electorate and consult with them on regular basis. They are also to consult them before each Assembly meeting on issues to be discussed in the Assembly. S/he is to collate views, opinions and proposals on matters affecting the district and present the issues to the Assembly.

or not. One of the findings of this research however shows that some chiefs connive with some of the planning officers to rezone and sell flood-prone lands or areas not suitable for development and when they do so the planners are given some of the parcels of land as gifts to sell out. Additionally, the findings show that the planning officers who as a matter of principle refuse to collaborate with the traditional leaders to rezone areas they are interested in are transferred to other towns. The chiefs use their positions to get the planners transferred. The above suggests that the traditional leaders to some extent contribute to the development of flood lands in urban settlements so come across as unconcerned about the dangers associated with such practices. Based on the above therefore, a large proportion (about 82%) of the respondents indicated that the traditional leaders are of no importance to them. Flood victims' perception about the police is similar to that of the traditional leaders. They said the police are of very little importance to them, even worse than the traditional leaders. An insignificant proportion of 1.6% of the residents said they contacted the police in times of flooding,

The research revealed that the MMDAs rarely understand flood victims as they consider the flood victims as a nuisance, living at/occupying illegal places and not law abiding. Persons living on flood lands are perceived to be people inviting trouble for themselves, and hence deserve to go through the punishment from nature. This perception of some of the MMDAs is often due certain anti-social and negative behaviours some of the residents of flood-prone communities put up. The research showed that they deliberately build houses in the flood-prone areas without building permit, they throw garbage in water bodies and disregard regulations of the MMDAs, they construct toilets on waterways, among others. Flood victims therefore lack the confidence to approach the institutions for support to mitigate the effects of flooding.

Another finding from the research is the inability of stakeholders to perform their duties effectively due to resource constraints and several institutional weaknesses beyond the control of the staff. This is because they have limited resources at their disposal to work with. For example, there is limited skilled personnel. The engineers and physical planners are expected to be moving around to inspect developments in their MMDAs but they do not have needed resources such as vehicles to make this possible. Where the vehicles are available, they are too old to use for such inspection work, or the assembly is unable to fuel them. The staff of the MMDAs are very much aware of the physical developments that need to be carried out in the flood-prone communities such as dredging, or expansion of narrow drains to contain the large volume of water overflows, but where the assembly is unable to provide resources to get this done, the staff becomes handicapped. Thus, inadequate resources at the local government to a large extent also makes it impossible for the staff to carry out their mandate effectively. This has, to a large extent, contributed to the poor physical state of the communities. In summary therefore and in addressing Objective 5, the respondents are dissatisfied with the kind of support they receive from all the stakeholders and see most of them as either of 'least important' or 'not important' to their existence in the flood-prone communities. This raises a major concern with regards to flood management and provision of support for such flood victims. The problem of flooding is going to be exacerbated with increased rural-urban drift, coupled with intensity of the effects of climate change on these communities. Consequently, there is the need for teamwork; an improved collaboration between the stakeholders and the flood victims to provide a better solution to the flood victims if they would have to continue living in such communities. Also, the MMDAs have to make available some dedicated fund which they can fall on in times of flooding. NADMO also need to be adequately resourced to make it possible for them to carry out their mandates.

8.3 Recommendations and Conclusion

8.3.1 Recommendations

Based on the above discussions, this section presents recommendations the research team came up with. Having gone through the research, it is obvious that managing issues related to flooding involves a number of stakeholders that have different roles to play at different times to avoid the risk and the devastating emotional and psychological stress associated with flooding.

i) Local Government

The MMDAs studied are aware of the recent and intensified menace of the flooding situation in the city of Greater Kumasi and have mapped out all the flood-prone communities, knowing the communities which are least affected by floods and the worst affected. This provides very good information for planning purposes and for any intervention. It is the responsibility of the local government to ensure that adequate drains are provided in these communities as well as others to contain the overflows during flooding. This is important because the original drains provided decades ago have outlived their usefulness as population and development have since been on the increase and thus, making it difficult for the existing drains to contain the volume of runoff waters that pass through them.

The local government have to reconsider the roles and functions of the assemblymen and unit committee members who are closest to the community members but are not supported with resources to enable them serve the needs of the community members better. To be effective to deliver mandates requires availability of resources. Thus, it is important for the local government budget to be revisited if they are to perform their functions efficiently. Presently, more lip service is being paid to the issues of local governments in general and in particular, to issues related to flooding in the urban settlements than ensuring that resources are made available to carry out planned actions. There is also the need for the

local governments to improve on their monitoring system to make it more robust to track performance at all levels. Further, ensuring regulations are adhered to is critical for the reduction of the negative effects of flooding. This implies that the law enforcement agencies have to be more active and efficient in rendering services.

ii) Physical Planning Officers

Every MMDAs has physical planning officers that are responsible for the physical development of the MMDAs. They are by law mandated to ensure the physical development of the assemblies. The findings of the research show that some of them are handicapped in carrying out their responsibilities as mentioned above. Some residents connive with people in higher authorities to frustrate the efforts of the officials. The physical planning officers need to be backed by law enforcement agencies to facilitate their work. They have the responsibility to ensure that laws and regulations are enforced to the letter. For example, it is their responsibility to ensure that building permits are acquired before development takes place. Those who develop unauthorized land in water ways illegally should be made to face the law so that they serve as deterrent for others. The by-laws should also be made known to the community members in advance through education. For the behaviour of the residents, attitudinal issues appeared to be dominant negative factors, suggesting that they need education on the implication of some of their actions.

iii) Building Construction in Flood-Prone Communities

One of the issues that came up was the disregard for building regulations. Both tenants and landlords would prefer to go into construction without any building permit in the flood-prone areas, which even those working on prime lands do. The physical planning officers mentioned that illegal developers would prefer to construct their buildings either at weekends or at night to avoid being stopped by the authorities. This finding, in addition to the need to provide the residents with coping skills, call for a review of development and construction practices

in urban settlements of Ghana, taking into account the effects of climate change. With the recent turn of events in the Kumasi Metropolis, it has become important for physical planning officers and other city authorities to consider all flood-prone areas as risky for habitation and provide measures to address the problem in a holistic manner. The review should also take into account aspects of building codes/regulations that are deficient in terms of having flood resilience construction guidelines. The building code/regulations should be improved to regulate construction activities in flood-prone areas. Evidence has shown that globally this is what is being done now in view of the fact that climate change is global and the effects are similar (Simpeh et al., 2023).

The development of effective approaches, such as a framework for assessing flood resilience in buildings is critical; this can be used in the design and construction of flood-resilient buildings. The World Bank made some recommendations to improve flood-resistant construction (World Bank & GFDRR, 2015), including effective land use and land governance systems; enhancement of legislative foundations for effective building code regulatory regimes at the national level; focusing on creating building standards appropriate to the poor and vulnerable; clear specifications of building code design and building standards of construction, and ensuring an effective and efficient building code administration and institutional capacity. As mentioned above, the city authorities should also enforce the acquisition of building permits before any construction takes place.

To drive the process, various institutions and actors, including but not limited to the construction industry, NADMO, the Environmental Protection Agency (EPA), the Land Use and Spatial Planning Authority (LUSPA), the Ministry of Sanitation and Water Resources, and the National Fire Service must collaborate and work together as a team. This should be coordinated at the national level by incorporating governmental development planning efforts to identify and improve institutions, regulatory systems, and structures that will support adaptation efforts (Simpeh et al., 2023).

iv) Education/Training

Education and awareness creation about flooding, flood management and flood resilience could take different forms and involve different stakeholders since flooding affects everyone directly or indirectly and differentially, and therefore it is of concern to everyone. Knowledge about flooding should be a must for all in urban dwellers. Training in all forms is required for both the victims and stakeholders so that each of these groups may know what is expected of them during flooding in terms of preparedness and prevention. The media is one important stakeholder that can assist with education using the local languages. NADMO, the local governments, as well as the other stakeholders can make use of the media to educate the public on flood management. This is necessary by bearing in mind the limited resources of NADMO and the MMDAs, which does not make it possible for them to reach out to many flood victims in terms of education/awareness creation and provision of material support for affected persons.

There is the need for other stakeholders, such as those in the health sector, to provide regular training/education for all communities located in flood-prone areas to create the awareness about the risks that comes with living in such places and how they could cope. Many of these residents are ignorant about the implications of some of their actions and therefore take things for granted. For example, some are of the view that they can locate toilets in water ways to allow the runoffs to wash away the faecal matter. Another view the flood communities hold is that their garbage can be carried away with a swift runoff water and so when the rain starts, they dump all their garbage in the waterways, including damaged television sets, fridges and many more. Residents of flood-prone communities need skills that can make them cope with the flood. A simple education on listening to the weather forecast regularly could go a long way to guide the residents as to when to expect the rains. Another negative practice noted in the flood-prone communities is sand weaning. This helps to degrade the land more and increases the volume of runoff water that leads to flooding.

vi) Collaboration among Stakeholder Institutions

There is the need for collaboration to be nurtured among all stakeholders involved in issues related to land and flooding. Although some of them, during the key informant interviews, indicated that there is a good collaboration amongst them, it appears the effect of this collaboration is not being felt much. The collaborators include all stakeholders from the MMDAs, land agencies, the health sector, media, education sector, traditional leaders (the chiefs), the law enforcement agencies, NADMO and many more if the issues related to flood are to be addressed holistically. Part of the haphazard development along river banks and in flood-prone areas are due to this lack of collaboration among the stakeholders to work as a team to combat the problem. It is the responsibility of the local governments therefore to ensure this happens and they should be in the forefront for that (see also 8.3.1 (iii)). The media was mentioned above as one of the critical stakeholders that can collaborate with all the above stakeholders in the dissemination of information related to flooding.

8.3.2 Conclusion

The research set out to address five objectives. The findings provided answers to these five objectives which were presented in the findings of the study and discussed. The research, which was carried out in seven flood-prone communities in Kumasi, using both qualitative and quantitative methods has revealed that with the effects of climate change getting worse every day, coupled with rapid urbanization that goes with exponential rate of population growth in the urban settlements in particular, flooding will continue to occur as physical developments are also on the increase. The study has affirmed that land is a critical resource for development and without it the situation for vulnerable groups without land, many of who are women, could become worse. However, land management is particularly necessary when rapid population growth, urbanization and climate change are altering planning of urban settlements. Urbanization suggests more land will be needed for development as population grows but the research has shown that those that are vulnerable are likely

to acquire the non-prime lands such as flood-prone lands. The majority of the residents in the flood-prone communities were the youth, women and migrants, most of who work in the informal sector and therefore incomes are averagely low for this category of people. These are all considered as vulnerable groups. However, the land market in Ghana does not favour the vulnerable who may end up living in very deplorable environments, including the flood lands. The hazard map of the Kumasi Metropolitan Assembly and its MMDAs shows that almost all the communities in Kumasi are now prone to flood, particularly those along the two major rivers that run through Kumasi—Subin and Oda Rivers. The seven communities studied are however the severest flood-prone communities in the city. Ghanaian Migrants occupy such places, with some of them having temporary and wooden structures as homes (see Plates 1), thereby creating slum settlements. The research output showed that a number of reasons were mentioned as to why individuals would acquire land in flood-prone areas, with the main reason being affordability and the urge to live close to the city.

The research results further showed that flooding could be highly traumatic for individuals and communities in particular where it involves loss of properties for the vulnerable. Flooding could also lead to serious injuries. Having lived in the flood-prone communities for years, the residents have adopted various forms of coping strategies based on their experiences over the years. The available local government stakeholders/institutions provide very minimal support in terms of resources and training for the flood victims. Consequently, the victims rarely depend on the state institutions and the other stakeholders to provide them with any form of support, particularly material support to cushion them a bit when the flood destroys their properties. The assemblymen however remain the last resort they fall on in times of flooding, and family members living outside the flood communities.

The research has shown that flooding has social, political and economic dimensions and therefore has consequences for individuals and communities. These can create financial, social, psychological burdens and physical trauma. The effects of flooding in these areas are enormous, cutting across several sectors of life. As

part of the social implications, families for example, get separated as a result of dislocation and relocation. School children for example, are compelled to take undeserved breaks from school for security reasons. Psychologically, parents are always anxious to know when and whether the rains are coming or not as that becomes the signal of flooding depending on the intensity. Inability to observe the clouds could lead to a disaster. In the case of economic dimension for example, economic activities get disrupted, perishable goods get spoilt and capital is lost. All these make residents in the flood-prone communities live in perpetual fear that there could be flooding again and at any time.

It could be concluded that the cost involved in acquiring land in flood-prone communities could be higher than the benefits, particularly for vulnerable groups who cannot afford technical expertise to make the place liveable. As long as urbanization and urban migration continue, the vulnerable will continue to seek shelter in less expensive and affordable communities which include low lying lands/communities in urban settlements. Such people will therefore require knowledge to cope with the situation when flood occurs. The planning authorities would also have to scale up their responsibilities towards these vulnerable groups to ensure that regulations are enforced to minimize the risk that comes with flooding.

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