

**AN ANALYSIS OF URBAN RESILIENCE IN SELECTED COMMUNITIES  
IN KUMASI AND ITS ENVIRONS**

**KNUST**

**BY**

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**DECLARATION**

I hereby declare that this submission is my own work towards the Master of Science Degree and that, to best of my knowledge it contains no materials previously published by another person nor material which has been presented for the award of any degree, except where due acknowledgement has been made in the text.

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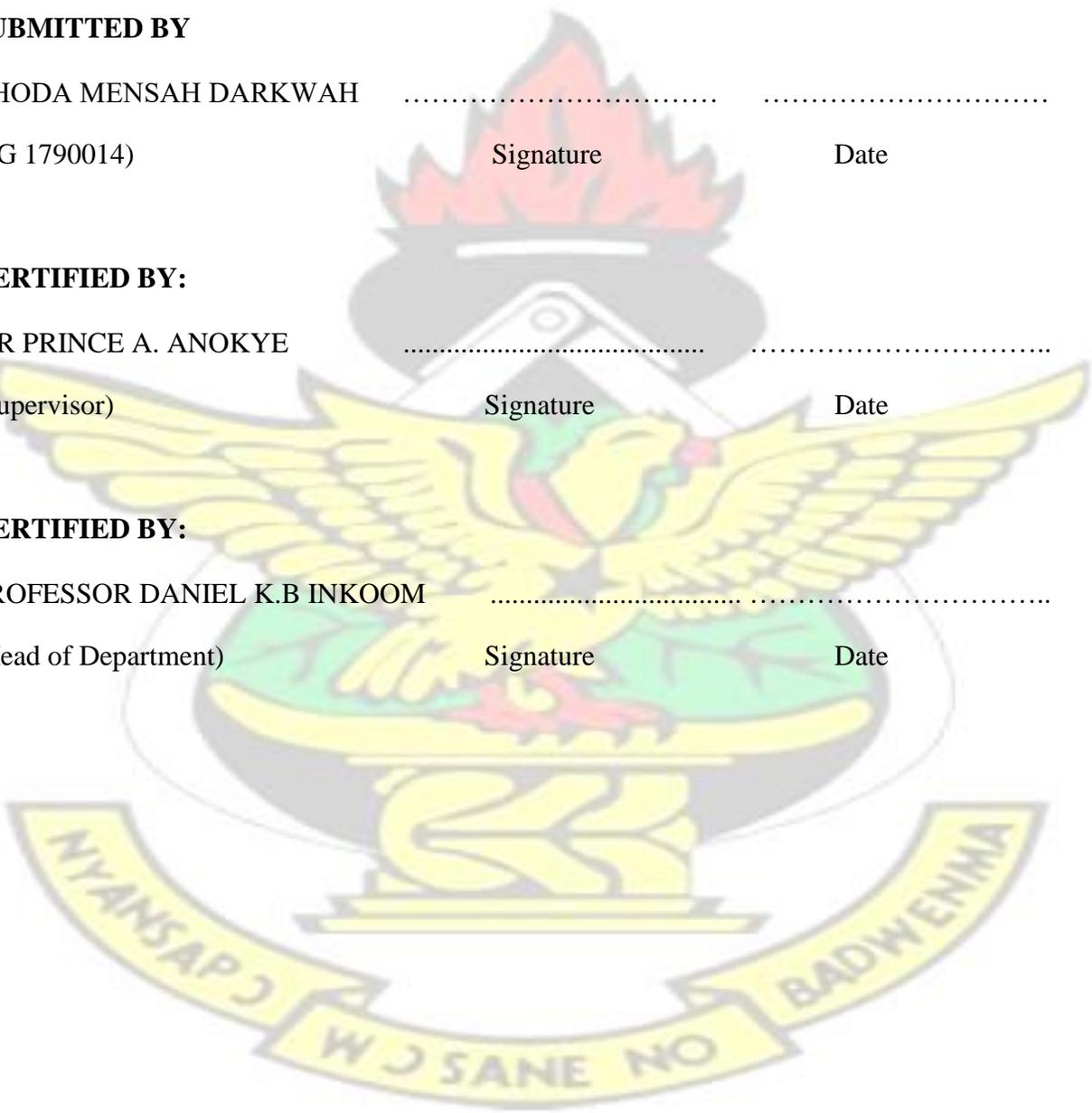
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## **ABSTRACT**

Climate change and rapid urbanisation remain two emerging global threats with widespread implications for poor countries. Yet, despite attempts to address these challenges by governments and international agencies, they remain unabated. Urban resilience concept has been identified as having the potential to ameliorate these challenges. Regardless of this potential, the contribution of urban resilience to sustainable urban environments remains a distant reality in areas most vulnerable to the impacts of these global threats. Understanding of the application of the resilience concept to urban development and its outcomes are limited in Ghana. This study fills this gap by focusing on: the extent of climate change in Kumasi; major urbanisation challenges in Kumasi; local understanding of urban resilience; and efforts towards urban resilience.

This research is based on the mixed methods approach, using three case study communities in Kumasi. Using semi-structured interviews, qualitative data were collected from institutional representatives of urban planning-related institutions from January-February 2016. Also, quantitative and qualitative data were collected during the same period from 375 households across the three case study communities; Asawase, Ahinsan Estate and Sisaakyi.

The findings indicated that although climate change is a global issue, the impacts are widespread in the case study communities. There is evidence of rising temperature and unpredictable rainfall pattern in Kumasi, resulting in flooding and destruction of natural areas. Complicating matters further are the impacts of rapid urbanisation, including poor sanitation conditions and inadequate social services and facilities. However, these findings vary considerably from one case study to another with poor communities such as Sisaakyi and Asawase most vulnerable. Unfortunately, despite these challenges, there is limited understanding of the urban resilience concept in Kumasi,

amongst urban planning-related institutions and local communities. As a consequence, while there is limited evidence of the implementation of the urban resilience tenets, institutional initiatives towards achieving urban resilience are uncoordinated and incomprehensive.

This study suggests a need for urban resilience policy to coordinate initiatives towards creating resilient Kumasi. The study further proposes the integration of public awareness on urban resilience in urban development effort. Lastly, the study recommends the exploration of the potential of institutional coordination to ensure harmonisation of efforts towards urban resilience.



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## ACRONYMS

DUR	Department of Urban Roads
EIB	European Investment Bank
EPA	Environmental Protection Agency
FIG	International Federation of Surveyors
GMeT	Ghana Meteorological Agency
GSS	Ghana Statistical Service
ICEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
KMA	Kumasi Metropolitan Assembly
MMDAs	Metropolitan, Municipal and District Assemblies
NADMO	National Disaster Management Organisation

NGO	Non-Governmental Organisations
SEI	Stockholm Environment Institute
SPSS	Statistical Product and Service Solution
TCPD	Town and Country Planning Department
ULI	Urban Land Institute
UN	United Nations
UNEP	United Nations Environment Programme
UNDESA/PD	United Nations Department of Economic and Social Affairs/Population Division
UNDP	United Nations Development Programme
UNHABIAT	United Nations Human Settlement programme
UNISDR	United Nations Office for Disaster and Risk Reduction



## CHAPTER ONE

### OVERVIEW OF THE CONCEPT OF RESILIENCE IN URBAN PLANNING

#### 1.1 Introduction

Emerging global threats, particularly climate change and rapid urbanisation, are increasingly threatening the future of cities particularly in developing countries (Intergovernmental Panel on Climate Change [IPCC], 2013). For some (e.g., Cobbinah & Anane, 2015; IPCC, 2013), ongoing and future impacts of climate change are predicted to make human survival and natural systems uncertain and difficult with developing countries being the most vulnerable due to their reliance on climate-dependent sectors (e.g., hydro-electricity, rain-fed agriculture). Others (e.g., Cobbinah et al., 2015; United Nations Department of Economic and Social Affairs/Population Division [UNDESA/PD], 2012) have identified rapid urbanisation as a socio-economic threat in developing countries. For example, urbanisation level in Africa, according to Cobbinah et al. (2015), is alarmingly high with official statistics estimating it to reach about 58% in 2050, which implies that Africa would be home to nearly quarter (1.3 billion) of the global urban population (see UNDESA/PD, 2012). Alternatively, studies (e.g., Stockholm Environment Institute [SEI], 2008; United Nations [UN], 2008) suggest that climate change is already impacting on the socioeconomic functionality and human survival in developing countries. SEI (2008), for instance, reports of widespread changing weather patterns in Africa which have resulted in stresses such as increased competition over resources and destruction of biodiversity.

Efforts to address and adapt to these global challenges have become urgent, tenable, and ever pressing in recent years (IPCC, 2013; UNDESA/PD, 2012). The notion of resilience has emerged over the past three to four decades, and is increasingly promoted by international organisations, researchers and non-governmental organisations as a strategy to respond and adapt to these global challenges (Beatley & Newman, 2013; Darkwah & Cobbinah, 2014; Pickett et al., 2003). Although its origin is strongly grounded in ecological discipline where it was frequently used to describe the capacity of a system to survive and recover from adverse events, and ensure a bounce back into a stable equilibrium state (Liao, 2012; Ove Arup & Partners International Limited, 2014; Pickett et al., 2003; Serre & Barroca, 2013), the concept of resilience is presently applied across multiple disciplines, including urban planning. In the context of urban planning, resilience has

been conceptualised largely in a city-wide context, often tagged ‘urban resilience’ (see Darkwah & Cobbinah, 2014; Godschalk, 2003; Urban Land Institute [ULI], 2010). The concept of urban resilience is thus defined as the capability and preparedness of cities to withstand and respond to severe shock and make necessary adjustments for continuing functioning while its inhabitants strive irrespective of the severity of the shock (Godschalk, 2003; Ove Arup & Partners International Limited, 2014; ULI, 2010).

Many (e.g., ARUP, 2012; ARUP RPA& Siemens, 2013; Cobbinah & Darkwah, 2016; Godschalk, 2003; Prasad et al., 2009; Seeliger & Turok, 2013) consider the notion of urban resilience as conceptually relevant in these changing times, particularly in developing countries where cities are increasingly becoming vulnerable to the upsurge in economic and environmental pressures and instabilities related to globalisation, urbanisation, climate change, poverty and resource depletion. It is true that the world has transitioned from rural past to an urban millennium (Moir et al., 2014; Prasad et al., 2009), with many urban settlements in developing countries located on hazardous and vulnerable sites in relation to climate change and rapid urbanisation (International Federation of Surveyors [FIG], 2010; Prasad et al., 2009). On the other hand, these urban settlements with complex geographical locations, according to some scholars (e.g., Prasad et al., 2009; Wikström, 2013), have the tenacity of possibilities and opportunities of becoming centres of positive change and transformation through new innovations, and resilience. In such situations, it is unsurprising that calls for building resilient urban environments continue to resonate across cities in developing countries. The principles of urban resilience, as discussed in Chapter Two, present an opportunity to turn the challenges of global threats particularly climate change and rapid urbanisation into opportunities and possibilities through effective planning, management and adaptation (Cobbinah & Anane, 2015; Cobbinah et al., 2015). In a variety of ways, it is true that the application of ‘resilience’ in urban planning is quite recent, yet, many (e.g., Cobbinah & Darkwah, 2016; Darkwah & Cobbinah, 2014; Wikström, 2013) regard it as a necessity in the process of safeguarding the interest and wellbeing of cities, its inhabitants and environment in these times of changing climate and growing population.

Worldwide, the importance of urban resilience is rapidly evolving with recent references to its influence in determining investment landscapes. For instance, the most resilient and adaptable cities are attracting investment and private sector organisations, with the European Investment

Bank (EIB) reporting its investments only in projects in cities which are deemed, among others, resilient with strong city governance and has a high market trust among investors and businesses (ULI, 2010). Research evidence indicates that many developed countries' cities are marching towards resiliency by adopting and applying the resilience notion in urban planning practices, including Istanbul (Turkey), Edinburgh (Scotland), Manchester (England), Sydney (Australia) (ULI, 2010), Tokyo (Japan), Singapore, Makati and Albay (Philippines) (Prasad et al., 2009). However, little is known about urban resilience in African cities (United Nations Office for Disaster and Risk Reduction, [UNISDR], 2010), despite the continent being one of the most vulnerable regions in terms of climate change and rapid urbanisation (see Cobbinah & Anane, 2015; Cobbinah et al., 2015). In this sense, research into urban resilience in Ghanaian cities is timely and necessary.

Since mid 20<sup>th</sup> century, Ghana has experienced rapid urban growth, with its urban population increasing from 9% in 1931 to 31.3% in 1984 and 43.8% in 2000 (Naab et al., 2013). By the turn of the first decade of the 21<sup>st</sup> century, the proportion of urban population had sharply increased to 50.9%, with the trend sets to continue in the foreseeable future (see Ghana Statistical Service [GSS], 2012). This is replicated in the growth of all major cities especially Accra – the national capital – and Kumasi, the second largest city. For example, with an annual growth rate of 5.4%, Kumasi is fast urbanising due to its unique centrality as a traversing point to all parts of the country (Cobbinah & Amoako, 2012), and it is rapidly merging into adjoining districts. This new spread is christened Greater Kumasi sub-region (Japan International Cooperation Agency [JICA], 2012). This spread of the urban area, is occurring at various scales (e.g., city-wide, regional and national levels) exemplified by different urban sprawling types: dispersed, nucleated, leapfrog and ribbon developments (Cobbinah & Amoako, 2012). The unguided outward expansion of Kumasi has, in many ways, affected the morphology of the city, causing peri-urban settlements on the city's fringes to alter considerably (Afrane & Amoako, 2011). Many reasons have been proffered for the rapid urbanisation and its associated urban expansion in Kumasi, such as unattractiveness of inner city living due to insanitary conditions, lack of recreational or green areas and basic social services (e.g., sanitation) in many suburbs including Aboabo and Asawasi (Afrane & Amoako, 2011). Others argue that changing housing preference of families, increased automobile ownership and

high cost of land in the city centre are the factors driving the unguided expansion and urbanisation of Kumasi (Adarkwa, 2011; Cobbinah & Amoako, 2012).

This anthropogenic occurrence also has implication on climate change in Kumasi. This, of course, is not to say that rapid and unguided urbanisation is the sole cause of climate change in Kumasi. However, as discussed by Cobbinah and Anane (2015), climate change evident through rising temperatures, floods, droughts and sea level rise, is a global phenomenon with global implications. Thus climate change is occurring with negative socio-economic implications on survival of cities, particularly those in developing countries. It is therefore unsurprising that the IPCC (2007) and UNDESA/PD (2012) consider climate change and rapid urbanisation respectively as two most threatening issues facing the world presently, particularly poor developing countries. In Kumasi, there is widespread evidence of climate change in the form of flooding (Owusu-Ansah, 2015), and rising temperatures (Quagraine, 2011). In such situations, the resilience of Kumasi in relation to adapting to changing climate and managing the consequences of urbanisation becomes increasingly questionable. It is in this regard that this thesis explores urban resilience in Ghana, using Kumasi as a case study.

## **1.2 Problem Statement**

The above analysis suggests that urban development in Kumasi is not resilient in terms of the city's ability to deal with the challenges of rapid urbanisation and climate change. Although the World Bank (2015) reports that urban growth in Ghanaian cities such as Accra has contributed to resilient cities in the area of poverty reduction, its outcome in Kumasi has mostly been negative, revelatory through the destruction and pollution of water bodies, alteration of the natural environment, and conversion of agriculture lands into residential and related uses, increased pressure on social services and high consumption of energy (Adarkwa, 2011). For example, several reserved green belts in Kumasi such as the Aboabo, Atonsu, Subin and Kaase nature reserves have been altered with colonial parks like the Abbey's and Jackson been encroached upon by residential and commercial buildings (Quagraine, 2011).

Per the rate of depletion of the urban landscape in Kumasi, Quagraine (2011) claims it has resulted in rising temperatures and higher air pollution concentration levels in the city. In such situations, it is unsurprising that Kumasi, once the Garden city of West Africa, has lost this accolade

(Quagraine, 2011). Similarly, Owusu-Ansah (2015) reports of climate change related events such as damaging flood events in Kumasi which are caused by among others impervious surface and human occupation in unauthorised locations such as areas liable to flooding. Unfortunately, these phenomena of rapid and unguided urbanisation and impacts of climate change are common across major Ghanaian cities including Accra, Sekondi-Takoradi and Tamale (see Adarkwa, 2012). In this era of rapid urbanisation and climate change, these issues are bound to persist, making the future bleak for Kumasi and other Ghanaian cities.

Previous studies have suggested a variety of ways to deal with the negative implications of rapid and unguided urbanisation and climate change in Kumasi: adequate provision for various land uses and facilities such as residential, commercial, industrial and circulatory, landscaped areas, prime agricultural lands, wetlands and forest reserves (Adarkwa, 2012; Cobbinah & Amoako, 2012; Quagraine, 2011). Interestingly, these proposals are consistent with urban resilience notion of promoting effective urban planning and management. Yet, urban planning in Kumasi and most Ghanaian cities has largely been one of a knee-jerk and reactionary approach to disasters and emergencies. For instance, recent flooding and fire disaster in Accra (June, 2015) was accompanied by ad hoc demolition exercise and eviction of slum communities, without considering the long term urban implications, and strategies to avert future occurrence. It is therefore expected that several studies have reported of the failure of city authorities to plan, develop and manage the development of Kumasi (e.g., Adarkwa, 2011, 2012; Braimah & Adom Asamoah, 2011; Cobbinah & Amoako, 2012).

While the need to turn towards urban resilience as a model has been acknowledged in previous studies (e.g., Adarkwa, 2012; Cobbinah & Amoako, 2012; Quagraine, 2011), the above discussion shows that the nature of growth and current patterns of development of Kumasi suggest otherwise. It is in response to this gap between research and practice that this study seeks to appraise the preparedness of Kumasi in responding to these global challenges. According to UNISDR (2013), urban resilience in African cities rests on nine key tenets, these include: (1)

Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of cities to contribute to risk reduction; (2) Incorporating risk assessment – considering exposure, vulnerability and hazards, urban settlements development and services – in all urban development designs, projects and programmes; (3)

Making safe land available for urban development, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas; (4) Upgrading informal settlements, with attention to access roads, flood-risk, and other safety measures; (5) Installing risk-reducing infrastructure, including drainage and sewerage systems, among others (see Chapter Two for details). Using these tenets, this study evaluates urban resilience in Kumasi and its environs from the perspective of both local urban planning-related institutions and city residents from selected case study communities.

### **1.3 Research Questions**

From the foregoing analysis, the study seeks to find answers to the following questions:

1. What is the state and extent of climate change in Kumasi?
2. What are the key urbanisation-related challenges facing Kumasi?
3. What does urban resilience concept mean to local urban planning-related institutions and local communities in Kumasi?
4. What are local urban planning efforts towards promoting urban resilience in Kumasi?

### **1.4 Research Objectives**

In response to the above questions, this study has the general objective of evaluating current opportunities and challenges shaping the development of Kumasi, and proposing relevant approaches that may help achieve urban resilience. The specific objectives of the study are to:

1. Appraise the state and extent of climate change in Kumasi's urban development trajectories.
2. Identify major urbanisation-related challenges facing the case study communities.
3. Examine the local institutional and community understanding of the concept of urban resilience in Kumasi.
4. Assess local urban planning-related institutions efforts towards achieving urban resilience in Kumasi.

### **1.5 Study Scope**

Geographically, this study focuses on Kumasi. The city has a total land area of 250 km<sup>2</sup>, and is situated in the transitional forest zone of Ghana, about 270 km north-west of Accra, the national capital of Ghana. Kumasi recorded a mean annual growth rate of 5.4% during the 2000-2010 intercensal period which was well above the regional and national annual growth rates of 2.6% and 2.5% respectively. The city currently accommodates nearly two-thirds of the Ashanti region's population (Cobbinah & Amoako, 2012). Emphasising its unique centrality as a traversing point from all parts of Ghana, and as a commercial hub of the country, as well as a major destination for migrants from all over the country (Adarkwa, 2011), Kumasi was selected for this study. The interplay of these factors which have resulted in rapid urbanisation gives a cause to worry about the future development trajectories of the city.

Contextually, the main thrust of the study is to appraise the resilience of Kumasi within the framework of rapid urbanisation and climate change, emphasising urban management opportunities and challenges. The level of understanding of local urban planning-related institutions and some residents from selected case study communities of urban resilience concept and efforts towards achieving resilience are considered.

## **1.6 Significance of the Study**

Gathering from the recent phenomenon on climate change and rapid urbanisation and their impacts on cities, the topic of urban resilience has gained considerable international attention as one of the means to ensuring cities' survival in the face of increasing future uncertainties. This study on achieving urban resilience in Kumasi is important and timely as Ghanaian cities struggle to deal with outcomes of rapid urbanisation and emerging consequences of climate change. The findings from this study would hopefully provoke critical reflections on the part of urban planners, city authorities, development practitioners, and the government to embrace and carefully consider ways and strategies for building urban resilience in the planning of Ghanaian cities. This study is designed to unearth approaches and strategies in the planning and management of cities, offering a proactive and holistic response to risk management and a technique for cities to maintain competitiveness on the global front by appraising the opportunities and challenges of urban development, and proffering proposals towards resiliency.

The challenges of rapid urbanisation in Kumasi would be minimised when the philosophy of urban resilience is given consideration as the city's development priority. This study would form a foundation and a framework for city authorities in their quest to create a liveable and functional urban environment. Given Kumasi's strategic location and its role as a commercial hub of the northern sector of Ghana, the study findings, when considered by city authorities and policy makers, would contribute to positioning the city to execute its role effectively and efficiently.

Among academics, the study findings would add to the burgeoning literature on urban resilience by presenting a Ghanaian perspective, thus providing an important reference material for academics. This study would also stimulate academic debate on 'how to do resilience' in Africa.

### **1.7 Organisation of the Study**

This thesis is organised into five chapters: Chapter One describes the background to resilience, climate change and urbanisation. The chapter presents the problem statement, the research questions and objectives and the scope of the study. The chapter further provides significance of the study and a summary of the research methods. Chapter Two presents the analysis of the literature used for the study focusing on key concepts such as urbanisation and urban resilience. Other theoretical issues relating to urban resilience are also described in Chapter Two including forms of resilience, climate change and urban planning in Ghana. The chapter concludes with a conceptual framework which provides a context for the empirical analysis.

Chapter Three examines the research location and methods used for the study. Issues relating to characteristics of the study area such as the physical characteristics, urban development dynamics and socio-economic characteristics are analysed in this chapter. The chapter further highlights important issues relating to the research design, data types and sources, sampling approach, data collection techniques and the data analysis methods.

Chapter Four focuses on the presentation and analysis of the empirical data. The chapter examines: evidence of climate change in Kumasi; the major urbanisation-related challenges in Kumasi; local understanding and interpretations of the concept of urban resilience; and the efforts made or are being made to build resilience in Kumasi by urban planning-related institutions. Chapter Five

presents the major findings from this research. Recommendations and the concluding remarks to help achieve urban resilience in Kumasi are outlined in this chapter.

## **CHAPTER TWO**

### **CONCEPTUALISING URBAN RESILIENCE IN AFRICAN URBAN PLANNING CONTEXT: INSIGHTS AND KEY ISSUES**

#### **2.1 Introduction**

The purpose of this chapter is to examine the concept of urban resilience within the broader context of ongoing and emerging urban development imperatives in Africa, and its relevance to urban planning and functionality in developing countries, especially in Ghanaian cities. This review contributes to addressing the research questions.

Ongoing and emerging urban development opportunities and threats, particularly rapid urbanisation and climate change remain major hurdles in developing countries of Africa (Cobbinah et al., 2015; IPCC, 2013). Literature examining urban development imperatives shows that many developing country cities especially in Africa are at the brink of collapse due to the inability of city authorities to adequately respond to the sheer scale of climate change – urbanisation induced challenges (Obeng-Odoom, 2009; UNHABITAT, 2014). For example, several cities in Africa are described by many authors as epitomised by increased urban poverty, proliferation of informal settlements, poor transport system, indescribable scenes of filth and crime (Cobbinah et al., 2015; Obeng-Odoom, 2009).

It is in this regard that international organisations, donor agencies, non-governmental organisations (NGOs) and urban researchers have identified and are advocating the concept of urban resilience as a development approach which could effectively and sustainably promote socio-economic development and support environmental protection in a spatially integrated and socially inclusive manner (Prasad et al., 2009; Seeliger & Turok, 2013; UNISDR, 2013). This chapter reviews the concepts of emerging global opportunities and threats – climate change and urbanisation – as well as the philosophy of urban resilience. Literature describing the role and relevance of the urban resilience concept in the urban development of African cities particularly in Ghana is also

presented. Conceptual framework for evaluating and contextualising the urban resilience concept in urban planning in Ghana is presented.

## **2.2 Emerging Urban Development Imperatives in Africa**

### ***2.2.1 The concept of climate change: What it means for African cities***

Climate change has become a major global, regional, national and local concern with implications for all countries. Commonly, climate change is defined as a considerable long-term alteration in the patterns of the —average weather that a given area experiences (Mosha, 2010). This change, according to Amos-Abanyie (2011, p.195), —may involve variability or average state of the atmosphere over durations ranging from decades to millions of years, and may include average temperature, precipitation and wind patterns.¶

Scientific evidence and predictions indicate that climate change is occurring with threatening impacts on the world's poorest regions including Africa (IPCC, 2007, 2013). Climate change has multifarious effects and wide-ranging manifestations across multiple landscapes (IPCC, 2013) which are spatially and socially differentiated (Adger, 2003). The tragedy of extreme weather events (e.g., flood, droughts, warming temperatures) continues to cause extraordinary human suffering (e.g., increased poverty), particularly in developing regions where it is not uncommon for people to derive their livelihood from the environment and poverty is widespread (Cobbinah & Anane, 2015; IPCC, 2007). Although global efforts towards managing the effects of climate change have, to some extent, been successful over the last three decades, with publications of many studies focusing on climate change impacts, mitigation and adaptation, in addition to growing consciousness of the debilitating impacts of climate change among people, progress has been uneven especially in poor developing regions, both urban and rural (see Amos-Abanyie, 2011; Cobbinah & Anane, 2015; Gentle & Maraseni, 2012).

Today, there is growing worldwide concern regarding how to deal with the repercussions of climate change for urban areas in developing countries, where cities are urbanising rapidly and a large section of urban populations are poor and vulnerable to climate-related disturbances (Tyler & Moench, 2012; UNHABITAT, 2011). According to Tyler and Moench (2012), climate change is already generating unavoidable impacts on urban systems and populations in developing countries. In Africa, human populations are mostly concentrated in large cities, such as Cape Town

(South Africa), Accra (Ghana), Lagos (Nigeria), Cairo (Egypt), many of which are along the coasts making them vulnerable to the impacts of climate change (UNDESA/PD, 2012; UNHABITAT, 2014). These African cities are also sensitive to many hazards and risks, from floods to disease epidemics (Boadi et al., 2005). For example, presently, an estimated 10 million people experience coastal flooding annually due to, among others, storm surges, with about 50 million projected to be at risk by 2080 because of climate change and rapid urbanisation (Adger et al., 2005).

Evidence of climate change, for Agyemang-Bonsu et al. (2008), abounds in Ghana with progressive rise in temperatures across the various urban and ecological landscapes and precipitation levels and patterns generally reducing and increasingly becoming variable. According to the aforementioned researchers, Ghana is at risk of suffering socio-economically from the impacts of climate change due to its dependence on climate sensitive sectors such as energy. Within the urban context, Ghanaian cities are fast expanding with inadequate housing and living space, clean water, solid waste management and sanitation systems, and are at risk from increased frequency and intensity of extreme weather events at various degrees (AmosAbanyie, 2011). In Kumasi for instance, Amos-Abanyie (2011) argues that the long term challenges of adapting to climate change lie in the need for climate proof housing policies, while the short-term limitations relate to the current housing stock and infrastructure shortfalls in relation to building design and neighbourhood planning.

Given the ongoing manifestation of global climate change, the United Nations Environment Programme [UNEP] and United Nations Development Programme [UNDP] (2010) maintain that unless strategies are cautiously and methodically introduced to achieve resilience in development and alleviate susceptibility, climate change may threaten national development in Ghana. This emphasises the importance of resilience in adapting to the impacts of changing climate. Similarly, Tyler and Moench (2012, p. 312) stress that for urban areas in developing countries to be adaptable to climate change, an approach based on resilience that encourages —practitioners to consider innovation and changes to aid recovery from stresses and shocks that may or may not be predictable should be promoted. Regrettably in Ghana, strategies to adapt to changing climate are reactionary and do not focus on achieving resilience of affected communities and people (UNEP & UNDP, 2010). The increased occurrence of natural disasters and events (e.g., flooding, drought,

warming weather) caused by climate change is challenging Ghanaian cities already faced with rapid urbanisation (Amos-Abanyie, 2011). The next section explores the concept of urbanisation.

### ***2.2.2 The concept of urbanisation: Its implications for African cities***

Recent rapid global urbanisation is alarming, especially in developing countries (Brockerhoff, 2000; UNDESA/PD, 2012). Yet, the concept of urbanisation is variously interpreted. While some conceptualise urbanisation as a process through which productive agricultural lands, forests, surface water bodies and groundwater prospects are being irretrievably lost, due to uncontrolled population growth (Bhatta, 2009; Boadi et al., 2005), others describe it as a demographic phenomenon involving the concentration of population in towns, cities and metropolises (Brockerhoff, 2010; UNDESA/PD, 2012). Considering the various perspectives, Cobbinah et al. (2015) describe urbanisation as a demographic, ecological, sociological and economic occurrence resulting from natural and anthropogenic influences that concentrates population in urban areas and has the tenacity to either fuel or impede the development of these areas in both developed and developing countries. Despite the different interpretations, rapid urbanisation is frequently described as a developing country phenomenon (Brockerhoff, 2000).

Across developing countries, urbanisation level rose sharply from 18% in 1950 to 40% in 2000, with the trend projected to surpass 50% by 2020 and 64% in 2050 (UNDESA/PD, 2012). Cobbinah et al. (2015) argue that, although the developed countries have experienced higher levels of urbanisation compared to those in the developing world, ongoing and future rapid urbanisation is set to occur largely in developing countries of Africa and Asia. As illustrated in Table 2.1, over 90% of global population growth is projected to occur in urban areas of developing countries in the foreseeable future.

Similarly in Ghana, official statistics show that, out of 24,658,823 population in 2010, approximately 51% is urban, with the country set on a trajectory of becoming increasingly urbanised (GSS, 2012). The 2010 urbanisation level in Ghana is unparalleled considering comparatively low levels of past trends: 9.4% in 1931, 13.9% in 1948, 23% in 1960, 28.9% in 1970, 31.3% in 1984 and 43.9 in 2000 (GSS, 2012; Songsore, 2009). As presented in Table 2.2, cities such as Accra, Kumasi, Sekondi-Takoradi and Tamale have recorded substantial increase in population over the past four decades. Accra and Kumasi, for instance, have a population growth of over 4.5% per annum (GSS, 2013). However, such sharply increasing recent trends may have

adverse consequences for the management of both natural and the built environments as well as socio-economic wellbeing of urban residents.

**Table 2.1 Urbanisation in the World**

Region	Population ('000)				Urbanisation Level (%)				Urbanisation Rates (%)		
	1950	2000	2010	2050	1950	2000	2010	2050	1950-2000	2000-2010	2010-2050
World	745495	2858632	3558578	6252175	29.44	46.69	51.60	67.18	2.69	2.19	1.41
Developed countries	441845	881344	957251	1127222	54.47	74.14	77.45	85.93	1.38	0.83	0.41
Developing countries	303650	1977289	2601326	5124953	17.64	40.08	45.96	64.11	3.75	2.74	1.70
Asia	245052	1392232	1847733	3309694	17.46	37.44	44.37	64.36	3.47	2.83	1.46
Europe	280602	514545	536611	591041	51.27	70.80	72.69	82.17	1.21	0.42	0.24
Latin America & Caribbean	69264	393619	465246	650479	41.38	75.49	78.84	86.62	3.48	1.67	0.84
Northern America	109667	247911	282480	395985	63.90	79.13	81.99	88.61	1.63	1.31	0.84
Oceania	7907	21924	25857	40346	62.38	70.43	70.66	73.05	2.04	1.65	1.11
Africa	33004	288402	400651	1264629	14.36	35.56	39.19	57.70	4.34	3.29	2.87

Source: UNDESA/PD (2012)

**Table 2.2 Population Size of Some Ghanaian Cities**

City	1970	1984	2000	2010
Accra	624,091	969,195	1,658,937	2,070,463
Kumasi	346,336	469,628	1,170,270	2,035,064
Sekondi-Takoradi	143,982	188,203	289,595	539,548
Tamale	83,653	135,952	202,317	371,351
Cape Coast	56,601	65,763	82,291	169,894
Tema	60,767	100,052	141,479	139,784
Koforidua	46,235	58,731	87,315	120,971
Ho	24,199	37,777	61,658	104,532
Sunyani	23,780	38,834	61,992	74,240
Wa	13,740	36,067	66,644	71,051
Bolgatanga	18,896	32,495	49,162	65,549

Source: Compiled using data from GSS, 1960, 1970, 1984, 2000, 2010

There are several ways through which urbanisation may occur. Most commonly, urbanisation may occur through the movement of rural populations to urban areas (Bloom et al., 2008; Cobbinah et

al., 2015). Empirically, migration is estimated to contribute on average between 40% and 50% of total global urban population growth (Bloom et al., 2008). Second, the rate of natural population increase also contributes considerably to urban population particularly in developing countries. It is frequently reported that birth and mortality rates are lower in urban areas compared to rural settings in Africa (Boadi et al., 2005). The third cause of urbanisation is the reclassification of rural settlements as urban due to rural population growth and increasing population density (Cobbinah et al., 2015). However, the criteria for reclassifying a rural area as urban vary across different geographical locales (Brockerhoff, 2000). For example, in Ghana, a settlement is classified as urban when it has a population threshold of 5000 inhabitants or more (GSS, 2012), compared to about 2500 inhabitants in the United States of America (Brockerhoff, 2000).

Considering that urbanisation can generate both positive and negative outcomes (Cobbinah et al., 2015), Bloom et al. (2008) describe the benefits of urbanisation with references to the natural process of modernisation and industrialisation. Through the urbanisation process, cities become locations of concentrated economic activities and offer large and diversified labour pools which are closer and readily available to customers and suppliers (Bloom et al., 2008). In Ghana, for example, The World Bank (2015) indicates that urbanisation has contributed to urban poverty alleviation by 20% in Accra. Others have argued that creation of cities through urbanisation provides increased economic opportunities for division of labour and make intra-industry specialisation a possibility (Cobbinah et al., 2015). Businesses and entrepreneurs do not only generate returns from horizontal and vertical spillovers but also are able to respond to and meet growing market demand more effectively (Bloom et al., 2008; Cohen, 2006). In a variety of ways, by aggregating educated and creative people in one geographical enclave, Cobbinah et al. (2015) and Bloom et al. (2008) agree that cities nurture new ideas and technologies that are often necessary to support efficient growth by potentiating the full social returns to increased human capital.

Unfortunately, according to Cobbinah et al. (2015), the negative implications of rapid urbanisation to urban functionality are increasingly becoming clear in African cities, where urban population growth is pervasive. Unsustainable land development manifesting in the form of urban sprawl and emergence of informal settlements (slums), and increased urban poverty revelatory through mushrooming of informal economic activities, water and sanitation challenges, high incidence of

vulnerability and insecurity, and unemployment are the two major hurdles accompanying African urbanisation (Cobbinah et al., 2015). In Ghana, Songsore (2009) describes urbanisation as the single most important hurdle confronting city authorities. Ghanaian urbanisation is variously described as the cause of loss of urban biodiversity green-house warming, degradation of urban agricultural land, air and water pollution, increased urban poverty, environmental decay, informal settlements, poor sanitation, overcrowded living and several other mortifying conditions that have become commonplace in Ghanaian cities (Amoako & Cobbinah, 2011; Awumbila et al., 2014). In such situations, it is unsurprising that many refer to Ghanaian and African urbanisation as parasitic, poverty driven and demographically fuelled (Obeng-Odoom, 2009; Songsore, 2009), while others describe it as urbanisation without development (Boadi et al., 2005).

While urbanisation in Ghana and Africa in general is worth pondering, Cobbinah et al. (2015) note that there is limited meaningful guidance available to city authorities on appropriate approaches and methodologies in addressing the urbanisation concerns in African cities. In their reflections, Cobbinah et al. (2015) advocate strong policy direction, institutional empowerment and capacity building, and expansion of the role and engagement of urban residents in the planning and management process as critical issues worth considering in containing rapid urbanisation. Interestingly, underlying these recommendations is the concept of urban resilience. The next section explores the concept of urban resilience.

### **2.3 The Emergence of Urban Resilience Concept**

Literature describing urban resilience shows that the concept has been in existence since the 1970s, but in a different field (e.g., Ove Arup & Partners International Limited 2014). Folke et al. (2002) argues that the term resilience was first applied in the ecological and engineering fields, and attributes its assumption of prominence to the insights generated in the field of ecology. Whilst some scholars argue that the term was popularised by Crawford Stanley Holling, a US-Canadian theoretical ecologist in the field of ecology (Seeliger & Turok, 2013), other sources claim that the concept has a much longer history, mapping out its origin to the 1950s (Oxford English Dictionary, 2015). Despite the differences in opinions on its origin, the emergence of the term resilience is strongly linked with the ability of ecosystem and the natural environment to bounce back or recover after shock or disturbances (Darkwah & Cobbinah, 2014).

Historically, although the concept of resilience dates back to several decades, literature indicates that its derivation remains debatable (Alexander, 2013; Smith et al., 2010). On the one hand, Alexander (2013) claims that the concept has its roots in a Latin term *resalire* or *resilio*, which means 'to spring back or recoil', on the other hand Smith et al. (2010) indicate that the term was derived from an English word *resile* which merges *re* meaning 'back' and *salire* meaning 'to jump or leap'. However, both interpretations of derivation of resilience define resilience as an ability to bounce back or recover. During the classical times, the term 'resilience' was also described from accomplished men and British nobility perspectives, as it was used in the writings of: Pliny the Elder in *Natural History* (9.71 - 11.39) to refer to the leaping of fleas and frogs; Ovid in the *Metamorphoses* (12.480) as 'to shrink or contract'; Cicero in the sense of rebounding; and Seneca in the sense of 'to leap' (Alexander, 2013). Much later (1529), the word appeared in the papers of King Henry VIII, meaning to 'retract', 'return to a former position' or 'desist', in relation to his troubles with his first queen Catherine of Aragon (1485–1536).

However in the field of urban studies, the concept of resilience is variously described as contemporaneous (Darkwah & Cobbinah, 2014), as it was fully conceptualised in the late 1990s (Mileti, 1999). The concept of urban resilience became popular, especially in the late 1990s, as a result of the negative socio-economic and environmental impacts (e.g., flooding, tsunamis, tornados, earthquakes) associated with emerging global development challenges particularly climate change and urbanisation (see Section 2.2). Increasing concerns about the impacts of natural and anthropogenic influences – climate change and rapid urbanisation – on urban functionality and liveability and on urban residents led to the rise in popularity of sustainable forms of urban development, including urban resilience (Chelleri & Olazabal, 2012).

One of the early and common definitions of urban resilience was given by Walker et al. (2002) as the ability of an urban structure or a social system to endure disturbances and to reorganise itself following disturbance-driven changes. This definition is emphasised by the Ove Arup and Partners International Limited (2014) which define urban resilience as 'the capacity of cities to function, so that the people living and working in cities – particularly the poor and vulnerable – survive and thrive no matter what stresses or shocks they encounter' (p.3). Table 2.3 summarises some key definitions of urban resilience.

**Table 2.3 Selected Definitions of Urban Resilience Concept**

<b>Author, Date</b>	<b>Definition</b>
Adger, 2000	The ability of communities to withstand external shocks to their social infrastructure
Godschalk, 2003	A sustainable network of physical systems and human communities, capable of managing extreme events; during disaster, both must be able to survive and function under extreme stress
Ganor & BenLavy, 2003	The ability of individuals and communities to deal with a state of continuous, long term stress; the ability to find unknown inner strengths and resources in order to cope effectively; the measure of adaptation and flexibility
Bruneau et al., 2003	The ability of social units to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimise social disruption and mitigate the effects of future earthquakes
Ahmed et al., 2004	The development of material, physical, socio-political, socio-cultural, and psychological resources that promote safety of residents and buffer adversity
Coles & Buckle, 2004	A community's capacities, skills, and knowledge that allow it to participate fully in recovery from disasters
Pfefferbaum et al., 2005	The ability of community members to take meaningful, deliberate, collective action to remedy the impact of a problem, including the ability to interpret the environment, intervene, and move on
Butler et al., 2007	Good adaptation under extenuating circumstances; a recovery trajectory that returns to baseline functioning following a challenge

Source: Adapted from Norris et al. (2008)

Over the past nearly two decades, the discussion on urban resilience has gained dominance in both regional and urban studies conferences and journals globally, with the definitional interpretations being broadened to incorporate capacity of urban environments to adapt to climate change and deal with rapid urbanisation (United Nations International Strategy for Disaster Reduction [UNISDR], 2010, 2013). For example, Folke et al. (2002) describes urban resilience as the ability of a system to absorb disturbance and still reorganise itself in the midst of ongoing and emerging changes in order to maintain its basic functions, structure and feedbacks, as well as its identity, in relation to its ability to change and still maintain the same identity. Similarly, the Stockholm Resilience Centre (2010, p. 3) indicates that urban resilience relates to

—the capacity of a system, be it an individual, a forest, a city or an economy, to deal with change and continue to develop. In this sense, urban resilience is about the capacity to capitalise on shocks

and disturbances including financial crisis or climate change to spur renewal and facilitate innovative thinking within the urban setting.

Campanella (2006) provides a simpler but comprehensive definition of urban resilience as a function of resilient and resourceful citizens necessary to achieving functional and liveable urban development through precautionary urban policy and planning regarding resource use, the reduction of vulnerability and the promotion of both present and future ecological integrity. This definition is supported by Chelleri and Olazabal's (2012, p.11) explanation of urban resilience, which describes urban resilience within the framework of —risk and vulnerability assessments, institutional and social governance structures, resilience in (or of) different sectors (e.g., ecosystems, economy), and transformations of urban areas. Thus, the concept of urban resilience seeks to build capacities of systems, communities or societies that are potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure (UNISDR, 2013).

Nonetheless, Jabareen (2013) argues that research on urban resilience frequently ignores the multidisciplinary and complex nature of the concept of urban resilience and/or use the term with limited understanding. According to Lu and Stead (2013, p.201), —focusing on a single or small number of contributing factors to urban resilience can easily lead to the exclusion of important characteristics that affect the performance of a city from the perspective of resilience since resilience has a variety of social, economic, cultural, environmental and spatial dimensions. In their reflections, they argue that in practice, policymakers habitually interpret the concept of urban resilience according to their interests and expertise, which unfortunately presents difficulties in applying resilience as a new paradigm to planning practices. Emphasising the notion of urban resilience as multidisciplinary in nature and a potential strategy to addressing issues relating to shocks and rebounding mechanisms in the urban environment (Chelleri & Olazabal, 2012), the UNISDR (2013) outlines nine key tenets, of how urban planning can contribute to building resilient cities and reducing disaster risk especially in developing countries of Africa. These include:

1. Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction.
2. Incorporating risk assessment – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs.
3. Making safe land available for urban development, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas.
4. Ensuring that public space for streets, infrastructure and parks is identified and protected.
5. Upgrading informal settlements, with attention to access roads, flood-risk, other safety measures.
6. Installing risk-reducing infrastructure, including drainage and sewerage systems.
7. Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city.
8. Developing good information on risk and communicating risk information widely.
9. Protecting ecosystems to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves.

This study examines urban resilience in Kumasi (Ghana) through the lens of the nine tenets. These tenets are central and relevant to Kumasi's urban development trajectories. The next section analyses the forms of resilience.

## **2.4 Forms of Resilience**

Although resilience is a latest addition to planners' discursive collection (Mileti, 1999), it is by no means a new concept (Davoudi, 2012). In understanding resilience, Holling (1973) made a distinction between engineering and ecological (environmental) resilience. Other forms of resilience have emerged: evolutionary, economic and social resilience. These forms of resilience are discussed in the following sections.

### ***2.4.1 Engineering resilience***

Engineering resilience refers to the ability of a system to go back to an equilibrium or steady state following a disturbance (Holling, 1973), which could be either a natural disaster (e.g., flooding and earthquakes), or a social turmoil, including banking crises, wars and revolutions (Davoudi, 2012). Davoudi (2012) argues that the resistance to disturbance and the speed by which the system assumes stability is the measure of resilience. In this case, the faster the system bounces back to equilibrium, the more resilient it is. The emphasis of engineering resilience is on return time, —efficiency, constancy and predictability (Holling, 1996, p. 31), which according to Davoudi (2012) are all desired qualities for a —fail-safe engineering design.

### ***2.4.2 Ecological resilience***

Ecological resilience relates to —the magnitude of the disturbance that can be absorbed before the system changes its structure (Holling, 1996, p. 33). Here, Davoudi (2012, p. 301) asserts that resilience is described not just according to the time a system takes in bouncing back after a disturbance, but also the extent of shock the system can take while remaining within critical thresholds. Ecological resilience thus revolves around —the ability to persist and the ability to adapt (Adger, 2003, p. 1). The main difference between the engineering and the ecological resilience types, according to Davoudi (2012), is that ecological resilience discards the existence of a single, stable equilibrium, and instead acknowledges the existence of multiple equilibria, and the likelihood of systems to flip into alternative equilibrium domains. Davoudi (2012) observes that despite this distinction and the fact that these two resilience types are rooted in different disciplinary traditions, what underlines both perspectives is the belief in the existence of equilibrium in systems, be it a pre-existing one to which a resilient system bounces back (engineering) or a new one to which it bounces forth (ecological).

### ***2.4.3 Evolutionary resilience***

Evolutionary resilience challenges the idea of equilibrium and advocates that the nature of systems may change over time with or without an external disturbance (Scheffer, 2009). Some writers call this socio-ecological resilience (Folke et al., 2010). Evolutionary resilience is thus not conceived of as a return to normality, but rather as the ability of complex socio-ecological systems to change, adapt, and, importantly, transform in response to shocks, stresses and strains (Carpenter et al., 2005).

#### **2.4.4 Economic resilience**

Literature describing economic resilience indicates that the concept has been interpreted from three main perspectives, regarding the ability: (i) to recover quickly from a disturbance; (ii) to withstand the impact of a disturbance; and (iii) to avoid any form of disturbance (Briguglio et al., 2006). The first assertion, ‘ability of an economy to recover quickly’ relates to the suppleness of an economy allowing it to recover after being negatively impacted by a shock. This ability, according to Briguglio et al. (2006) is often limited in cases where there is a chronic tendency for large fiscal deficits or high rates of unemployment. In contrast, this ability is enhanced when the economy possesses discretionary policy tools for counteracting the effects of negative disturbances. This resilience type is associated with —shock-counteraction (Briguglio et al., 2006).

The second assertion, ‘ability to withstand shocks’ suggests how the negative effect of a disturbance could be absorbed or neutered. According to Briguglio et al. (2006, p.7), this type of resilience —occurs when the economy has in place mechanisms to endogenously react to negative shocks to reduce their effects, which we can refer to as —shock-absorption. The third assertion, ‘ability of an economy to avoid shocks’ in Briguglio et al.’s (2006) view, is inherent and regarded as the obverse of economic vulnerability. From the foregoing, it is clear that economic resilience can be described in a variety of ways, but in this thesis the concept is used in relation to the ability to bounce back from or adjust to negative impacts of internal and external economic disturbances.

#### **2.4.5 Social resilience**

Social resilience is frequently described as the ability of a society or of individuals to withstand shocks and stress without significant upheaval (Adger, 2000). Shocks and stresses are defined as significant changes in social structure and livelihood brought about by, for example, government policy, civil strife or environmental hazards (Adger, 2000). The social resilience of a society is determined by the resilience of the resource base which support the community and the social, economic and institutional ‘infrastructure’ of the community, as well as the broader sociopolitical context within which that community is located (Adger, 2000). Within this framework, demographic changes (e.g., migration) affect social resilience by, among others, altering economic wellbeing and the structure of the community and impacting on the resilience of the resource base (Adger, 2000).

In this research, the social resilience form is used in understanding and analysing the urban resilience in Kumasi. This resilience type is employed for this study given its influence on community functionality and its acknowledgement of community resource base, infrastructure and socio-political system that are necessary for promoting the wellbeing of individuals and the survival of communities (Adger, 2000).

## **2.5 Urban Resilience as a Theoretical Framework**

The urban resilience theory is a more appropriate framework for urban development and management, for it builds on a more realistic paradigm of multi-equilibria, focusing pragmatically on persistence in a world of flux (Adger et al., 2005; Liao, 2012). The urban resilience concept has become a sophisticated resilience theory, addressing complex humannature couplings (Liao, 2012). It is instrumental for addressing urban development and management challenges that arise from the interaction between rapid urbanisation and climate change.

Two key arguments in urban resilience theory would shift the paradigm of urban development and management (Liao, 2012). First, resilience arises from adapting to inherent variability, uncertainty, and surprise (Folke, 2003). Coupled human–natural systems lose resilience when the inherent variability is artificially suppressed to promote stability through command-and-control management (Holling et al., 2002). This suggests that building socio-economic functionality upon forced environmental stability results in resilience erosion. It thus challenges the bias towards maintaining steady socioeconomic activities (Liao, 2012). Urban management based on resilience theory would begin with acknowledging inherent environmental dynamics, by which socio-economic activities are inevitably affected.

Secondly, resilience theory holds that periods of gradual development and sudden changes complement each other (Folke, 2006). As demonstrated in frequently disturbed urban environment, resilience is borne out of experiencing and learning from disturbances (Holling 1973). The resilience theory suggests a paradigm shift in urban development and management that should focus on building resilience as opposed to maintaining stability (Liao, 2012). Because urbanisation and climate change are inherently parts of the normal urban dynamics, resilience is neither urban challenges resistance nor recovery to pre disaster conditions, both are simply means to an end of stability. In this study, resilience is the tendency to survive, which is in itself an end (Liao, 2012).

The next section examines the relevance of the urban resilience theory to Ghana's urban planning process.

## **2.6 Relevance of Urban Resilience to Ghana's Urban Planning**

Prior to European colonisation, human settlements in Ghana were planned based on traditional settlements patterns and along cultural and ethnic lines, and by kinship of communities, although formal institutionalised urban planning was non-existent (Okpala, 2009). Njoh (2004) argues that the absence of formal planning does not ignore the fact that urban planning tradition pre-dates colonialism, and that large human settlements were all planned and governed using indigenous urban planning practices. This argument is echoed by Okpala (2009), stating that all African countries experienced traditionally meaningful planning before the arrival of European colonialists. Though formally unplanned, in most cases, human settlements in Ghana were meaningfully ordered physical structures conforming to traditionally established arrangements and cultures. However, a majority of human settlements in Ghana hardly boasted of an urban population higher than 10% of their total national population. Thus, urban planning practice was, to some extent, a simple and undemanding activity, although well and carefully planned.

In 1877, formal urban planning was introduced by the British in Ghana during the colonial rule through the establishment of town councils. According to Quarcoopome (1993), the British introduced urban planning through the creation of town councils as a strategy to deal with poor sanitation and hygiene conditions that engulfed Ghanaian cities particularly Accra. The responsibilities of the town councils, among others, were to make crowded neighborhoods decongested, ensure safety by removing unsafe and insanitary structures, and improve communication efficiency through improved roads, telegraph and postal communications (Gocking, 2005; Quarcoopome, 1993).

In 1945, the Town and Country Planning Ordinance (Cap 84) was introduced, and the Town and Country Planning Department (TCPD) established. This period marked the beginning of efforts towards national urban planning (Cobbinah & Korah, 2015). The Cap 84 mandated the TCPD to plan and manage the growth and development patterns in both urban and rural settlements in Ghana. For Cobbinah and Korah (2015), the introduction of the Cap 84 and the establishment of the TCPD had the fundamental purpose of promoting sustainable development of Ghanaian

settlements epitomised by efficiency, orderliness, safety and health. In other words, the purpose of the Cap 84 and the TCPD was to build resilient human settlements that are functional and liveable.

Regrettably, as Cobbinah and Korah (2015) argue, the role of the Cap 84 and the TCPD in dealing with urban planning and management challenges between the 1950s and 1980s was impeded as Ghanaian government failed to make any considerable efforts towards decentralising urban planning following independence in 1957. Scholarly opinion suggests that urban planning during that period was centralised, nationally oriented and was not people-centered as it was insensitive to community aspirations, development and engagement (Adarkwa, 2012; Boamah et al., 2012). A decentralised approach to planning was introduced in 1988 to provide a community-centered approach to planning through the creation of Metropolitan, Municipal and District Assemblies (MMDAs) (Cobbinah & Korah, 2015). The passage of Local Government Act of 1993 (Act 462) provided a legal framework for the implementation of the decentralised approach to planning and declared all human settlements in Ghana as statutory planning areas. According to Cobbinah and Korah (2015), several other legislations were enacted during the 1990s to support the implementation of the decentralised approach to planning and sustainable urban planning practices, including the National Development Planning Systems Act of 1994 (Act 480) and the National Building Regulation Act (LI 1630).

Regardless of these planning laws and administrative setup, sustainable urban planning that delivers orderliness, health, safety and efficiency remains a distant reality in Ghanaian cities (Cobbinah & Korah, 2015). Urban planning in Ghanaian cities, as argued by many scholars, has become a product of inadequacies in the planning systems (e.g., under-resourced urban planning institutions), distortions in land management practices (e.g., the challenges of land tenure systems), contradictions of roles (e.g., traditional authorities assuming the role of urban planning institutions) and conflicts in public knowledge on planning issues (e.g., limited public knowledge on urban planning in Ghana) that continue to operate across multiple urban landscapes in Ghana (Adarkwa, 2012; Boamah et al., 2012; Yeboah & Obeng-Odoom, 2010).

In such situations, it becomes increasingly clear that urban planning practices that build resilient cities are lacking in Ghanaian cities as unauthorised development is widespread and pervasive across cities (Adarkwa, 2012), urban sprawl remains uncontained (Cobbinah & Amoako, 2012), urban residents' compliance to planning requirements remains low (Boamah et al., 2012), informal

settlements and activities are on the rise (Amoako & Cobbinah, 2011; Obeng-Odoom, 2009; Yeboah & Obeng-Odoom, 2010) and nature reserves and ecologically sensitive areas are increasingly threatened by haphazard and unauthorised human activities (Cobbinah & Korah, 2015; Quagraine, 2011). Drawing from the above, it becomes increasingly clear that the problematic process of urban planning in Ghana is making the creation of resilient cities a myth. It is difficult to argue that Ghanaian cities are or will become resilience.

As the 21<sup>st</sup> century unfolds, an increasing proportion of the Ghanaian population is and will be residing in urban areas, particularly cities. Human welfare in Ghanaian cities, according to Obeng-Odoom (2009) and Cobbinah and Amoako (2012), is contingent on the extent of interactions of institutions, infrastructure, and information sharing. Adarkwa (2011) argues that Ghanaians are attracted to cities, particularly Kumasi and Accra, because of their role as the economic and commercial centres, available livelihood options and innovation. However, several studies have shown that Ghanaian cities are also locations for accumulated stresses (e.g., housing challenges, transportation inadequacies) and unexpected shocks (e.g., floods) that often result in social breakdown, physical collapse and economic deficiency (Afrane & Amoako, 2011; Cobbinah & Amoako, 2012; Quagraine, 2011).

Ghanaian cities have always faced risks, and in most cases, many of them that have failed to recover from such shocks in the face of resource shortages. For example, Ghanaian cities such as Accra have been experiencing perennial floods often culminating in natural hazards, and destruction of lives and properties. Regrettably, long term lasting solutions continue to elude city authorities as they often proffer short-sighted and knee jerk reactions following annual floods, such as temporary eviction and decongestion exercises. In such situations, it is unsurprising that urban planning institutions are unable to exert effective influence on Ghanaian cities (Yeboah & Obeng-Odoom, 2010). It is not uncommon to find newspaper headlines expressing the distressing state of urban planning in Ghana such as —Ghana faces tough questions amid deadly flooding‖ (The Seattle Times, 2015) and —Make urban planning a priority‖ (Daily Guide, 2015).

However, research indicates that global pressures (e.g., climate change, urbanisation) in the 21<sup>st</sup> century that play out at a citywide level generate new threats (Cobbinah et al., 2015; IPCC, 2007; UNDESA/PD, 2012). The extent of urban risk (e.g., flood, disasters, inadequate housing, and sanitation challenges) is ever-increasing as human population concentration in Ghanaian cities

increases. The Ove Arup and Partners International Limited (2014) observe that risk assessments and measures to alleviate specific foreseeable risks (e.g., urbanisation) are central to urban planning. In a variety of ways, —cities need to ensure that their development strategies and investment decisions enhance, rather than undermine, their resiliencel (Ove Arup & Partners International Limited, 2014, p.3). The urban resilience concept provides an avenue to bridge the gap between urban disaster risk reduction and climate change adaptation. This complex background, coupled with growing recognition of the potential of urban resilience concept in building resilient cities, provides a context to appraise Kumasi’s efforts towards resiliency in the face of changing climate and rapid urbanisation.

## **2.5 Chapter Summary and Conceptual Framework**

This chapter has discussed the evolution of the urban resilience concept, and explored the various characteristics of emerging urban development imperatives in Africa. It focused on the relevance of urban resilience philosophy in planning and managing Ghanaian cities, which forms the basis of this research. The literature review revealed urban resilience as a potential strategy for correcting the ills of urban development in Africa and Ghanaian cities, particularly for adapting to climate change and managing rapid urbanisation.

The literature review identified three factors relevant to achieving resilience in Ghanaian cities. First, climate change is occurring in Ghanaian cities and is already generating unbearable impacts (e.g., floods, rising temperature) on human population and urban functionality. However, to adapt effectively to climate change, urban planning and management have to be guided by the principles or tenets of urban resilience which are necessary in creating healthy, safe, efficient and orderly urban environments. Second, there are growing indications from several studies suggesting rapid and unguided urbanisation in Ghanaian and many African cities (Cobbinah et al., 2015; GSS, 2012; UNDESA/PD, 2012). This is due to excessive rural-urban migration, natural increase and reclassification of rural areas as urban (see Section 2.2.2). Third, the urban resilience concept can generate positive urban development outcomes in Ghanaian cities, if properly considered and applied (see Section 2.3).

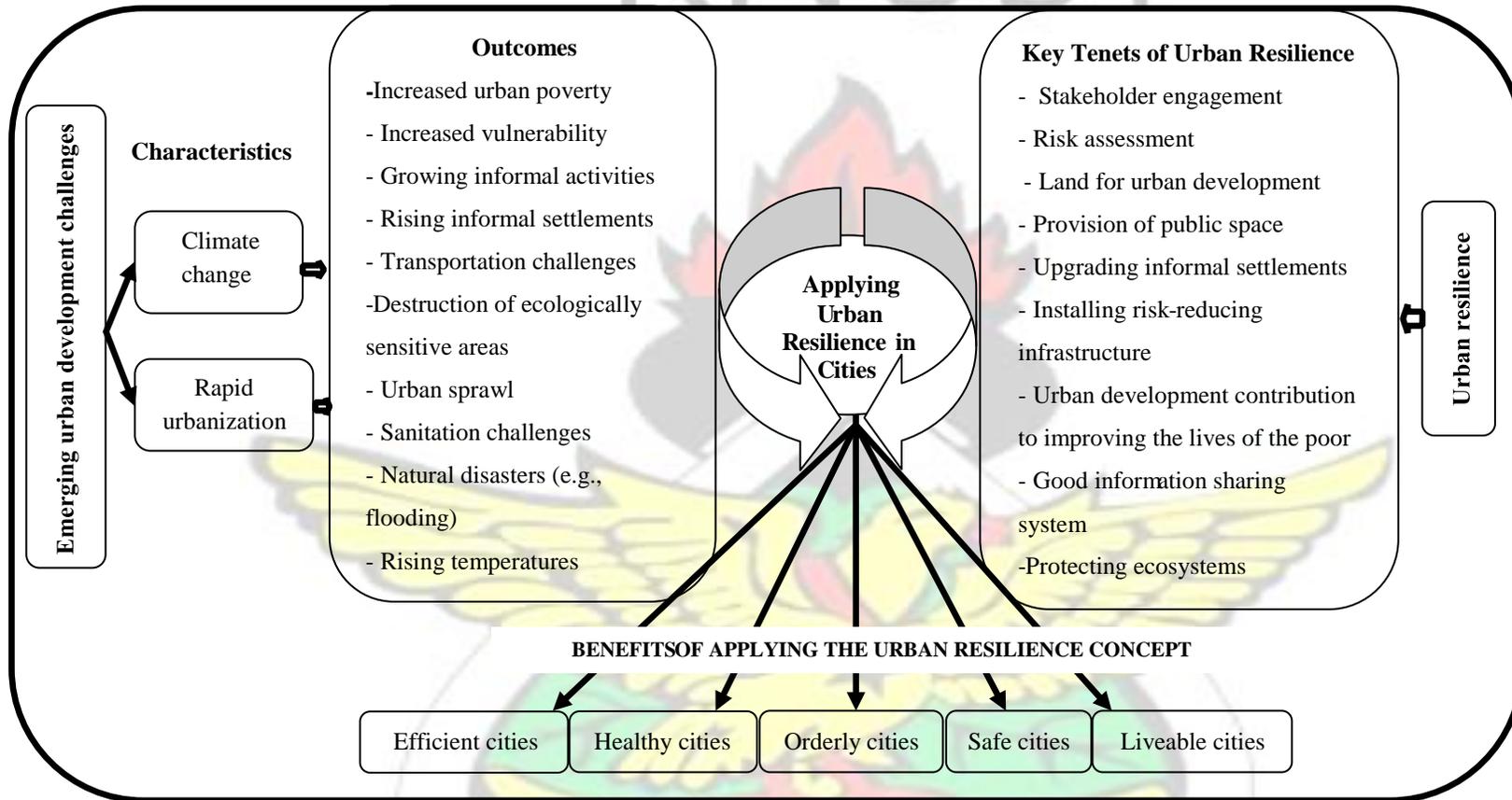
As illustrated in Figure 2.1, although the literature provides evidence for urban resilience as an effective urban planning and management concept, there remains a considerable gap between

theory and practice of urban resilience, as the principles/tenets of urban resilience are conspicuously lacking in Ghanaian urban planning context. The literature suggests urban resilience concept can contribute to functional and liveable urban environments and sustainable urban development and management by adhering to its basic tenets. Despite these potential contributions of urban resilience, the predicament of urban planning in Ghanaian cities is that of distortions, contradictions and inadequacies (see Section 2.4).

Figure 2.1 shows that major emerging urban development challenges across the globe are climate change and rapid urbanisation induced. The interaction of climate change and rapid urbanisation is generating many negative outcomes on the functionality of urban areas particularly in Africa, including increased poverty, increased vulnerability, growing informal activities, rising informal settlements, transportation challenges, destruction of ecologically sensitive regions, urban sprawl, sanitation challenges, natural disasters (e.g., flooding) and warming weather conditions. In contrast, the urban resilience concept, as illustrated in Figure 2.1, exhibits certain characteristics that are necessary in addressing the twin challenges of rapid urbanisation and climate change. These characteristics of the urban resilience concept include stakeholder engagement, risk assessment, land for urban development, provision of public open spaces, upgrade of informal settlements, installation of risk-reducing infrastructure, protection of ecosystems and improvement of urban livelihoods particularly those of the poor.

It is therefore hoped that the application of the urban resilience concept particularly its characteristics/ tenets to urban development in African cities would generate positive outcomes such as creation of efficient cities, promotion of healthy cities, adherence to orderly development, and creation of safe and liveable cities across the urban landscape (see Figure 2.1). These positive outcomes would advance human welfare and support effective functionality of urban areas in Africa.

This study presents an example of the extent of urban resilience in Ghanaian cities, using Kumasi as a case study, to further the understanding of the potential of the urban resilience concept to deliver sustainable urban development outcomes in the face of changing climate and rapid urbanisation. In the next chapter (Chapter 3) the research methods used in this study and the data collection methods and analysis, as well as the characteristics of the case study area are examined.



**Figure 2.1 Applying the Concept of Urban Resilience in Urban Planning Source:**

Author's Construct, November 2015.

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## CHAPTER THREE

### RESEARCH METHODS AND STUDY AREA PROFILE

#### 3.1 Introduction

This chapter describes how this study was conducted, in order to answer the research questions outlined in Chapter One. Literature describing social science research shows that defining the limits and boundaries of key research concepts such as methodologies, designs and approaches is a difficult task for researchers (Mackenzie & Knife, 2006). This chapter examines the theoretical basis for the selection of the research methods, designs and sampling approaches. Discussions focus on the mixed methods approach, the case study research design, and the data collection techniques and data analysis. Other issues discussed include validity and reliability of the data collected, and the profile of the area of study.

#### 3.2 An Overview of the Mixed Methods Research Approach

McGrath (1982) asserts that there is no perfect or definitive research method, only a series of compromises. A chosen research method should be a function of the research situation (Yin, 1994). According to Yin (1994), the kind of questions asked, the control over actual behavioural elements, and the extent of focus on past or current events are the conditions which should form the foundation for the determination of an appropriate research method.

This research uses a mixed methods approach by integrating both quantitative and qualitative research methods. Although the use of one approach is often supported by some researchers (e.g., Johnson & Onwuegbuzie, 2004) because of issues relating to resource and time constraints, there are other researchers (e.g., Amaratunga et al., 2002) who maintain that a mixed methods approach ensures complementarities of both qualitative and quantitative research methods and provides deeper understanding. In this study, three main reasons underlie the use of a mixed methods approach: First, a mixed methods approach provides a framework to highlight the strengths of both qualitative and quantitative methods while the weaknesses are minimised. Second, a mixed methods approach allows for complementarities between quantitative and qualitative methods. Third, a mixed methods approach provides for a comprehensive examination of a research topic.

The mixed methods approach also has the advantage of triangulation – the combination of various research techniques in the same study (Yin, 1994). The use of triangulation through the mixed methods approach in this study ensured the shortcomings of both quantitative and qualitative methods were sufficiently balanced by the counter complementary strengths of another (Amaratunga et al., 2002). For instance, the data from the qualitative sources informed the design of the quantitative data collection techniques, and the selection of respondents to be involved in the qualitative data collection. This process ensured that respondents with adequate understanding of the issues being investigated were involved in the study.

### **3.3 Research Design**

The research design used for this study is the case study method. A case study explanatory research design, for Bromley (1990), is a systematic investigation into an event or a set of related events which intend to describe and explain the phenomenon of interest. Nachmias (1992) further adds that the case study involves an observation of a single group or phenomenon at a given point in time, often following a phenomenon that allegedly produced change. The case study method, to a large extent, is an empirical inquiry that investigates a contemporary phenomenon within its real life context, particularly when the boundaries between the phenomenon and the context are not evident, and requires the use of multiple sources of evidence (Hagget & Frey, 1977; Yin, 1993).

Norgaard (1994) explains that the case study method is preferable when control on the subjects being studied is neither feasible nor desirable. Although a case study method is criticised for having difficulties in generating beyond the case as opposed to survey research, Yin (1993) maintains that it is possible to make analytical generalisations to the body of theoretical framework from a case study research. It is in this regard that Theordorson and Theordorson (1969) assert that a case study approach is very useful for studying an individual, group, an episode, a process, a society or any other units of social life. David and Sutton (2004) describe the case study approach as an explanatory method which makes it easy to ask and seek answers for the necessary ‘\_how’, ‘\_when’ and ‘\_why’ questions related to the study. The advantage with the case study method is that it allows statistical inferences to a broader population so that results can be extrapolated as it increases external validity through generalisation (Babbie, 2007).

For the purpose of this study, the city of Kumasi in the Ashanti Region of Ghana is selected as a case study area for the following reasons: (1) The Ashanti Region is the most populous region in Ghana, with about two-thirds of its population living in Kumasi (Amoateng et al., 2013; GSS, 2012); (2) Kumasi is a major migration destination and commercial and economic center for Ghana and the West African sub-region (Adarkwa, 2011; Cobbinah & Amoako, 2012); (3) Despite the economic potential, the city of Kumasi is faced with several urban development and management challenges, including urban sprawl, slum proliferation, transportation challenges, congestion, growing informalisation, destruction of ecologically sensitive areas, indescribable scenes of filth and gradual extinction of urban greenery (Amoako & Cobbinah, 2011; Cobbinah & Amoako, 2012; Quagraine, 2011); (4) Kumasi has weak urban planning institutions who have frequently failed to ensure orderly development through planning and management interventions (Amoateng et al., 2013; Cobbinah & Korah, 2015); (5) Evidence of climate change impacts on Kumasi, in terms of warming temperatures and variable precipitation (Amos-Abanyie, 2011); and (6) There is existing information on the city of Kumasi, which provides important background data to support this study.

Further analysis of the profile of the case study area is presented in Section 3.9. Additionally, three communities (suburbs) in Kumasi were selected as case study communities. The sampling approach and reasons for the selection of those communities are appraised in the Section 3.6.

### **3.4 Data Requirements and Sources**

This study required data on urban development and challenges (e.g., data on climate change and urbanisation) in Kumasi, and the available or potential opportunities for managing the urban development and management challenges through urban resilience concept. Also, data on local understanding of the urban resilience concept, and the initiatives being undertaken to build resilience of Kumasi by the urban planning-related institutions were required.

In relation to the data sources, both secondary and primary data were sourced for this study. The secondary data sources focused on review of literature from relevant and related published materials, including journals articles, books, reports and other internet sources. The literature review was useful in appreciating and appraising the key issues of urban development in African urban planning context, history and philosophy of urban resilience and the relevance of the urban

resilience concept in urban planning in Ghanaian cities. The literature review also formed the basis for the development of the conceptual framework for this study (see Chapter Two). Table 3.1 shows the data requirements and sources for the study.

**Table 3.1 Data Requirements and Sources**

<b>Data Required</b>	<b>Source of Data</b>	<b>Data Collection Technique</b>
Literature review	Journal articles; books; reports; and other internet sources	Internet and data base searches; library readings
Urban development and challenges	TCPD; KMA; NADMO, EPA, Department of Urban Roads; and urban residents	Semi-structured interviews; Household questionnaires; Secondary data analysis; Participant observation
Climate change	Ghana Meteorological Service	Secondary data analysis
Urbanisation	GSS	Secondary data analysis
Understanding of urban resilience concept	TCPD; KMA; Department of Urban Roads, EPA; Ashanti Regional Lands Commission; and NADMO	Semi-structured interviews; Secondary data analysis
Evidence of urban resilience occurring in Kumasi	TCPD; KMA; NADMO, EPA and Ashanti Regional Lands Commission; and Urban residents	Semi-structured interviews; Household questionnaires; Secondary data analysis; Participant observation
Efforts/initiatives towards building urban resilience in Kumasi	TCPD; KMA; NADMO, EPA, and Ashanti Regional Lands Commission;	Semi-structured interviews; Secondary data analysis

Source: Author's Construct, November, 2015.

As illustrated in Table 3.1, the primary data on urban development and challenges (e.g., data on climate change and urbanisation) in Kumasi, and the available or potential opportunities for managing the urban development and management challenges within the context of urban resilience concept was collected from the offices of the Ghana Meteorological Service, Kumasi, the Town and Country Planning Department, Kumasi (TCPD), the Kumasi Metropolitan Assembly (KMA), National Disaster Management Organisation (NADMO), Environmental Protection Agency (EPA), Department of Urban Roads, Ashanti Regional Lands Commission, Kumasi and residents of the three selected case study communities/suburbs in Kumasi. The development plans of the KMA and policy documents of NADMO and EPA were used as sources

of data for understanding available policy frameworks or guidelines for making the city resilient in the face of changing climate and rapid urbanisation.

### **3.5 Data Collection Techniques**

In undertaking this study, four key data collection techniques were used, including semistructured interviews with agency officials of selected institutions, household questionnaire surveys with urban residents in the three selected case study communities/suburbs in Kumasi, participant observation to appreciate the extent of urban development and management challenges, and secondary data analysis. These data collection techniques were useful in facilitating and enhancing the data collection process and were useful in answering the research questions. The following sections examine how the data collection process was carried out.

#### ***3.5.1 Pretesting***

Prior to the data collection, pretesting was carried out to appreciate the usefulness and suitability of the data collection techniques in answering the research questions. The pretesting provided an avenue for the researcher to improve the quality of the research techniques through modifications of the interview and survey questions to more accurately focus on the research questions. Pretesting, as variously reported, refers to the use of a sample interview guide or questionnaire in a small pilot survey to ascertain its suitability. This process, according to Backstrom and Hursch (1963), is important because no amount of intellectual activity can be a replacement for testing a research technique prepared with the objective of communicating with people.

In this study, 12 household respondents from Atonsu (a suburb in Kumasi) were involved and participated in the household questionnaire survey administration as a pretesting exercise. Twelve household respondents were selected because a sample of 12 is considered satisfactory for a pretesting exercise (Ferber & Verdoorn, 1962). At the institutional level, two officials from the TCPD were involved in the semi-structured interviews as part of the pretesting exercise. The pretesting was necessary for determining the strengths of the data collection techniques in responding to the research questions.

### ***3.5.2 Semi-structured interviews***

The use of semi-structured interviews offered the researcher adequate flexibility in approaching the respondents in a variety of ways, while still focusing on the various aspects of the data collection (Mohd Noor, 2008). In applying this data collection technique, a list of questions (interview guide) based on the research questions and objectives was used and provided the research enough space to seek and probe further into the issues. These questions were mostly open-ended, and structured reasonably beginning with basic questions including the roles of the institutions (see Appendix 1). This arrangement invigorated respondents' interests in the study, allowed the researcher to seek clarifications and focused on the research questions based on the identified strengths and knowledge of respondents.

The semi-structured interview data collection technique was used in the collection of institutional data. As discussed in Section 3.4, this technique focused on understanding the urban development imperatives – both challenges and prospects – of Kumasi from the perspectives of relevant and related agency officials. Other data solicited through this data collection technique were the urban resilience efforts in urban planning, and frameworks or guidelines for building resilient city going forward. The interview time ranged from 45 minutes to 60 minutes, depending on the interests and knowledge of the research topic and willingness of the agency officials.

### ***3.5.3 Household questionnaire survey***

The household questionnaire survey was designed based on open and closed-ended questions, with unrestricted comment field. As shown in Appendix 2, this structure provided respondents the freedom to give further details, explanations and information to support their responses to the closed-ended questions. This structure also prevented the researcher from preempting responses regarding urban development and management challenges, and efforts towards resiliency, and ensured high degree of objectivity and impartiality in the data collection. Similar to the semistructured interviews, questions for the household questionnaire survey were logically structured with basic questions relating to the household, such as household demographics, being presented first, and then questions of their experiences with urban development challenges and opportunities, particularly with urbanisation and climate, following. This process was useful as respondents were relaxed, immersed and fully engaged in the survey.

The household questionnaire survey was conducted with residents of three communities/suburbs in Kumasi (see Section 3.6 for details on the sampling process). The household questionnaire survey was carried out face-to-face with respondents, focusing on household heads, and also ensuring gender equity. For example, in cases where heads of households are mostly men, permission was sought from the men to allow the interview to be conducted with their wives (women), ensuring gender equity in respondents' participation. Responses from the household questionnaire survey were hand written due to their brevity. To cater for non-responses due to some respondents' unwillingness to participate in the study, additional household questionnaire survey were administered. The average time for the household questionnaire survey administration was 20 minutes.

#### ***3.5.4 Participant observation***

Participant observation was used as an effective tool for collecting emotional and physical data. It is true that the semi-structured interviews and the household questionnaire surveys were useful in collecting data on urban development and management in Kumasi, as well as efforts towards creating resilient cities, some data could not be collected through such techniques. Physical data in the form of challenges of urban development (e.g., poor transport systems, sanitation, slums etc.) were collected through participant observation (e.g., pictures). Participant observation provided the researcher the opportunity to understand the state of urban development in Kumasi, as it provided the researcher the platform to participate in the data collection process.

Regarding emotional data, participant observation was used to support the data collected through the semi-structured and household questionnaire survey by documenting the feelings/emotions of both agency officials and community respondents observed during the data collection. The participant observation led to the collection of two sets of data, descriptive and pictorial. The descriptive data sets provided credence to the semi-structured interview and household questionnaire survey data by describing the mood of the respondents. The pictorial data set collected using cameras provided visual confirmation to support the data collected using the other data collection techniques, in the form of photographs.

### ***3.5.5 Secondary data analysis***

Secondary data are important sources of information for any given research. This is because secondary data sources such as published and unpublished documents can serve as a foundation and provide further guidelines for determining the research purpose, especially in cases where issues or problems are identified in the documents (Merriam, 1998). This data collection technique was useful for this study because issues of urban development and management as well as urban resilience efforts are frequently documented in development plans, programmes and policies.

The secondary data collection focused on documents provided by the selected institutions, including medium-term development plans (2000-2015) from the KMA, urban resilience-related policy documents from NADMO and EPA, land development documents (2000-2015) from the Ashanti Regional Lands Commission, Kumasi. These documents provided important data for understanding both the challenges and prospects of urban resilience in Kumasi, and efforts towards resiliency.

## **3.6 Sampling Techniques**

The impossibility of surveying the entire population because of resource and time constraints makes sampling an important process in research. The sampling process, for Agyedu et al. (1999), makes it possible to limit a research to a relatively small portion of the population, which is generalisable for the whole. The sampling process for this research was undertaken at two levels: institutional and household. The following sections examine the sampling processes.

### ***3.6.1 Institutional sampling process***

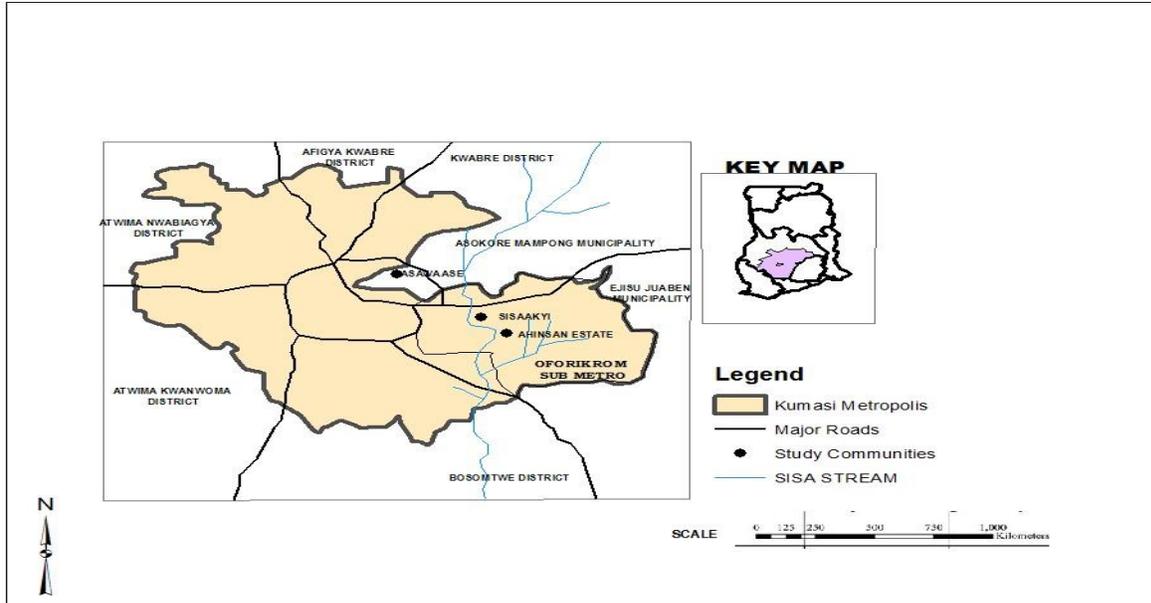
This study used both probability and non probability sampling methods. Under non probability sampling, this study used purposive sampling to provide in-depth data from a smaller and relevant number. Six urban planning and management institutions were purposively sampled to provide data regarding urban development and management in Kumasi. The use of the purposively sampling method ensured the selection and involvement of institutions with adequate knowledge and experience with the research topic (Guarte & Barrios, 2006).

The selected institutions involved in the semi-structured interviews included: KMA (Development Planning and Physical Planning Units) responsible for the socio-economic and physical

development of Kumasi; the TCPD responsible for the physical and spatial planning of Kumasi; the Ashanti Regional Lands Commission, Kumasi responsible for land administration in Kumasi and the Ashanti Region as a whole; the Department of Urban Roads (DUR) Kumasi contributes to road provision and maintenance in the city; Environmental Protection Agency (EPA) responsible for environmentally responsible development in Kumasi; and the National Disaster Management Organisation (NADMO) responsible for disaster education and management. The involvement of these institutions was useful in understanding urban development imperatives in Kumasi, land development processes and the extent of stakeholder participation, which is the focus of the research questions.

### ***3.6.2 Household sampling process***

The multi stage sampling approach was employed to determine the household respondents involved in the household questionnaire survey. In applying the multi stage sampling technique, combination of different sampling techniques at various scales of sampling were employed. First, purposive sampling was used to select one district (Asokore Mampong Municipality) and one sub-metro (Oforikrom sub-metro) in the Kumasi Metropolitan Area, all in the city of Kumasi. Two communities: Sisaakyi and Ahinsan Estate, were selected from the selected sub-metro and one community (Asawase) was selected from the Asokore Mampong Municipality for the study (see Figure 3.1). Given time and resource constraints, purposive sampling was useful in selecting three case study communities from over 20 communities in Kumasi and its environs focusing on first class, slum and low income communities (see Table 3.2).



**Figure 3.1 The Case Study Communities in the Context of Kumasi**

Source: Adapted from Amponsah et al. (2016)

The households in the three case study communities constituted the study population. However, there was a lack of reliable data on the number of households in the case study communities. As a result, the housing stock was used as the sampling frame instead of households (see Table 3.2). The housing stock for each case study community was determined as the product of the average number of persons per house and the total population. The study used Slovin’s Formula to determine the sample size for the household questionnaire survey. The Slovin’s Formula is as follows:  $n = N/1+Ne^2$ , where  $n$  = sample size,  $N$  = sampling frame and  $e$  = margin of error. The sampling frame ( $N$ ) represents the estimated total number of houses in each of the three case study communities. With a margin of error of 0.08, the sample ( $n$ ) was determined from the sampling frame ( $N$ ) as shown in Table 3.2. A margin of error of 0.08 was used in this study because margin of errors of between 0.02 and 0.08 are usually considered appropriate for scientific research (Miller & Brewer, 2003). Additionally, a margin of error of 0.08 has been used in similar research (e.g., Amoateng et al., 2013). It was therefore considered appropriate for this research.

**Table 3.2 Sample Size Determination**

Case Study Communities	Criteria for Selection	Sampling Frame (Houses) (N)	Sample Size (n)
Sisaakyi	Flood vulnerable area	387	111

Ahinsan Estate	First class residential area	486	118
Asawase	Evidence of slum conditions	2525	147
Total		3398	375

Source: Estimates based on average persons per house and total population (2010 data)

Second, simple random sampling was used to select the houses to be involved in this study from the three case study communities. The lottery method where all houses in the case study communities were numbered and selected randomly was used for the simple random sampling. This sampling method ensured that all houses had equal chances of being selected. The final phase of the multi-stage sampling involved random purposive sampling. The random purposive sampling method is a technique used to select units of relevance to the study from a randomly determined group. Following the identification of the houses to be involved in this study, this sampling method was used to select household respondents from each of the three case study communities targeting heads of households. The random purposive sampling was important in ensuring that a single household is selected from every sampled house. This is because in the case study communities, about 2-5 households can share a house. In cases where most household heads were males, permission was sought from the male household heads to allow their wives (females) to participate in the survey. This process ensured gender equity in the responses.

### **3.7 Ethical Considerations**

Following the approval of the ethics information sheet (about confidentiality and the purpose of the study) by the Department of Planning, KNUST to conduct household surveys and interviews, data collection began with an introduction of the study purpose to the agencies and the case study communities. The researcher explained to the participants the purpose of the research and further ensured their confidentiality and anonymity. Also, participants were not forced or coerced to participate in this study.

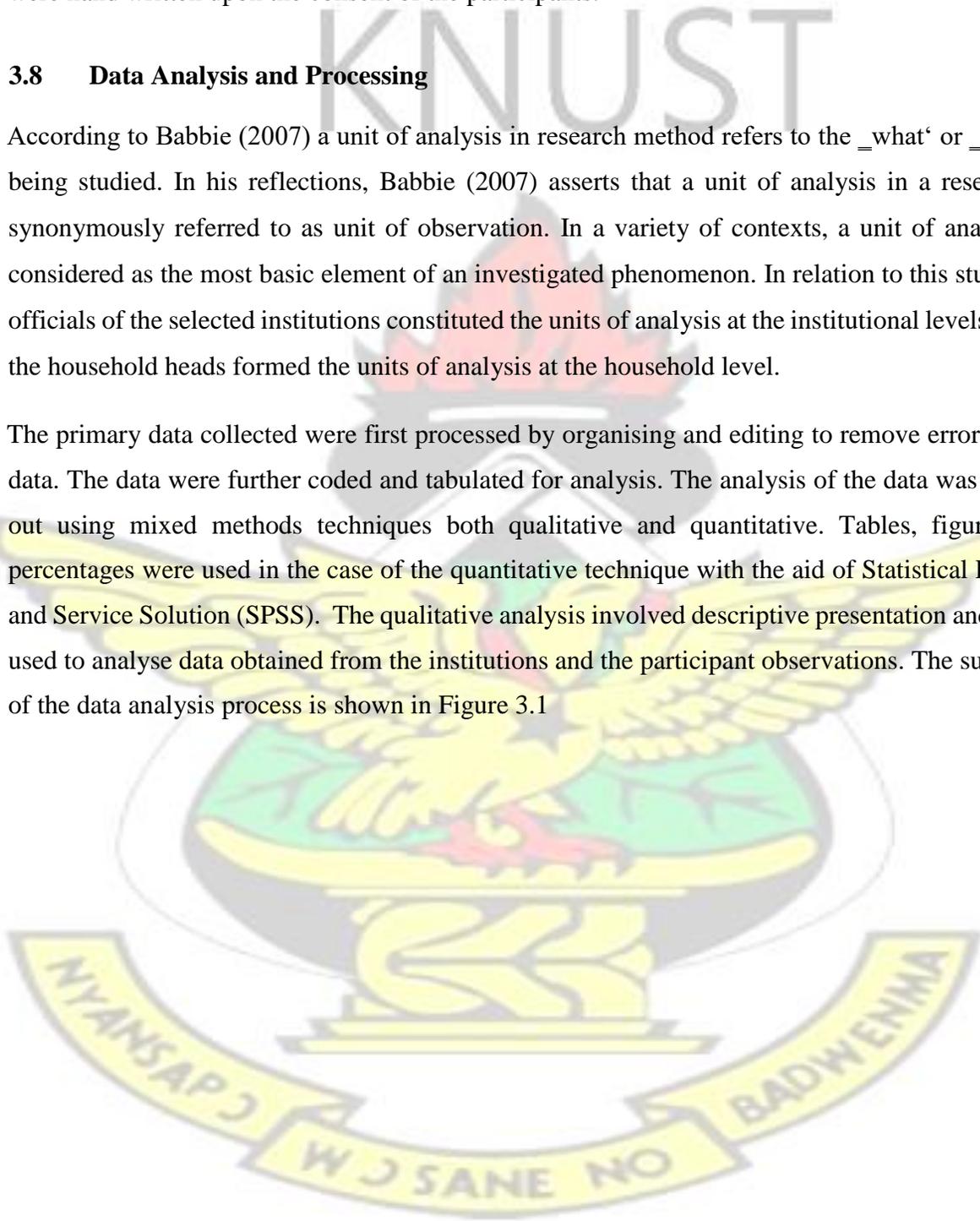
Regarding the semi-structured interviews with the selected institutions, the purpose of the study was explained, and their participation solicited. Upon understanding and agreeing to participate in the study, the participants were informed and their consent sought that the interview would be tape-recorded to reduce interview time and to capture all data needed. The researcher made it clear to the participants that the answers provided would remain confidential and would be used only for the purpose of this research. At the household level, the researcher explained the purpose of the

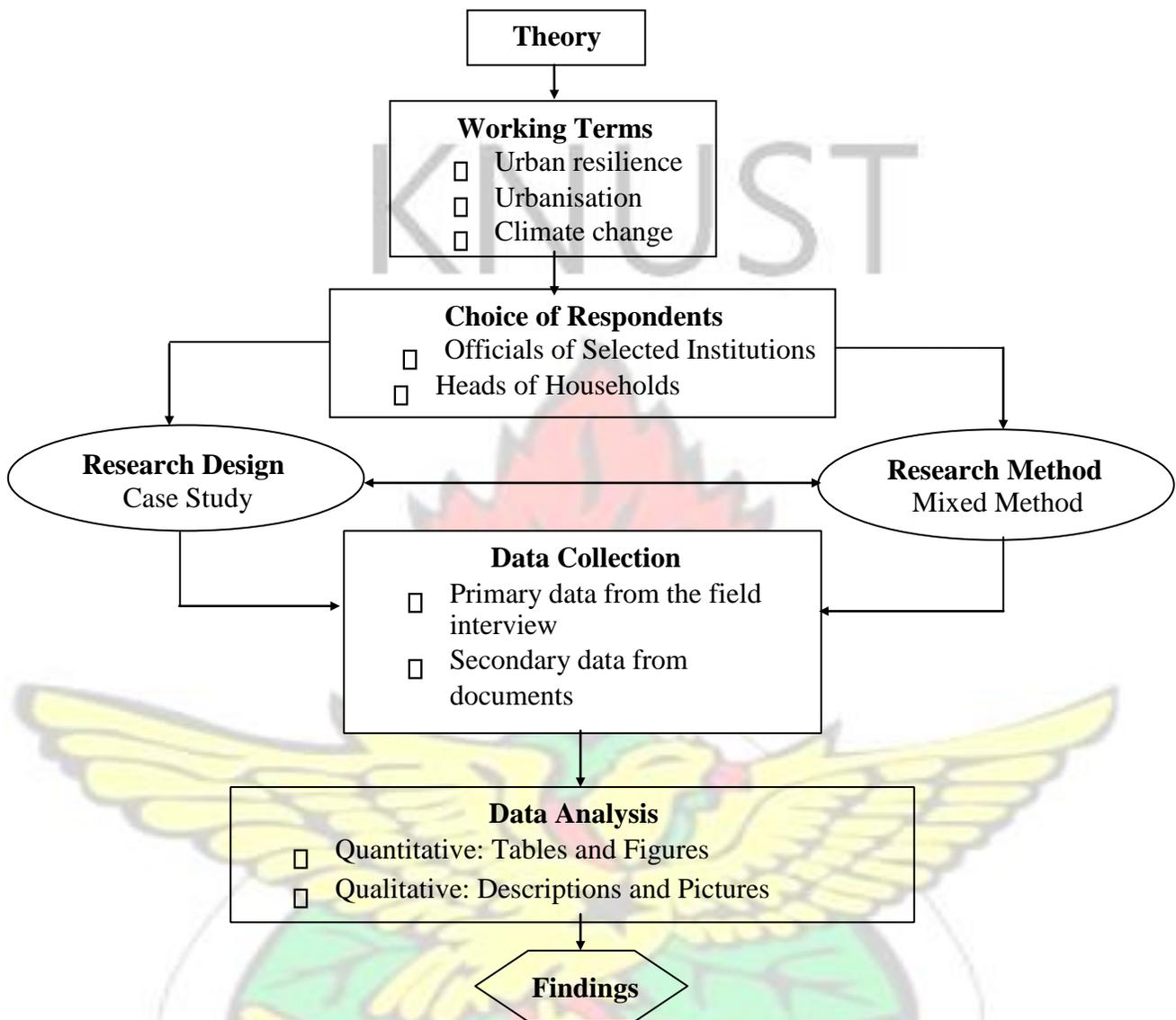
study to the participants and their anonymity and confidentiality. The participants' willingness and voluntary participation was used as an indication of their consent. Responses to household survey were hand written upon the consent of the participants.

### **3.8 Data Analysis and Processing**

According to Babbie (2007) a unit of analysis in research method refers to the 'what' or 'whom' being studied. In his reflections, Babbie (2007) asserts that a unit of analysis in a research is synonymously referred to as unit of observation. In a variety of contexts, a unit of analysis is considered as the most basic element of an investigated phenomenon. In relation to this study, the officials of the selected institutions constituted the units of analysis at the institutional levels, while the household heads formed the units of analysis at the household level.

The primary data collected were first processed by organising and editing to remove errors in the data. The data were further coded and tabulated for analysis. The analysis of the data was carried out using mixed methods techniques both qualitative and quantitative. Tables, figures and percentages were used in the case of the quantitative technique with the aid of Statistical Product and Service Solution (SPSS). The qualitative analysis involved descriptive presentation and it was used to analyse data obtained from the institutions and the participant observations. The summary of the data analysis process is shown in Figure 3.1





**Figure 3.1 Data Analysis and Reporting Framework**

Source: Adapted from Waugh (1995)

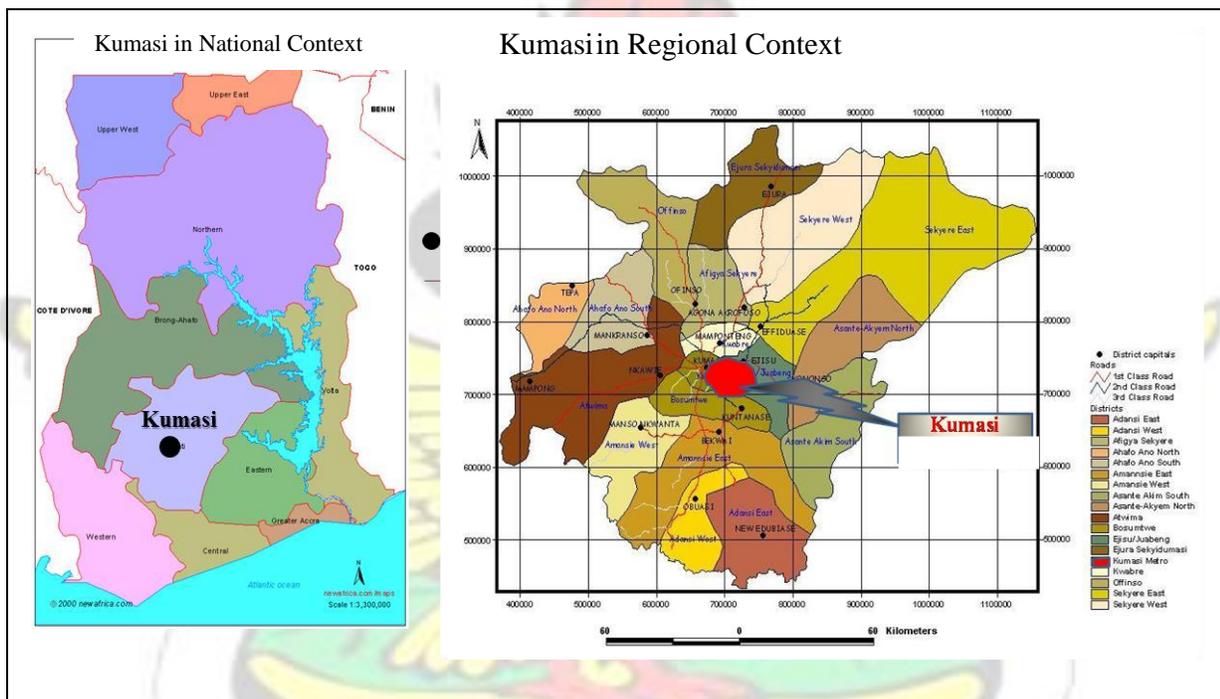
### 3.9 Profile of the Study Area

#### 3.9.1 Location and size

Kumasi remains the second largest city in Ghana with its geographical location in the transitional forest zone, about 270 km north of the national capital, Accra (Cobbinah & Amoako, 2012). In the context of regional capitals, Kumasi is situated 397 km south of Tamale (the Northern

Regional Capital) and 120 km south east of the Brong Ahafo Regional Capital, Sunyani (Adarkwa, 2011). The city covers a total land area of 254 km<sup>2</sup>, between latitudes 6°35' N and 6°40' and longitudes 1° 30' and 1°35'. Generally, Kumasi has an undulating topography with elevations ranges from 250 m to 300 m above sea level. Within the framework of climatic conditions and zones, the city is located in the wet sub-equatorial region, with an average minimum temperature of about 21.5° C and a maximum average temperature of about 30.7° C.

Kumasi has two rainfall patterns; 214.3 mm in June and 165.2 mm in September each year (Adarkwa, 2011). Figure 3.3 shows the geographical location of Kumasi.



**Figure 3.3 Geographical Location of Kumasi**

Source: Kumasi Town and Country Planning Department (2011).

Adarkwa (2011) argues that Kumasi has a high population density and is surrounded by districts with relatively dense population due to, among others, the spill over of population from the city leading to several urban management challenges. In fact in 2010, Kumasi was reported as the most populous metropolis in the Ashanti region with a population density of about 5419 persons per km<sup>2</sup>. The next section examines the demographic characteristics of Kumasi.

### ***3.9.2 Demographic characteristics of Kumasi***

According to the 2010 Population and Housing Census of Ghana, Kumasi accommodated a total of 2,035,064 people as at 2010 (GSS, 2012), at an annual growth rate of 5.4% (Cobbinah & Amoako, 2012). Kumasi's annual growth rate is higher than the Ashanti region and national growth rates of 2.7% and 2.5% respectively, emphasising the rapidly urbanising nature of the city. With high population density (5419 persons per km<sup>2</sup>), it is unsurprising that traffic congestion, slum development, urban sprawl and destruction of urban greenery and ecologically sensitive areas have become a commonplace in Kumasi.

### ***3.9.3 Economic activities in Kumasi***

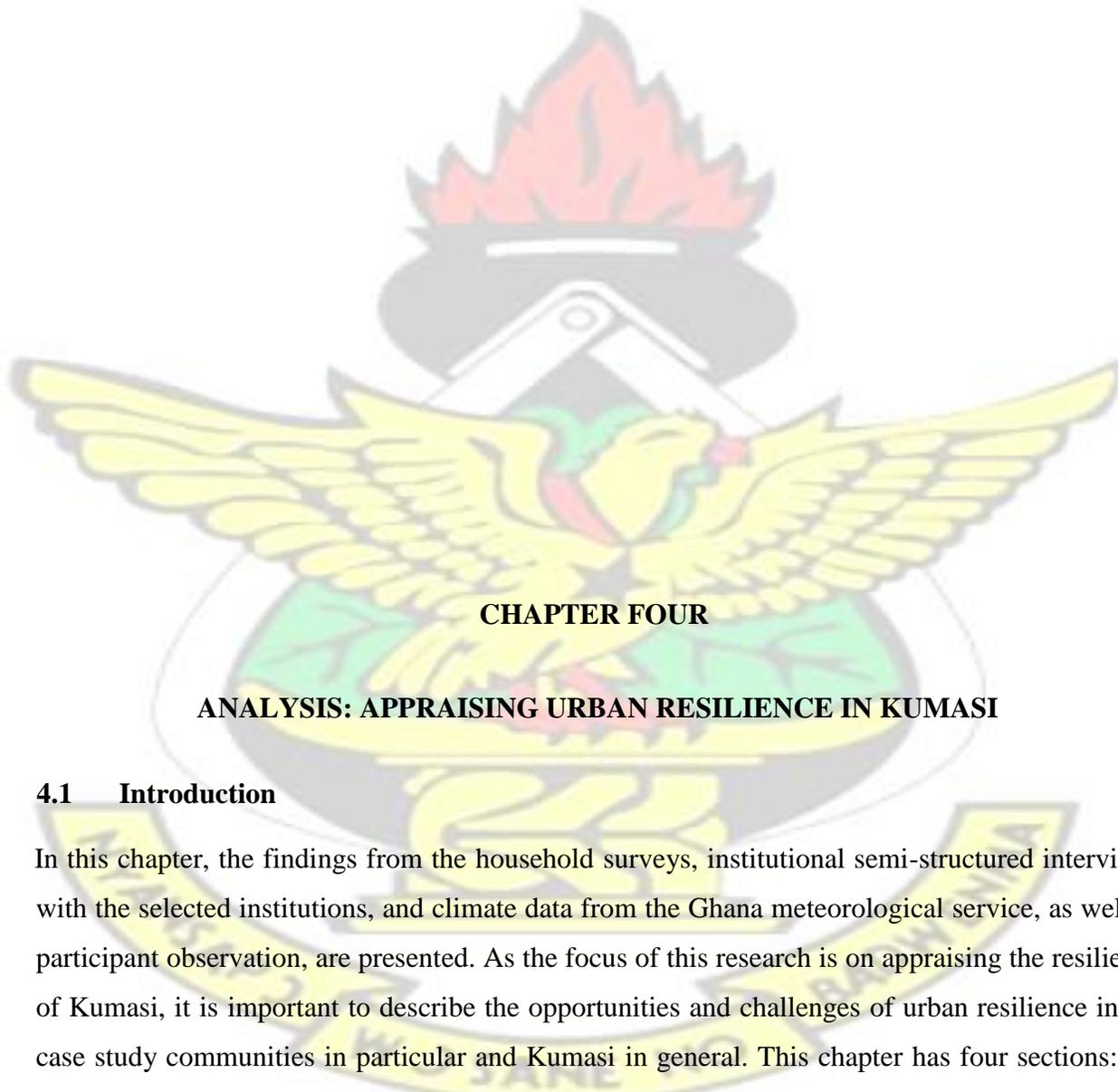
Kumasi's economy is epitomised by three sectors: informal and formal. Yet, over 75% of Kumasi's inhabitants are engaged in the informal sector, making it an important sector in the city (GSS, 2012). Many of those engaged in the informal sector are self-employed individuals and groups (e.g., artisans, market women, traders etc.). Unfortunately, the informal sector is poorly organised, both spatially and institutionally. As a result, the streets, pedestrian walkways and nature reserves have become a safe haven for informal activities and operators, creating congestion, haphazard development and urban blight.

## **3.10 Chapter Summary**

This chapter has presented the methods and processes used in this study. The chapter discussed the mixed methods research used in this study and further explored the case study research design. Kumasi was selected as the case study area with three communities/suburbs further sampled as case study communities; Sisaakyi, Asawase and Ahinsan Estate. These communities were selected to provide diverse experiences regarding urban development challenges and climate change impacts across the city. The sampling approach and analysis techniques were discussed in this chapter.

Other issues discussed in this chapter include the profile of the study area covering the geographical location of the case study area, the demographic and economic characteristics of Kumasi. The rapid population growth of Kumasi has contributed to urban management challenges such as congestion, slum proliferation, uncoordinated physical development and destruction of urban greeneries. The next chapter presents the findings of this study.

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## **CHAPTER FOUR**

### **ANALYSIS: APPRAISING URBAN RESILIENCE IN KUMASI**

#### **4.1 Introduction**

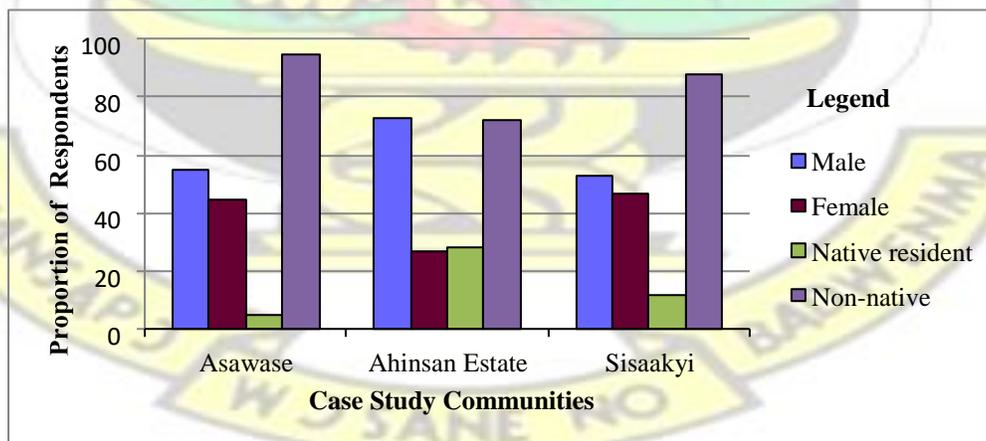
In this chapter, the findings from the household surveys, institutional semi-structured interviews with the selected institutions, and climate data from the Ghana meteorological service, as well as participant observation, are presented. As the focus of this research is on appraising the resilience of Kumasi, it is important to describe the opportunities and challenges of urban resilience in the case study communities in particular and Kumasi in general. This chapter has four sections: the first section presents the characteristics of respondents; the second section analyses evidence of climate change and its patterns in Kumasi, and further compares it with local understanding. The

third section evaluates key issues and insights of urban development in Kumasi, and fourth section defines the opportunities and challenges of urban resilience in Kumasi.

#### 4.2 Characteristics of Respondents

Household survey results show that over 50% of respondents across the case study communities are males mostly heads of households. As presented in Figure 4.1, more than 80% of household respondents in both Asawase and Sisaakyi are non-natives. These respondents are mostly relocated residents from northern Ghana (64%), Volta region (21%) and other parts of Ghana (15%). Interestingly, Asawase and Sisaakyi communities are variously reported as slums and some of the major hotspots for migrants particularly from northern Ghana (see Amoako & Cobbinah, 2011).

This finding may provide an understanding as to why these two communities are largely unplanned and frequently faced with urban development and management challenges such as poor sanitation and housing and flooding (see Owusu-Ansah, 2015). The situation is however different in Ahinsan Estate where over 20% of respondents were indigenes or natives of Kumasi. In this case, it may be reasonable to argue that neighbourhoods with considerable native residents are comparatively better in terms of location, flooding and basic urban planning challenges (e.g., poor sanitation) than those dominated by migrants. This is because native residents have higher tendency to improve their living environments and may be in a better position to adapt to changing climate and manage urbanisation challenges compared to migrant residents who often work and send remittances and/or return to develop their communities of origin.



**Figure 4.1 Gender Characteristics and Residency Status of Respondents**

Source: Field Survey January-February 2016.

This section examines the basic household socio-demographic characteristics of the case study communities, such as household size, education, occupation, and income and expenditure patterns. These factors form the basis for understanding the nature of the case study communities, in terms of opportunities and challenges, and the extent of their capacities to adapt to changing climate and urban development challenges in Kumasi, as well as building resilience.

#### 4.2.1 Household size

As presented in Table 4.1, the household survey results show that over 50% of households across the three selected communities in Kumasi have more than five household members, which is higher than the metropolitan and national averages of 3.8 and 4.4 persons per household respectively (GSS, 2012).

**Table 4.1 Household Size of Respondents (n=375)**

Case Study Communities	1-2 Household Size (%)	3-5 Household Size (%)	Over 5 Household Size (%)
Asawase	13	34	53
Ahinsan Estate	41	32	27
Sisaakyi	14	17	69
<b>Overall</b>	<b>22</b>	<b>28</b>	<b>50</b>

Source: Field Survey January-February 2016.

The situation is more pronounced in the Asawase and Sisaakyi communities, where over 65% of household respondents have more than five members compared to Ahinsan Estate, where only 27% of respondents have more than five household members. Discussions with respondents revealed that the poor communities (i.e. Asawase and Sisaakyi) consider large household size as a form of future security, particularly for household heads in old age, in relation to receiving support from their younger household members. The respondents in Asawase (45%), predominantly an Islamic community, further mentioned that their religion encourages polygamous marriage, a reason that has contributed to large household size among residents. However, a review of the KMA development plan shows that other factors such as illiteracy, poverty, the lack of family planning programmes and facilities, and traditional norms and culture have influenced household size in the case study communities, particularly Sisaakyi.

Large household sizes have implications on urban resilience. The large household sizes would invariably contribute to urbanisation and some cases occupation of vulnerable grounds (e.g., areas

liable to flooding). For example, the case study communities where large household sizes were reported (Asawase and Sisaakyi) exhibit characteristics of slum and low income communities. Thus, with large household sizes, the capacity of these communities to adequately respond to the dual challenges of climate change and rapid urbanisation may be weakened.

#### 4.2.2 Educational characteristics

Given that household size in the case study communities is influenced by socio-cultural issues, it is unsurprising that findings from the household survey indicate that majority of respondents in Asawase and Sisaakyi communities have had relatively low levels of formal education compared to Ahinsan Estate. As presented in Table 4.2, about 10% of household respondents have never received any form of formal education, while 27% have received tertiary level education, mostly from Ahinsan Estate (39%). Interestingly, despite the fact that respondents from the Sisaakyi having large household size (see Table 4.2), they mostly have higher levels of education. This situation suggests that issues of large household size do not always influence household educational characteristics and illiteracy.

**Table 4.2 Educational Characteristics of Household Respondents (n=375)**

Case Study Communities	Tertiary (%)	Senior High/ Technical (%)	Junior High (%)	Primary (%)	Never (%)
Asawase	12	23	31	15	19
Ahinsan Estate	39	44	10	5	2
Sisaakyi	29	52	3	6	10
<b>Overall</b>	<b>27</b>	<b>40</b>	<b>14</b>	<b>9</b>	<b>10</b>

Source: Field Survey January-February 2016.

Across the three case study communities, the respondents mentioned the lack of educational opportunities in their communities during their formative years (between 5-20 years) as a cause of high illiteracy, particularly in Asawase and Sisaakyi. The KMA development plan (2010-2013) however identifies the prospects of informal activities as a motivation for residents in low income communities (e.g., Sisaakyi) to abandon school and engage in income generating activities contributing to low level of education in these communities.

The level of education among urban residents is central in building resilient communities. Urban residents' ability to understand climate change and its impacts as well as understand the causes and impacts of urbanisation are to a large extent influenced by their level of education. With over 10% of the respondents across the case study communities without any formal education, efforts towards addressing climate change and urbanisation challenges as well as building urban resilience are likely to be difficult. It is thus understandable that case study communities with relatively low levels of education (e.g., Asawase) have large household sizes.

#### 4.2.3 Occupational characteristics

Findings from the household survey show that all respondents were employed. However, households in the case study communities have different occupations and/or sources of income, both formal (11%) and informal (89%). The household survey results show that commerce remains the main employment sector for the households across the three case study communities. Commerce includes income generating activities such as petty trading, hawking, and self-owned businesses. As presented in Table 4.3, over 50% of respondents across the case study communities are employed in the commerce sector. Discussions with the household respondents revealed that the case study communities largely depend on small scale petty trading for their sustenance.

**Table 4.3 Employment Sectors of Household Respondents (n=375)**

Case Study Communities	Commerce (%)	Industry (%)	Service (%)	Agriculture
Asawase	61	11	28	0
Ahinsan Estate	19	9	70	2
Sisaakyi	84	0	13	3
<b>Overall</b>	<b>55</b>	<b>7</b>	<b>36</b>	<b>2</b>

Source: Field Survey January-February 2016.

Apart from commerce, service (e.g., hair dressing, tailoring, commercial drivers, civil servants etc.) is another major source of livelihood for the households. About 36% of respondents earn their income from and engaged in the service sector. The service sector employment is however higher in the Ahinsan Estate community (70%) compared to the other case study communities (see Table 4.3). Only 2% and 7% of households across the three case study communities depend on agriculture and industry sectors as sources of income.

Given the large number of households involved in the commerce sector, particularly in Asawase and Sisaakyi, the household survey results further show low incomes of households in the case study communities, compared to the national daily minimum wage (GH¢ 8.00, October 2015 rate). As presented in Table 4.4, the average monthly income across the three case study communities is below GH¢ 1500.00. The household survey results show that less than 15% of respondents across the three case study communities earn monthly incomes above GH¢2000.00.

Discussions with the respondents identified the dominance of petty commercial activities in Asawase and Sisaakyi as reason for relatively low income compared to those in Ahinsan Estate.

**Table 4.4 Monthly Income Patterns of Household Respondents (n=375)**

Range of Monthly Income (GH¢)	Case Study Communities			Overall (%)
	Asawase	Ahinsan Estate	Sisaakyi	
	%	%	%	
Under 100	2	0	6	2.7
100-500	21	7	42	23.3
501-1000	58	13	11	27.3
1001-2000	15	49	39	34.3
Above 2000	4	31	2	12.3
<b>Average Monthly Income</b>	<b>GH¢1,312</b>	<b>GH¢ 2,230</b>	<b>GH¢ 856</b>	<b>GH¢1,466</b>

Source: Field Survey January-February 2015, (US\$ 1 = GH¢ 3.93, February 2016 rate).

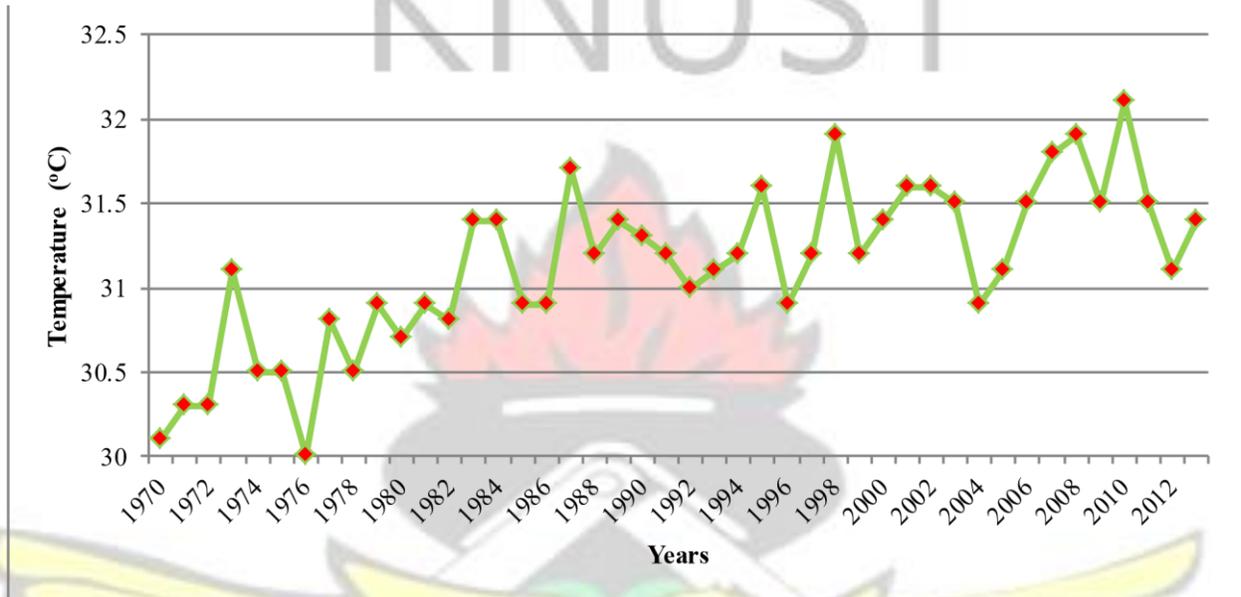
These basic household characteristics provide a context to analyse the extent of climate change impacts on the case study communities, and the urban development challenges confronting them. This is because the household characteristics have provided an understanding of the background of the respondents and the socio-economic conditions which are fundamental in climate and urban studies research. The next section presents findings on climate change in Kumasi and how the phenomenon is impacting on the case study communities. The known relationships between these socio-economic attributes and climate change and resilience are also analysed.

### **4.3 Evidence and Patterns of Climate Change in the Kumasi Metropolis**

#### **4.3.1 Increasing temperature**

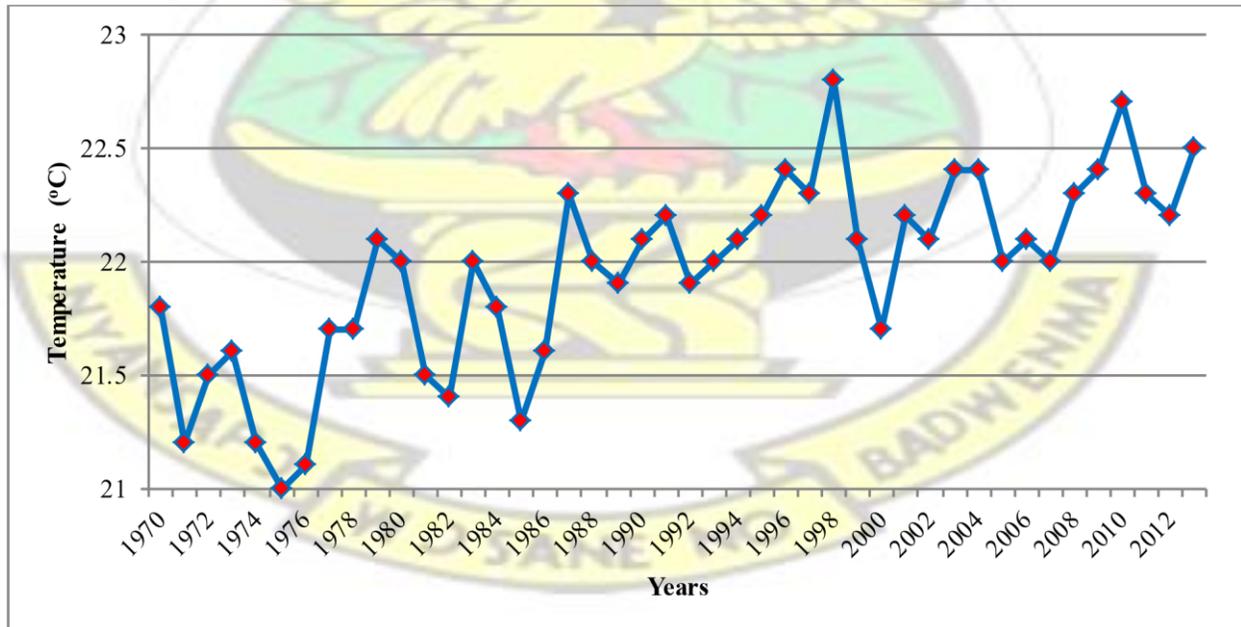
An analysis of temperature data over the last 40 years available from the Ghana Metrological Department office in Kumasi revealed a gradual increase in both the average maximum and average minimum temperatures (see Figures 4.2 and 4.3). Although the mean temperature shows

an increasing trend, the climate data were highly variable. For example, the average mean maximum temperature ranges from 30.0°C in 1975 to 32.1°C in 2010. Similarly, year 1975 and 1998 had the lowest average minimum temperature of 21.0°C and highest average minimum temperature (22.8°C) respectively.



**Figure 4.2 Mean Maximum Temperature of Kumasi (1970-2013)**

Source: GMet (2016)



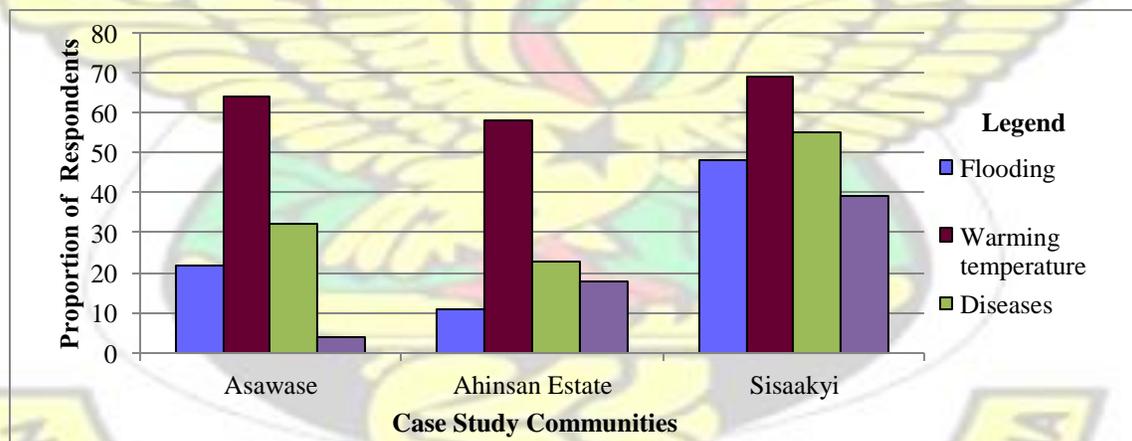
**Figure 4.3 Mean Minimum Temperature of Kumasi (1970-2013)**

Source: GMet (2016)

Between 1970 and 2013, the average maximum temperature of Kumasi increased by 1.3°C.

However, the highest change in the average maximum temperature of Kumasi occurred between 1975 and 2010 when a change of 2.1°C was recorded. Similarly, the average minimum temperature increased from 21.8°C in 1970 to 22.5°C in 2013 representing a change of 0.7°C. However, the highest change of 4.8°C in the average minimum temperature was recorded between 1975 and 1998.

These statistical changes in temperature were further compared with impressions and opinions of residents in the case study communities during the household survey questionnaire administration based on the research methodology. Similar observations related to the increasing trend of warming, unpredictable rainfall and its impact on the survival of residents were reported by the communities, particularly Sisaakyi. As illustrated in Figure 4.4, majority of respondents in Sisaakyi reported impacts in relation to perennial flooding and warming weather, compared to Ahinsan Estate and Asawase communities.



**Figure 4.4 Respondents Perceptions of Climate Change Impacts**

Source: Field Survey, January-February 2016

Discussions with the respondents, particularly those in Sisaakyi and Asawase where the perceived impacts of climate change seem severe (see Figure 4.4), revealed that perennial flooding (see Section 4.3.2 for causative factors) and the increasing temperature resulting in warm weather have contributed to increasing attacks from mosquitoes as their communities have become favourable

grounds for mosquito breeding. Although this situation is largely a result of poor sanitation conditions in these two communities and may not necessarily be effects of climate change, the respondents blamed climate change as the cause of warming weather and perennial flooding in the case study communities.

Consequently, an increasing trend of insanitary and water-borne diseases was reported including malaria, cholera and dysentery. To a large extent, the insanitary conditions and water-borne diseases are a result of human induced activities leading to environmental degradation. Yet, the local communities maintained that changing climate in the form of flooding and warming weather is to be blamed for the insanitary conditions and water-borne diseases. Similarly, a decreasing trend of the riparian (buffer) zone of water bodies (Sisa stream) were reported due to prolonged dry season, unpredictable rainfall and increased human population, and over exploitation of land resources. This finding is consistent with Quagraine's (2011) claim of increasing depletion of nature reserves of river bodies in Kumasi. Although Quagraine (2011) accused poor urban planning and rapid urbanisation as causes to destruction of nature reserves, findings from this research indicate that the local communities perceive climate change as the cause.

In summary, across the three case study communities, the perceived impacts of climate change in relation to increasing temperature appears to be more pronounced in Sisaakyi and Asawase compared to Ahinsan Estate. This is because majority of respondents in these two communities mentioned and extensively discussed these issues than Ahinsan Estate (see Figure 4.4). The perceived impacts of climate change by the case study communities are also supported by the climatic data which indicate a rising temperature in Kumasi although highly variable. This finding corroborates those of Cobbinah and Anane (2015) and IPCC (2013) who argue that issues of climate change affect the world's most vulnerable and poor communities. It is however important to emphasise that this finding is only in relation to increasing temperature. It is important to evaluate climate change from the perspective of precipitation. The next section thus examines climate change in relation to rainfall patterns.

#### ***4.3.2 Erratic and low rainfall***

With Kumasi's geographical location in the wet equatorial climatic zone of Ghana, the city experiences double maxima rainfall patterns with major rainy season occurring between March

and July and the minor rainfall season occurring between September and November each year. A noticeable variation in rainfall patterns over the last 40 years has occurred in Kumasi (see Table 4.5). The average total annual rainfall in Kumasi during the last 40 years from 1970 to 2013 was only 1011 mm which is low in comparison to the national annual average rainfall of 1187 mm (World Bank, 2016). As presented in Table 4.5, the highest total rainfall (1668.3 mm) occurred in 2002 while 1984 recorded the lowest total rainfall of 914.4 mm. According to Owusu-Ansah (2015), this period (1982-1984) was characterised by frequent bush fires and destruction of farmlands which contributed to food shortages in Kumasi in particular and Ghana in general.

The rainfall pattern was analysed with reference to the case study communities using both meteorological data and household respondents' observation during the household survey. A trend was observed in a highly variable rainfall pattern in minor rainy season remarkably in September to November, affecting the planning of the economic activities of residents in the case study communities. As discussed in Section 4.2.3, majority of respondents across the three case study communities are engaged in the commerce sector and involved in petty trading and hawking, which are considerably influenced by unpredicted precipitation, because such activities often occur in the open. Additionally, mean dry season rainfall in December to February was found to be very erratic and highly variable between 1970 and 2013.

**Table 4.5 Pattern of Rainfall (mm) in Kumasi (1970-2013)**

Year	Total Rainfall (Jan-Dec)	Total Dry Season Rainfall (Dec-Feb)	Total Major Rainy Season Rainfall (March-July)	Total Minor Rainy Season Rainfall (SeptNov)
1970	1322.8	51.8	785.3	442.4
1972	1630.9	190.3	888	525
1974	1411.7	61.3	893.4	306.3
1976	1474.1	89.4	123.7	433.2
1978	982.8	176.8	512.9	75.7
1980	1538.2	127.6	633.2	355.9
1982	1191.2	143.6	460.8	210.8
1984	914.4	22.2	804.5	398
1986	1232.6	132.1	734.2	297.8
1988	1520.4	88.9	1056	360.5
1990	1219.2	184.8	573.6	433.5
1992	1063.5	16.2	589.3	427.6
1994	1111.1	7.3	156.1	370.3

1996	1040.9	135.8	638.4	157.1
1998	1092.2	110.1	731.8	174.7
2000	1488.5	69.6	1011.8	341.8
2002	1668.3	14.6	1090.1	487.8
2004	1415.3	173.1	607.8	519.4
2006	1159.8	213.2	579.1	302.3
2008	1452.0	108.5	886.8	264.1
2010	1197.5	105.7	165.9	430.8
2012	1521.4	183.6	955.7	378.7
2013	1597.8	96.7	736	510.6

Source: GMet (2016)

The household respondents across the three case study communities (75%) reported that flood cases were common and widespread during the major rainy season (March-July) due to extended and extreme nature of rainfall. Other respondents (21%) indicated cases of potential flash floods between December and February because of, among others, encroachment on riparian zones of streams and indiscriminate dumping of solid wastes into streams and drains. Thus, in reality, these floods may not be related to climate change but normal rainfalls in which human activities have degraded or blocked natural waterways leading to flood even at the least rainfall. These findings were confirmed by the institutional officials (e.g., NADMO, KMA and EPA) who, despite admitting the natural influence of the variations in the rainfall pattern on flood events, emphasised that poor attitude of local residents, in terms of dumping of solid wastes, and occupation in unbuildable landscape in the city as major contributing factors to flood events. One institutional official commented that:

*... It is true that changes in rainfall patterns have contributed to some flooding in the city. However, I think the problem we have in this city is that many residents especially those living in communities such as Moshie Zongo, Asawase, Aboabo, Sisaakyi etc. don't pay attention to their environment; they dump garbage indiscriminately on streets, drains and even into water bodies. In such situations, what else do you expect than flooding? ... EPA, January 2016.*

This finding supports those of Owusu-Ansah (2015) who found that the impervious surfaces resulting from the removal of wetlands, riparian lands and urban vegetation, in addition to deposits of sediments and domestic wastes into streams and drains, have combined to contribute to flooding in surrounding built up areas particularly areas on lower terrains.

The climate data analysis has demonstrated that although there is evidence of climate change and variability in Kumasi, with Sisaakyi and Asawase appearing to be the most vulnerable compared to Ahinsan Estate, in terms of economic activities, geographical locations and environmental conditions, the perceived effects of climate change are likely to be related to human induced activities rather than climate change. The next section presents findings on key issues and insights on urban development in Kumasi, in order to appreciate the state of preparedness of Kumasi in the face of climate change and variability and urbanisation. This will provide a context to evaluate urban resilience efforts in Kumasi, with emphasis on the case study communities.

#### 4.4 Urban Development in Kumasi: Key Issues and Insights

While it may be appropriate to argue that climate change remains a major challenge to urban living and development, an analysis of key urban development issues will provide an understanding of the extent of other influences on urban development patterns of Kumasi, particularly in the case study communities. This section focuses on three issues: the housing characteristics, social services conditions and urban management challenges in the case study communities. These issues are explored in the following sections.

##### 4.4.1 Housing types of respondents

As presented in Table 4.6, less than 30% of household respondents across the three communities live in detached houses. However, the majority of household respondents in Ahinsan Estate lived in detached (51%) and semi-detached (41%) houses. These are single-houses occupying a large land area (usually 100 feet \* 100 feet) often walled and occupied by a single household. The high proportion of Ahinsan Estate respondents' occupation of detached and semi-detached housing types may reflect the history of Ahinsan Estate compared to Sisaakyi and Asawase communities, and the income levels of the respondents (see Table 4.4). The history is that Ahinsan Estate, unlike Sisaakyi and Asawase, was designed and built as a low cost government estate. As a result, it exhibits characteristics of a first class residential area: dominance of detached houses, motorable and accessible roads.

**Table 4.6 Housing Types of Respondents (n=375)**

Case Study Communities	Detached (%)	Semi-detached (%)	Compound (%)
Asawase	21	25	54

Ahinsan Estate	51	41	8
Sisaakyi	5	26	69
<b>Overall</b>	<b>25</b>	<b>31</b>	<b>44</b>

Source: Field Survey, January-February 2016.

Alternatively, the majority of respondents in Asawase (54%) and Sisaakyi (69%) live in compound housing type, where multiple households occupy different rooms in a single house and share facilities such as compound, bath house and kitchen. This, of course, is not to say that all areas in Sisaakyi and Asawase have compound housing, but as presented in Table 4.6, compound housing type is dominant compared to Ahinsan Estate. While it may be logical to argue that that these communities are largely slum and migrant communities – lack basic amenities, findings from this research show that although some Sisaakyi (23%) and Asawase (19%) respondents have lived in their communities for less than five years, majority of them have been residents for more than 10 years. Thus, the migratory status of residents of Sisaakyi and Asawase may not explain the dominance of compound housing occupation. Besides, the household survey results show that 34% of Ahinsan Estate respondents have lived in the community for less than five years, indicating that respondents' housing type is not influenced by the period of occupation or residency.

#### ***4.4.2 Availability and conditions of basic amenities in the case study communities***

Given the variety of housing types in the case study communities, the community and institutional interviewees were asked to mention and describe the availability and condition of basic social amenities in their communities. As presented in Table 4.7, the quality of living conditions in all the three case study communities is mostly based on the availability and quality of, and the level of access to basic amenities or facilities. Based on the household survey findings and field observations, the legend below Table 4.7 provides descriptions of the quality and access to basic amenities in the case study communities.

**Table 4.7 Availability of and Conditions of Basic Amenities**

<b>Basic Facilities</b>	<b>Ahinsan Estate</b>	<b>Asawase</b>	<b>Sisaakyi</b>
Health centre	Good condition	Good condition	No health facility
	Health professional available	Health professional available	Not applicable
Primary school	Good condition	Good condition	Good condition
	Adequate teachers	Inadequate teachers	Inadequate teachers

Junior High School (JHS)		Good condition	Good condition	Good condition
		Adequate teachers	Adequate teachers	Adequate teachers
Potable sources	water	Pipe water/ Borehole	Piped water	Pipe water
Natural sources	water	Not applicable	Well	Well
Sanitation		Good sanitation	Poor sanitation	Poor sanitation
Internal roads		Untarred	Untarred	Untarred
		Dusty	Bumpy and dusty	Bumpy and dusty

Source: Based on Field Survey, January -February 2016. **Legend**

**for Table 4.7**

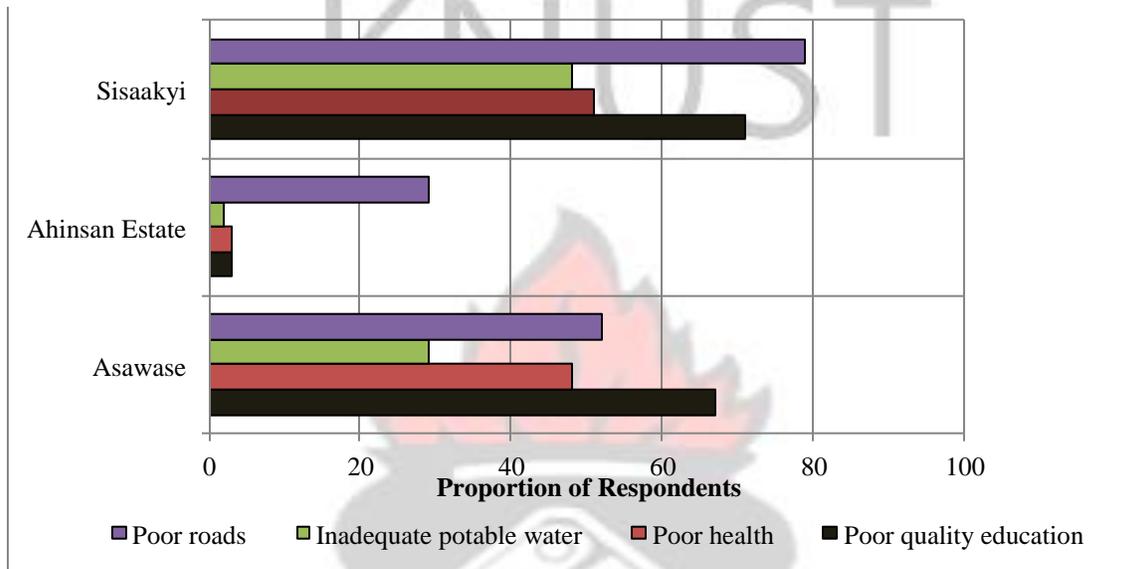
1. Good condition (no leaking roof; quality building structure; availability of working materials/equipment);
2. Bad condition (leaking roof; dilapidated structure; lack of materials/ equipment);
3. Adequate teachers (availability of required numbers of trained teachers);
4. Inadequate teachers (low numbers of trained teachers; availability of untrained teachers, locally referred to as pupils' teachers);
5. Good sanitation (availability of public and private toilet facilities; well-maintained; effective ways of solid and liquid waste disposal); and
6. Poor sanitation (one public toilet facility for the whole community; unkempt; indiscriminate disposal of waste and defecation).

Across the case study communities, issues with education mostly relate to the quality in the form of poor academic performance. As illustrated in Table 4.7, poor quality of education was interpreted in relation to the availability of inadequate trained teachers, and teaching and learning materials. Majority of respondents particularly in Asawase (67%) and Sisaakyi (71%) reported this issue emphasising severity of this issue in these two communities compared to Ahinsan Estate (see Figure 4.5). One Sisaakyi respondent said that:

*... My only child has failed his exams [Basic Education Certificate Exams] three times ... there are few qualify teachers here [Sisaakyi public school] to teach them ... how can my child continue to the senior high school? ... Sisaakyi 17, January 2016.*

The above quote indicates that the issue of inadequate teachers is a major challenge in Sisaakyi and Asawase. However, as shown in Figure 4.5, few respondents (5%) in Ahinsan Estate reported poor quality of education. Further clarification with the respondents revealed that, unlike Asawase and Sisaakyi where most of the respondents have their children in public schools, majority of Ahinsan Estate respondents (89%) have their children in private schools which they believe

provide quality education compared with public schools. Nevertheless, some (6%) of those who reported having their children in public schools in Ahinsan Estate did not mention poor quality education as a challenge.



**Figure 4.5 Respondents Perceptions on Education, Health, Water and Roads in their Communities**

Source: Field Survey, January-February 2016.

Although most institutional interviewees (5 out of 6) mentioned and admitted the generally poor quality of education in the city particularly low income communities including Asawase and Sisaakyi, they put the blame on the households. These institutional officials reported that, despite the availability of basic schools in every neighbourhood in Kumasi, households in low income communities‘ desire of making financial gains from their children often encourage their children to engage in petty trading. This situation has resulted in the substitution of education with child labour. One official indicated that:

*... We are not saying children should not help their parents or guardians with their income generating activities. What we don't encourage is children abandoning classes just to make money for their parents/guardians. Unfortunately, this has become the practice in localities such as Aboabo, Asawase ... KMA, January 2016.*

In addition to the issue of poor quality education in the case study communities, findings from this research show that poor health characteristic is a challenge. However, poor health characteristic manifests differently in each of the case study communities. In the Sisaakyi and Asawase

communities, respondents mostly lamented the lack of health facility and high cost of accessing health care respectively. As illustrated in Figure 4.5, 51% of Sisaakyi respondents and 48% of Asawase respondents expressed disappointment with the situation, arguing that it is affecting the wellbeing of residents, as every illness or injury has to be taken outside the community for treatment, and residents have to pay more for health care services. One Sisaakyi respondents mentioned that:

*... In our community, we don't have any health facility; we have to go to Ahinsan, Bomso or Tech [neighbouring communities] to access healthcare ... Sisaakyi 21, January, 2016.* The remaining Sisaakyi respondents (49%) who did not complain about poor health characteristics indicated that Sisaakyi's location in close proximity to Tech, Bomso and Ahinsan makes it easy to access healthcare, a reason they believe there is no need for a health facility in their community. The remaining respondents in Asawase (52%) were happy with the availability of both private and public healthcare facilities within their reach. However, as shown in Figure 4.5, these issues were not considered problems in Ahinsan Estate, except the issue of untarred roads which 29% of respondents mentioned it as a challenge confronting them. This situation emphasises Ahinsan Estate's relatively well planned residential status.

The above analysis has shown that although all the case study communities have their own challenges in terms of availability and access to basic social amenities, the situation varies considerably from one community to another. While Asawase and Sisaakyi seem to be on the same scale as far as social service provision, access and infrastructure conditions are concerned, those in Ahinsan Estate appear to be better off in relation to these social amenities, as a few respondents mentioned them. This situation of different perceptions on availability and condition of basic amenities may also influence residents' perspectives on critical urban management challenges in the city. The next section explores this issue.

#### **4.4.3 Urban management challenges in the case study communities**

As discussed in Chapter Two, urban studies literature on Ghana and Kumasi in particular is replete with urban management challenges such as slums (e.g., Amoako & Cobbinah, 2011), flooding (Owusu-Ansah, 2015), unplanned and haphazard development (e.g., Amoateng et al., 2013), urban sprawl (e.g., Cobbinah & Amoako, 2012) and open spaces destruction (Quagraine, 2011). These

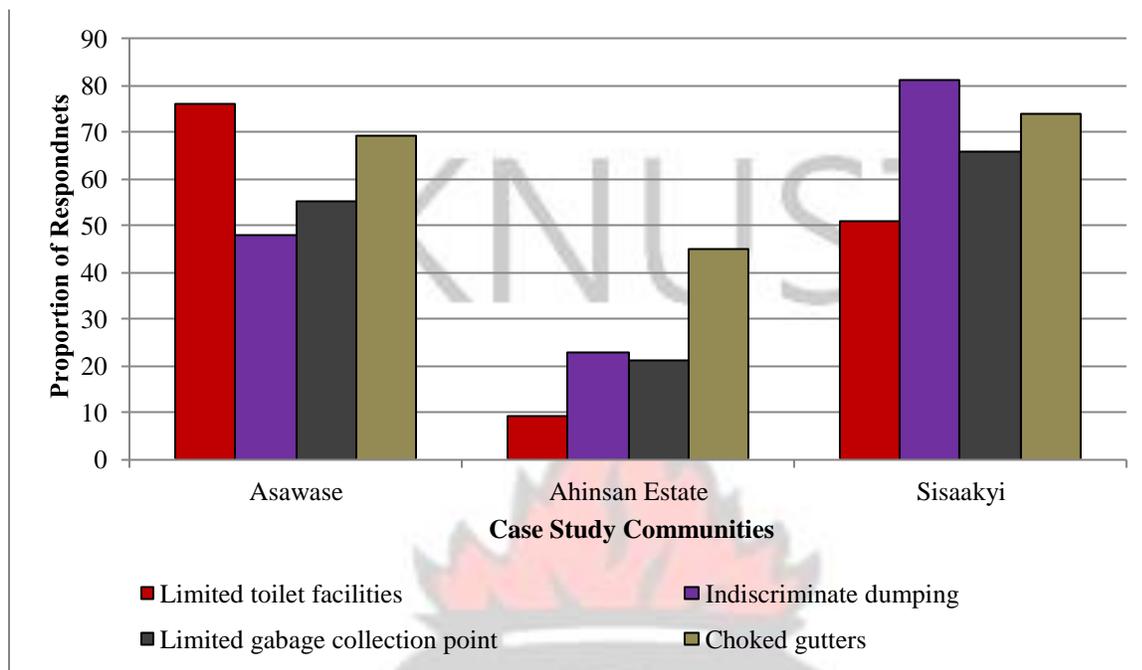
studies portray the extent of deterioration in Kumasi's urban landscape influenced by both natural and anthropogenic factors. However, in understanding issues of urban resilience, it is imperative to evaluate local communities' perspectives on what they consider urban challenges. This is necessary in developing management strategies that are in sync with the local communities' aspirations and reflect their interests. This section of the chapter thus focuses on community perspectives on major urban management challenges confronting them. These responses are further compared with institutional officials' perspectives to appreciate the extent of the challenges at the city-wide level.

Findings from the household survey identify three major urban development challenges facing the case study communities. These include poor sanitation, destruction of ecologically sensitive areas, and mushrooming of unplanned informal development/settlements. Although these issues were mentioned and discussed across the three case study communities, the nature, extent and impact differ from one case study community to another. These issues are discussed in the following sections.

#### *4.4.3.1 Poor sanitation*

Across the three case study communities, the household survey results show that poor sanitation is a major challenge. However, the nature and extent of poor sanitation vary considerably from one case study community to another. As illustrated in Figure 4.5, while Sisaakyi community respondents explained poor sanitation in relation to indiscriminate dumping of both solid and liquid wastes, those in Asawase reported of limited toilet facilities. For example, over 70% of the Asawase respondents reported limited public toilet facilities. This situation, according to the respondents, affects their daily activities as sometimes they are compelled to queue before using the public toilet facilities. One Asawase respondent mentioned that:

*.. Toilet facility is a problem in the whole Asawase ... Where I live, we have only one public toilet serving all those living here ... Asawase 16, February 2016.*



**Figure 4.5 Sanitation Conditions in the Case Study Communities**

Source: Field Survey, January-February 2016

In Sisaakyi, the respondents were more concerned with the indiscriminate dumping of both solid and liquid wastes (see Figure 4.5). Over 80% of Sisaakyi respondents reported widespread incidence of indiscriminate dumping in the community, which some believe has contributed to fertile breeding grounds for mosquitoes in the community. One respondent indicated that:

*... Because we don't have enough waste collection points [two waste collection points]. Many people have taken advantage of that to dump their waste anywhere including gutters because they claim they can't walk long distances to dump their waste ... Some people even throw their solid waste on the streets ... Because of that, mosquitoes have become our friends here ... You can't sit outside for 10 minutes after 6 pm without getting malaria from mosquito bites ... Sisaakyi 43, January 2016.*

In Ahinsan Estate, however, many respondents (45%) were particularly worried with choked gutters. Discussions with respondents reveal that infrequent desilting of the gutters by submetropolitan council coupled with activities of some nonchalant residents discharging their liquid waste into broken gutters which often spill onto roads remains a major sanitation challenge.



**Figure 4.6 Sanitation Condition in Sisaakyi**

Source: Field Survey, January-February 2016.

In such a situation, it is not surprising that poor sanitation was reported as being most frequent and very severe urban issue across the three case study communities. As presented in Table 4.7, whilst 64% of Asawase respondents reported poor sanitation as very frequent occurrence in their community, 91% of Sisaakyi respondents also emphasised the same situation. This highlights the seriousness of the situation. It is thus understandable 91% of Sisaakyi respondents consider poor sanitation as a very severe challenge confronting their community compared to only 11% of Ahinsan Estate respondents.

**Table 4.8 Community Responses of the Frequency and Severity of Poor Sanitation (n=375)**

Case Study Communities	Frequency (%)				Severity (%)			
	Very Freq	Freq	Less Freq	Infrequent	Very severe	Severe	Less severe	Not severe
Asawase	64	21	10	5	43	31	16	10
Ahinsan Estate	3	1	24	72	11	23	48	18
Sisaakyi	91	9	0	0	91	7	2	0
<b>Overall</b>	<b>52.7</b>	<b>10.3</b>	<b>11.3</b>	<b>25.7</b>	<b>48.3</b>	<b>20.3</b>	<b>22.0</b>	<b>9.3</b>

Source: Field Survey January-February 2016.

Very Frequent (when the issue is a daily challenge); Frequent (when the issue is a weekly-monthly challenge); Less frequent (when the issue is an annual challenge); Infrequent (when the issue is perceived to be rare challenge) Very severe (when the issue is the most persistent worrying challenge); Severe (when the issue is a worrying one but not a daily challenge); Less severe (when the issue is a yearly concern); Not severe (when the issue is perceived not to generate any concern or worry).

In summary, poor sanitation is widespread across the three case study communities with various degrees of frequency and severity. However, the situation in Sisaakyi and Asawase appears to be more pronounced compared to Ahinsan Estate (see Table 4.8)

#### 4.4.3.2 Destruction of ecologically sensitive areas

The problem of destruction of ecologically sensitive areas was mostly reported in Sisaakyi and Ahinsan Estate communities. This situation is understandable as these two communities are traversed by the Sisa stream. In Sisaakyi, the respondents mentioned that the riparian zone of the stream is increasingly depleted because of human occupation which they claim is due to limited habitable land. As presented in Table 4.9, the frequency and severity of ecologically sensitive areas in Sisaakyi is indescribable as over 90% of respondents mentioned and extensively discussed this issue. One community respondent indicated that:

*... This community is squeezed between the stream [Sisa stream] and the Ahinsan-Bomso Road. This is a small stretch of land occupied by thousands of people, so what do you expect? ... We will definitely develop close to the banks of the stream because we don't have any option ... Sisaakyi 18, January 2016.*

**Table 4.9 Community Responses of the Frequency and Severity of Ecological Sensitive Area Destruction (n=375)**

Case Study Communities	Frequency (%)				Severity (%)			
	Very Freq	Freq	Less Freq	Infrequent	Very severe	Severe	Less severe	Not severe
Asawase	0	0	5	95	0	0	5	95
Ahinsan Estate	24	3	1	72	48	23	18	11
Sisaakyi	89	11	0	0	90	7	3	0
<b>Overall</b>	<b>37.7</b>	<b>4.7</b>	<b>2.0</b>	<b>55.7</b>	<b>46.0</b>	<b>10.0</b>	<b>8.7</b>	<b>35.3</b>

Source: Field Survey January-February 2016.

Very Frequent (when the issue is a daily challenge); Frequent (when the issue is a weekly-monthly challenge); Less frequent (when the issue is an annual challenge); Infrequent (when the issue is perceived to be rare challenge) Very severe (when the issue is the most persistent worrying challenge); Severe (when the issue is a worrying one but not a daily challenge); Less severe (when the issue is a yearly concern); Not severe (when the issue is perceived not to generate any concern or worry).

Although the Sisaakyi respondents are aware of the implications of living in close proximity to the stream in terms of flooding and destruction of the riparian zones, they argue that unless government and city authorities support them, they have nowhere to go but to live in such perilous environment. Interviews with the KMA official however suggest that many of the Sisaakyi residents are occupying unauthorised location unrecognised by the Metropolitan Assembly, a reason why many of them lack basic social amenities such as sanitation facilities. Unfortunately, the KMA seems not to have any plans for the Sisaakyi community as the official did not provide any indication of immediate support or relocation for those living in unauthorised locations in Sisaakyi.

In contrast, Ahinsan Estate respondents (53%) reported that the riparian zone of the Sisa stream is increasingly being depleted due to the activities of Sisaakyi and other upstream communities, and to some extent, Ahinsan Estate residents. According to these respondents (53%), residents from Sisaakyi and other upstream communities use the Sisa stream as a dumping ground for solid waste. The solid waste pollutes the water and frequently gathers at the banks of the stream, damaging the riparian zone. This situation, according to the EPA official, is severely impacting on the quality of the water body, as the stream has gradually been turned into a dumping gutter. The EPA official however admitted that the institution cannot deal with the problem alone but requires the support of the local communities in terms of reforming their attitudes and supporting the conservation of the water body.

#### *4.4.3.3 Growing unplanned informal settlements*

Unplanned informal settlements are common in the Kumasi metropolis. Amoako and Cobbinah (2011) conveniently describe these unplanned informal settlements as slums and include neighbourhoods such as Aboabo, Asawase, Sisaakyi and Moshie Zongo. These neighbourhoods are described as slums because they are largely and officially unplanned, lack basic social services, often exhibit poor housing structures and lack good internal circulation. Across the three case study communities, majority of residents in Asawase (78%) and Sisaakyi (81%) admitted that their communities are slums. Figure 4.7 shows housing condition in Asawase community.



**Figure 4.7 Evidence of Poor Housing Condition in Asawase and Sisaakyi Respectively**

Source: Field Survey, January-February 2016.

In Asawase, the respondents (78%) mentioned that many Asawase residents are migrants who are trying to make ends meet and that are not much concerned about the appropriateness of their housing units. They argue that building a house or renting a decent accommodation in Kumasi is expensive, and that they cannot afford. Thus, although they are aware that their living environment is not very appropriate, they are not overly concerned. One Asawase respondent said that:

*... I am here to work and support my family back home [Northern Region], I am not here to rent an expensive house ... it is true that conditions in this house and this community are not the best, but I can't complain. If I get money, I will get a better house in my home town [Northern Region] ... Asawase 40, February, 2016.*

Similar findings were reported in Sisaakyi, where the respondents argue that they are mostly migrants. As discussed in Section 4.2, about 85% of Sisaakyi residents are non-natives emphasising its migratory status. As a result, majority (67%) of the respondents held an opinion that they are temporary residents and that it is not a great deal to invest in their housing structure and the community. An interviewee from Sisaakyi commented that:

*... It is true you can't compare this community to Ahinsan Estate, Ahodwo, Kwadaso Estate and others ... the houses are built with poor quality materials, are congested and unplanned. We are aware of it but we need money for more important things like sending*

*our children to school, buying food and clothing ... if the government wants to help us, it can plan our community for us ... Sisaakyi 9, January 2016.*

Interviews with the institutional officials reveal that the planning-related institutions are aware of the slum conditions in these communities. While the KMA official indicated that efforts have been made over the past years to provide such communities with potable water, toilet facilities and schools, the TCPD official also indicated that some of these communities have been rezoned for regularisation. The TCPD official was however unsure whether the case study communities particularly Asawaase and Sisaakyi have been rezoned yet.

The above analysis has shown that the various communities are confronted with different urban management challenges which have implications on their capacity to achieve urban resilience. The next section explores urban resilience in Kumasi and the case study communities in particular in order to appreciate the extent of preparedness of the communities in responding to emerging global threats particularly climate change and rapid urbanisation.

#### **4.5 Understanding Urban Resilience in Kumasi**

As discussed in Chapter 2, the urban resilience concept is gaining increasing recognition in urban planning studies. While generally there seems to be a consensus on the importance of the concept in building adaptable societies in the face of changing climate and urban development challenges, it remains to be demonstrated whether local communities and institutions are abreast with the global recognition of the relevance of urban resilience. This section of the Chapter presents an analysis of the local understanding and interpretation of urban resilience concept and locally initiated efforts towards urban resilience. The following sections explore these issues.

##### ***4.5.1 Understanding the concept of urban resilience: institutional perspectives***

As discussed earlier in Chapter Two, the established urban resilience ideology, emphasising sustainable development and effective management over the traditional adhoc reactive approaches to urban planning in developing countries, particularly in Africa has resulted in the recognition of urban resilience as a ‘transformation drive’, due to its basic principles of building adaptable and enduring urban environments. This characteristic of the urban resilience concept is based on the nine key tenets or principles developed by UNISDR (2013); its potential to: engage multiple stakeholders in the planning process; incorporate risk assessment; make safe land

available for urban development; provide public space for streets and infrastructure; upgrade informal settlements; install risk-reducing infrastructure; assess urban development contribution to improving lives; develop good information on risks; and protect ecosystems (see Chapter Two for details). Using these nine tenets as a framework for understanding urban resilience in Kumasi, there appears to be a limited understanding of the concept among urban planning-related institutions. Out of the six urban planning-related institutions interviewed, only two (NADMO and EPA) had knowledge of the concept of urban resilience. The NADMO official asserted that:

*... In Kumasi here, many of the institutions that are supposed to create the environment for building resilience of communities and residents, don't even know what resilience is, let alone understand what goes into it ... NADMO, February 2016.*

To accurately reflect the institutions' perspective on urban resilience, the meaning of urban resilience was explained to the institutions in terms of its tenets. The institutional officials were further asked to express their understanding of urban resilience in relation to their institutions' activities. Although the interview data suggest a variation in the meaning of urban resilience, all institutional officials consistently mentioned and discussed incorporating risk assessment and information sharing as an overarching theme of urban resilience. Some institutional officials explained that:

*... the concept of urban resilience can be explained as the process of safeguarding communities, people and their livelihoods through the provision and maintenance of quality and reliable road networks ... Department of Urban Roads, January 2016. ... Our understanding of urban resilience is about equipping people with the infrastructure they need to combat challenges such as floods, fires and other natural disasters ... KMA, January 2016.*

Other institutional interviewees (TCPD and Ashanti Regional Lands Commission) mentioned land development and the education of developers on urban land development to avoid locating in areas vulnerable to disasters. As pointed out by the TCPD official, the whole purpose of urban planning in Kumasi is about achieving resilience and sustainable development to reduce risk of natural and anthropogenic disasters:

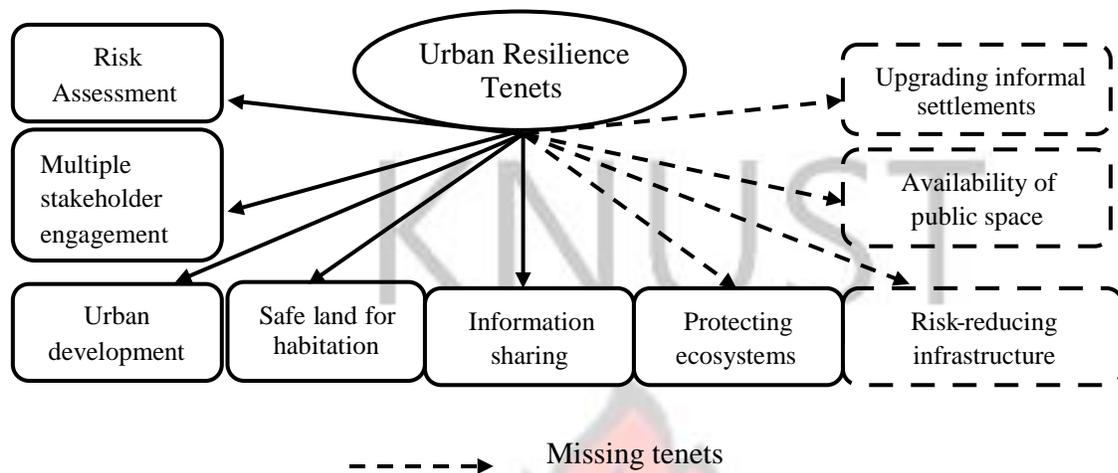
*... Urban resilience is all about disaster management and prevention. Disasters, whether natural or man-made, occur on land. This highlights the importance of land development in avoiding disasters and achieving resilience ... In this case, if developers are fully educated by us [TCPD] and other stakeholders like the media on the importance of land development, then naturally we will achieve resilience, is that not the case? ... TCPD, January 2016.*

Other attempts to understand and describe urban resilience relate to information sharing among stakeholders and protecting ecosystems to allow proper drainage and avoid environmental erosion. Institutional interviews show that urban resilience involves information sharing between urban planning institutions, developers and local community residents. The NADMO and EPA officials explained that urban resilience encourages information sharing which is critical in protecting ecologically sensitive areas and resources in Kumasi:

*... It is good you are putting an institutional interpretation to urban resilience. To us at NADMO, urban resilience is got to do more with preparation ... It relates to the capacity that a city or community and its individuals have developed in their culture to maintain certain structures and functions despite major disturbances. This obviously includes the capacity to return to a stable equilibrium after that disturbance ... NADMO February 2015.*

*... The whole idea of resilience focuses on ensuring that there is harmony between the natural environment and built environment ... Urban resilience creates an environment where our ecosystem is protected, there is limited pollution and there is community understanding of these issues... EPA, January 2016.*

Analysis of the institutional interviews shows that while there is considerable understanding of the concept from institutions, only six out of the nine tenets of the concept (incorporating risk assessment, making safe land available for urban development, assessing urban development contribution to local residents, developing good information sharing, and protecting ecosystems) were evident in the institution's interpretations of urban resilience (see Figure 4.8). Although some institutional officials (NADMO, EPA and TCPD) are aware of, and recognised the need for risk assessment in terms of considering exposure, vulnerability and hazards in urban settlements development and services provision, their interpretations of urban resilience do not emphasise installing risk-reducing infrastructure.



**Figure 4.8 Urban Resilience Interpretations in Kumasi – Key Principles**

Source: Based on Field Survey, January-February 2016

These interpretations were further compared with urban planning-related documents (e.g., NADMO policy documents, KMA development plans) on Kumasi. Findings indicate that, aside the National Climate Change Policy 2013 which provides a broad overview of the impacts of climate change and has one of its five policy themes and strategic focus on disaster preparedness and response, there are no known urban resilience policies in Kumasi. Besides, the National Climate Change Policy 2013, as the name suggests, overly focused on climate change without adequately considering other variables (e.g., urbanisation) that interact to shape the future of urban Ghana. Although the interpretations of urban resilience based on the nine tenets outlined above appear to be central to National Climate Change Policy 2013, and the NADMO, EPA and KMA policy documents, such as KMA ‘\_Medium-term Development Plan (2010-2013)’, EPA’s ‘\_Climate Change and Ghanaian Economy (2007) report’, and the NADMO ‘\_National Climate Change Adaptation Strategy 2012’ and ‘\_the Hyogo Framework for Action 2005-2015’, discussions with the institutions in Kumasi show they have a limited understanding of the comprehensiveness of the concept. As a consequence, the NADMO official indicated that planning activities in Kumasi branded as resilient or sustainable development interventions are not geared towards achieving resiliency, because they do not accurately reflect the foundational principles of urban resilience. He explained the situation in relation to urban development in Kumasi:

*... We [residents of Kumasi] have over the years left the planning and management of Kumasi to the city authorities without demanding accountability of what goes on ... Many*

*of our city institutions often sit in their offices, issue building and other development permits without actually knowing what's happening on the ground. As a result, people are developing haphazardly even in water ways. Meanwhile these planning institutions sit in their offices thinking that they are promoting sustainable development and building resilience ... NADMO February, 2016.*

Examination of planning and resilience policies provided by NADMO, EPA and KMA further revealed that the various resilient tenets (i.e., risk assessment, multiple stakeholder engagement, urban development, information sharing, ecosystem protection and availability of safe lands for habitation) highlighted in those documents appear to have been influenced by the involvement and participation of international organisations such as United Nations Development Programme (UNDP) in the preparation of these documents, rather than by a locally driven understanding of resilience. As a result, there appears to be a disconnect between urban resilience tenets proposed in these documents, and what is applied in reality. Additionally, a review of these documents shows that their implementation has been marred with challenges, because international organisations supported their preparation whereas local institutions with limited understanding have implemented them. Considering the limited understanding and different interpretations of urban resilience amongst planning-related institutions, the case study communities were asked to describe the concept. Their responses are presented in the next section.

#### **4.5.2 Local communities' perspectives on urban resilience**

Findings from the household survey indicate that the idea of urban resilience was foreign to many local residents. As a result, the concept of urban resilience was explained to the respondents based on and the foundational tenets and were asked to indicate which of the tenets are visible or occurring in their communities, and which ones they consider necessary in their communities. Based on the nine foundational tenets, findings show an overwhelmingly limited appreciation of the cases or evidences of urban resilience in the case study communities. As present in Table 4.9, although majority of the respondents across the case study communities consider all the nine tenets to be applicable and necessary in their communities, less than 30% of the respondents reported evidence of the urban resilience occurring in the communities.

**Table 4.9 Community Perceptions of Evidence and Application of Resilience (n=375)**

Tenets of Urban Resilience	Asawase (%)		Ahinsan Estate (%)		Sisaakyi (%)		Overall (%)	
	Evidence	Applicable	Evidence	Applicable	Evidence	Applicable	Evidence	Applicable

1. Stakeholder engagement	13	87	31	95	12	83	18.7	88.3
2. Incorporating risk assessment	0	72	36	77	5	96	13.7	81.7
3. Making safe land available for urban development	0	94	3	88	0	98	1.0	93.3
4. Provision of public space	0	92	29	91	0	94	9.7	92.3
5. Upgrading informal settlements	0	98	0	58	0	92	0	82.7
6. Installing risk-reducing infrastructure	0	81	30	87	0	96	10.0	88
7. Urban development contribution to improve lives	9	94	41	90	15	97	21.7	93.7
8. Good information sharing system	14	98	52	94	21	76	29.0	89.3
9. Protecting ecosystems	0	53	2	81	0	44	0.7	59.3

Source: Field Survey January-February 2016.

Across the three case study communities, evidence of urban resilience is more evident in Ahinsan Estate compared to Sisaakyi and Asawase community. For example, while about 52% and 41% of Ahinsan Estate respondents reported evidence of urban resilience tenets number 8 (i.e. information sharing) and number 7 (i.e. urban development that contribute to improving lives) respectively, only 14% and 9% of Asawase respondents reported such evidences (see Table 4.9). A respondent from Ahinsan Estate commented that:

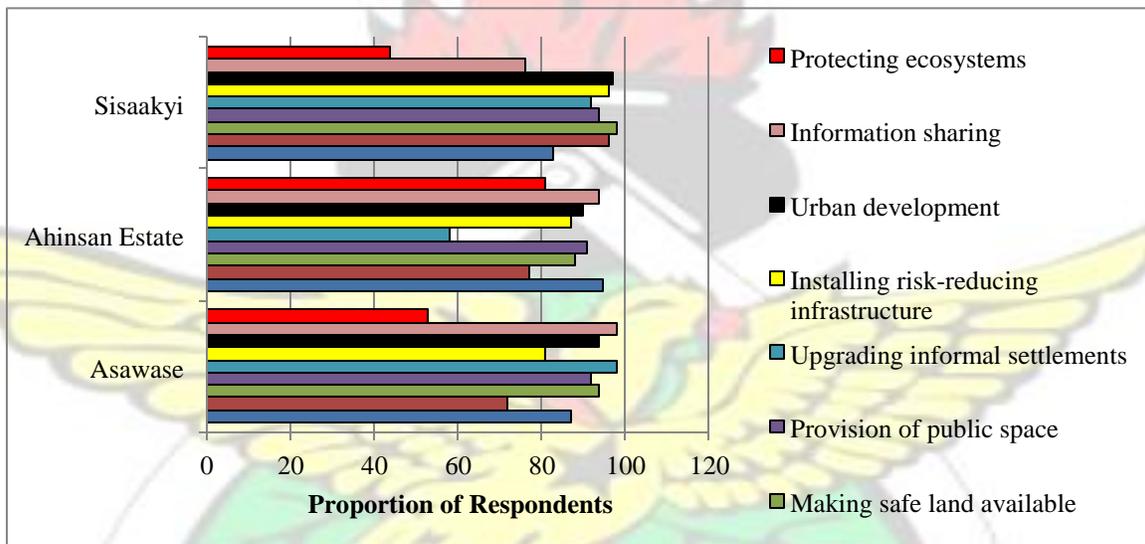
*... We can't say there are no problems in this community but we are fortunate compared to many areas in Kumasi. We have regular supply of water, there is electricity in every house here, our roads although untarred are in good condition, there is a Youth Centre here and many other facilities. It is a good place to live ... Ahinsan Estate 3 February 2016.*

Despite the relatively reasonable evidence of urban resilience in relation to the foundational tenets in Ahinsan Estate, Table 4.9 shows that household responses for 8 out of the 9 tenets were less than 50%. The situation was however worse in Sisaakyi and Asawase communities where 5 out of the 9 tenets were reported not to be occurring. Some respondents said:

*... I think if there is any minor man-made or natural disaster like fire outbreak or flooding, this community [Sisaakyi] will never recover ... As we sit here, we don't know what the city authorities are planning for us, we are not involved in any decision making, we are living in highly floodable zone, we lack many basic infrastructure; just have a look at the sanitation and road conditions here, very bad ... Sisaakyi 28, January 2016.*

... All that you are talking about [tenets of urban resilience] can only happen in Ahodwo, Danyame and other rich areas not here. Everyone is struggling to live here, nobody cares about us... Asawase 9, February 2016.

The foundational tenets that receive very low responses across the three case study communities include upgrading of informal settlements (0%), protecting ecosystems (0.7%), making safe land available for urban development (1%), and provision of public space (9.7%). While the low response rate of evidence of urban resilience for the aforementioned tenets may not be a surprise given the status of communities like Sisaakyi and Asawase as slum and low income communities, the finding is particularly worrying in this time and age when climate change is occurring and rapid urbanisation remains uncontrollable.



**Figure 4.8 Community Perceptions of the Applicability of Urban Resilience** Source: Field Survey, January-February 2016.

Interestingly, as illustrated in Figure 4.8, over 60% of respondents across the case study communities acknowledged the need for the application of all nine urban resilience concept. Mentioning the many challenges confronting the communities, particularly Sisaakyi and Asawase communities, including poor sanitation, flood events, poor housing structure, encroachment on riparian zone of water bodies, congestion, and lack of basic social amenities, the respondents believe that the effective application of the tenets of urban resilience would improve their living conditions and facilitate their socio-economic activities. Some respondents reported that:

*... These principles you are mentioning [tenets of urban resilience] are all that we need to solve our sanitation problems, feel part of the development of this community and to protect our water bodies which have become dumping grounds for solid waste ... Ahinsan Estate 25, January 2016.*

*... Our number one problem is sanitation and because of that there are mosquitoes everywhere ... so if we can have a policy that will help upgrade our community from what it is now to one where we participate in decision making, and there is safe land for development, I think many of us will be better off... Asawase 3, February 2016.*

*... Look at where my house is, just on the edge of the stream [Sisa stream], so if this concept [urban resilience] you are talking about will help people in this community to decide on what we need such as fences along the stream [risk reducing infrastructure], a bridge over the stream and some sanitation facilities such as refuse collection points and containers, then I think everyone in this community will support its implementation... Sisaakyi 3, January 2016.*

The above quotes are representative of the community responses regarding the need for the application of the urban resilience concept. The quotes seem to indicate a strong community support for urban resilience, as they perceive the tenets of the concept as the panacea to their problems, both anthropogenic and natural. However, this situation may not reflect the perspective of the planning-related institutions. The next section presents findings on institutional efforts towards urban resilience in Kumasi.

#### ***4.5.3 Towards urban resilience in Kumasi: institutional efforts***

A number of responses were provided by the selected urban planning-related institutions in relation to their efforts as far as achieving urban resilience is concerned in Kumasi. It is interesting to note that pragmatic initiatives and efforts were proposed by the institutions.

Undertaking simulation exercises to appraise the preparedness of communities to any eventualities, public education and awareness creation, and establishment of an emergency operation centre in Kumasi were proposed by NADMO. According to the NADMO official, the emergency operation centre will ensure effective information sharing and education on disasters such as flooding to communities most vulnerable to flood events. The NADMO officials asserted that:

*... Urban resilience is a big part of our [NADMO] activities. We are establishing an emergency response unit in Kumasi, which will provide the public with the information and*

*education they need... We have over the past years embark on public education and awareness creation about hazards, risks and vulnerability, as well as assessing basic infrastructure such as schools and health facilities and recommending their upgrade where necessary ... NADMO February 2016.*

According to the KMA official, efforts towards urban resilience are largely based on the public education on issues such as fire outbreaks, sanitation among others and the provision of social services and infrastructures such as schools, health facilities, markets and water facilities. While the KMA focuses on social service provision and public education, the EPA official reported that the institution uses permit issuance as a strategy to ensure that development projects undertaken in Kumasi are environmentally sound, in terms of not generating any negative impacts on people, and the natural environment. Below are abstracts from the interviews with the KMA and EPA officials in relation to efforts towards urban resilience:

*... Resilience, resilience, resilience is all about making sure that people have safe environment to undertake their daily socio-economic activities at all times ... We have over the years focused on providing people of Kumasi with basic infrastructure services to support their activities such as markets, health centres and potable water... And we will continue to provide these and many more services as long as the people of Kumasi need them ... KMA, January 2016.*

*... We issue permits for regulating activities of projects to prevent irreparable damage to the environment... We also investigate complaints to control activities which may have caused pollution or permanent destruction to any part of the environment and prosecute offenders by taking them to court ... This strategy serves as a deterrent to others and encourages the public to respect environmental laws and procedures... EPA, January 2016.*

The TCPD and Ashanti Regional Lands Commission officials explained their efforts towards resilience in relation to land use and development. The TCPD official explained that the Department, since its establishment has used land use planning schemes to order and direct growth of Kumasi. The TCPD official further mentioned that the Department educates developers through its development permit issuance process on the need to carry out physical development only on locations approved by the Department. The official from the Ashanti Regional Lands Commission however argued that the Commission uses its land title process to, first, ensure that lands in the metropolis are litigation free and are actually meant for development project, and second, to educate the public on the processes of land registration and development.

Regardless of these initiatives, both officials from TCPD and Ashanti Regional Lands Commission admitted that their activities have not been very effective due to many reasons including the activities of chieftaincy institutions' allocating lands for development without the knowledge of the official institutions, and developers proceeding with development without development permits. As a result, there are many locations within the metropolis where physical development has preceded urban planning efforts leading to development in unauthorised locations such as water bodies and public open spaces. This finding supports those reported by Quagraine (2011) and Amoateng et al. (2013). These researchers found that unauthorised locations (e.g., open spaces, nature reserves etc.) in Kumasi have suffered physical development due to poor urban planning efforts and the activities of nonchalant urban residents.

Despite these arguable pragmatic initiatives and policy documents (see Section 4.5.1) to build urban resilience in Kumasi, some institutional officials (e.g., NADMO and EPA) argue that urban resilience initiatives such as disaster management are not fully incorporated into national development plans and climate change policies. According to them, inadequate funding and political interference are among the key reasons inhibiting full operationalisation of urban resilience interventions. As discussed in Section 4.5.1, this situation may explain why international organisations such as UNDP are involved in urban resilience documents' preparation, while local institutions with limited knowledge and funds implement them. This finding further corroborates the experiences of the case study communities who argue that there is limited evidence of urban resilience tenets occurring in their communities (see section 4.5.2).

#### **4.6 Summary of Chapter**

This chapter has described the findings for this research. It focuses on four issues: the characteristics of the respondents, climate change situation in Kumasi, urban management challenges in Kumasi, and urban resilience initiatives. Findings show that residents of Ahinsan Estate are generally better off in terms household size, educational characteristics, employment and income characteristics compared to Sisaakyi and Asawase.

The climate data from the Ghana Meteorological Agency present evidence of climate change in Kumasi. While there is gradual increase in temperature over the past 40 years in Kumasi, rainfall pattern has witnessed a generally decreasing trend, although highly variable. In the case study

communities, climate change impacts such as rising temperature and flood events appear to be widespread in Sisaakyi and Asawase compared to Ahinsan Estate. This is because over 50% of respondents from these two communities mentioned and extensively discussed the issue of warming temperature and flood events than Ahinsan Estate respondents (18%).

Given the evidence of climate change in Kumasi and the case study communities, it was unsurprising that major urban management challenges identified by the household respondents are climate change and urbanisation related. These urban management challenges include destruction of ecologically sensitive areas, growing unplanned informal activities, transportation challenges and poor sanitation. However, it is worth acknowledging that these challenges vary considerably across the three case study communities (see Section 4.4.3).

Considering that the case study communities are faced with a number of urban management challenges as well as climate change threat, one would assume that efforts towards resilience will be effective and widespread. Unfortunately, findings from this research shows a limited understanding and varied interpretations of the urban resilience concept amongst planning related institutions in Kumasi, while there is limited evidence of urban resilience initiatives in the case study communities. However, the case study communities recognise the need and importance of implementing the nine tenets of urban resilience (see Section 4.5.2). Yet, urban resilience initiatives proposed by the institutions are driven in isolation with no concerted approach towards achieving resilience in Kumasi. The next chapter presents summary of the key findings, recommendations and concluding remarks to the research.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION**

#### **5.1 Introduction**

This chapter presents summary of the major findings arising from this research, and provides recommendations. The research findings contribute both theoretically and practically to understanding the extent of Kumasi's resilience in the face of changing climate and rapid

urbanisation. This chapter presents the following four key findings as they relate to the research questions:

- Key finding one: Climate change is occurring in Kumasi with multiple implications;
- Key finding two: Rapid urbanisation is generating negative impacts in the case study communities;
- Key finding three: Limited local understanding of urban resilience; and
- Key finding four: Lack of concerted efforts towards urban resilience in Kumasi.

On the basis of the key findings, the chapter presents recommendations for the improvement and achievement of urban resilience as a strategy for adapting to climate change and managing rapid urbanisation in Kumasi.

## **5.2 Summary of Key Findings**

### ***5.2.1 Key finding one: Climate change is occurring in Kumasi with multiple implications***

Findings from this research show that climate change is occurring in Kumasi. The meteorological data obtained from the Ghana Meteorological Agency indicate a gradual increase in both mean maximum and mean minimum temperatures over the past four decades.

Additionally, the precipitation data suggest a generally decreasing trend of rainfall from 1970 to 2013. However, the change in precipitation pattern was highly variable. As result, majority of respondents particularly in Sisaakyi and Asawase communities reported cases of flooding and warming weather. It is however worth mentioning that the cases of flooding and warming weather are more humanly induced than climate change inclined due to increasing depletion of riparian zones of streams and insanitary conditions.

This finding supports those of other researchers (e.g., Agyemang et al., 2008; Cobbinah & Anane, 2015). These researchers found that there is evidence of climate change in Ghana and the impacts are affecting agricultural productivity and the pattern of the ecological regions in Ghana. Findings from this research also indicate that climate change impacts in the form of rising warming weather and flooding have contributed to the destruction of riparian zones of water bodies, particularly along the Sisa stream and malaria cases. Although to a large extent, poor urban planning and rapid urbanisation have contributed to destruction of nature reserves and insanitary conditions

favourable for mosquito breeding, findings from this research demonstrate that climate change impacts remain a challenge to the urban development agenda of Kumasi, especially low income slum communities such as Sisaakyi and Asawase.

**5.2.2 Rapid urbanisation is generating negative impacts in the case study communities** As discussed in Chapter Two, urban planning literature in Ghana is full of urbanisation and related challenges including slums, urban sprawl, destruction of ecologically sensitive areas and open spaces, unauthorised development among others (e.g., Adarkwa, 2011; Amoako & Cobbinah, 2011; Amoateng et al., 2013; Cobbinah & Amoako, 2012; Quagraine, 2011). Echoing a more general trend reported in the literature, findings from this research identify four key issues: the housing conditions, the basic services conditions in the case study communities, poor sanitation, and destruction of natural areas.

In relation to the housing conditions, findings from this research show that many houses (44%) across the three case study communities are compound housing unit. The situation is particularly widespread in Sisaakyi and Asawase communities where 69% and 54% of respondents respectively occupy compound housing unit. On the issue of basic social services, findings from this research indicate there is evidence of poor quality education in the case study communities due to inadequate trained teachers, teaching and learning materials at the basic school level in Sisaakyi and Asawase communities. The severity of this issue was emphasised when 67% and 71% of respondents in Asawase and Sisaakyi respectively mentioned and extensively discussed it. Other problems of social services relate to poor internal road conditions, inadequate potable water and poor health (see Chapter Four).

Poor sanitation was another urbanisation-related challenge mentioned and discussed by respondents. About 75% of Asawase respondents reported availability of limited toilet facilities whilst over 80% of Sisaakyi respondents expressed concern about indiscriminate dumping of both solid and liquid wastes which has become the custom in the community. Respondents in Ahinsan Estate (45%) however expressed their dissatisfaction with the poor sanitation conditions in the form of choked gutters. Thus, findings from this research show that the issue of poor sanitation, although a major concern, varies considerably from one case study community to another. Another challenge was the destruction of ecologically sensitive areas in Kumasi, especially the riparian

zone of the Sisa stream. Respondents from Sisaakyi and Ahinsan Estate mostly expressed these concerns; a situation which they claim is affecting the quality of the Sisa stream.

### ***5.2.3 Limited local understanding of urban resilience***

The findings from this research indicate that building urban resilience requires negotiations and engagement between different stakeholders with different agendas. However, findings show a lack of recognition of the importance of this process in urban resilience understanding among the selected local urban planning-related institutions operating in Kumasi (see Chapter Four). Although nearly two decades have passed since the concept of resilience emerged in urban planning studies and practice, and its promulgation at the international level, there is no clear universal meaning of urban resilience amongst researchers (see Chapter Two).

However, despite this lack of clarity in relation to the meaning of urban resilience, the UNISDR (2013) proposed nine tenets that are clear and widely promoted, including multiple stakeholder engagement, making safe land available for development, protecting ecosystems and incorporating risk assessment in urban development projects (see Chapter Two). This research shows that the limited understanding of urban resilience amongst local urban planning-related institutions remains a fundamental gap in addressing rapid urbanisation and climate change challenges in Kumasi.

As discussed in Chapter Two, while the foundational tenets of urban resilience focus on achieving sustainable and adaptable urban environments, this research shows that the tenets of urban resilience that focus on upgrading informal settlements, making available public spaces and providing risk-reducing infrastructure were conspicuously missing from the interpretations of the concept by the local urban planning-related institutions (see Chapter Four). The lack of understanding of the urban resilience concept as a process of negotiating different agendas to achieve sustainable and adaptable urban environments has resulted in the exclusion of some key foundational tenets, such as provision and availability of public open spaces and parks. For example, residents of Asawase and Sisaakyi communities lack open spaces, live in slum conditions and unsafe lands (see Chapter Four). The process of negotiating agendas, strategies, outcomes and sharing information to deliver multiple goals, including goals of sustainable development and adaptable environments, is lacking in the interpretation of urban resilience in Kumasi. However,

to ensure that urban resilience delivers on its multiple tenets, all tenets should be considered and integrated into urban development policies and programmes.

Across the three case study communities, the concept of urban resilience was foreign to many respondents. However, upon explanation of the concept and the tenets, the respondents expressed strong commitment to the implementation of the urban resilience concept. According to the respondents, the happenings in their communities, especially Sisaakyi and Asawase are in sharp contradiction to the tenets of urban resilience. They mentioned that the implementation of the urban resilience tenets will improve their living conditions and address many of their challenges. This situation emphasises the relevance of the urban resilience concept to the people of the case study communities.

#### ***5.2.4 Lack of concerted efforts towards urban resilience in Kumasi.***

Although urban resilience studies date back to the 1990s, there is no specific policy or plan for building resilience in Kumasi. The findings from this research demonstrate that urban planning initiatives occurring in Kumasi are not coordinated, concerted and comprehensive to deal with the challenges of rapid urbanisation and climate change impacts. This lack of a comprehensive and concerted regulatory framework does not support efforts towards urban resilience in Kumasi.

Interviews with the selected local urban planning institutions reveal that every institution has its own initiative to ensure urban resilience. Whilst NADMO emphasises on public education and awareness creation as well as simulation exercises to appraise the preparedness of communities towards emergencies and disasters, the KMA embarks on the provision of social services as a strategy to ensuring adaptable and sustainable urban environment. The TCPD, through land use planning efforts, promotes urban resilience by guiding and directing the growth of Kumasi. Similarly, the Ashanti Regional Lands Commission consider the processes of granting land titles as avenues for educating and raising awareness about appropriate location of physical development, which they believe would contribute to achieving resilience. Other strategies include the EPA's use of permit issuance to ensure that development projects undertaken in Kumasi are environmentally sound, in terms of not generating any negative impacts.

Despite the availability of these uncoordinated efforts, findings indicate that urban resilience efforts such as disaster management are not fully incorporated into national development plans and

climate change policies due to inadequate funding and political interference. As a result, the preparation of the available policy documents on urban resilience, particularly from NADMO was funded by international organisations such as the UNDP, while local institutions (e.g., NADMO) with inadequate funding implement them. This finding corroborates the experiences described by the community respondents in relation to limited evidence of urban resilience tenets occurring in their communities (see Chapter Four). This situation suggests that the lack of coordination amongst the local urban planning-related institutions is limiting efforts towards building resilience in Kumasi.

### **5.3 Recommendations to Improving Resilience in Kumasi**

The findings show that formulation and implementation of urban resilience policies and programmes across the globe are imperative if the tenets of urban resilience philosophy are to deliver sustainable outcomes, in relation to building sustainable and adaptable urban environments, in the face of climate change and rapid urbanisation. The following sections present recommendations to improve the planning and implementation of the urban resilience concept in Kumasi and Ghana in general.

#### ***5.3.1 The need for urban resilience policy and programme***

This research indicates that evidence of emerging global threats particularly climate change and rapid urbanisation is occurring in Kumasi. The findings show that the urban resilience concept has the potential to contribute to sustainable and adaptable urban environment in facing these global threats. However, those potential contributions of urban resilience are often limited by lack of locally driven policy direction, and unfavourable local conditions at the institutional and case study communities. This is because urban resilience tenets cannot deliver sustainable and adaptable urban environment when they are not supported by effective policies (Cobbinah & Darkwah, 2016), and do not involve the local communities (UNISDR, 2013).

Given the widespread urban development and management challenges in Kumasi and in the case study communities in particular such as poor sanitation, growing informal settlements, inadequate social services among others, an assessment of current efforts towards improved, concerted and comprehensive policy or programme that makes appreciable attempts towards effectuating of the tenets of the urban resilience concept is tenable. As outlined in the tenets of urban resilience, the

process of policy formulation should involve regular consultation of multiple stakeholders particularly government institutions, NGOs and local communities to ensure that needs of the various actors are addressed and reflected. The KMA together with the TCPD should take the lead role in developing a policy that will direct Kumasi onto a path of resilience. The input of key stakeholders such as the local communities, NADMO, utility service providers and donor and international agencies are necessary in formulating implementable resilience policies in Kumasi.

### ***5.3.2 Integrating public awareness on urban resilience in urban development***

The literature on urban resilience suggests that unlocking socio-economic and environmental opportunities for urban residents is central to urban resilience tenets (Chelleri & Olazabal, 2012; Cobbinah & Darkwah, 2016; UNISDR, 2013). Urban resilience may deliver many socioeconomic and environmental benefits, especially in an event of natural or anthropogenic induced disasters such as flooding, and fire outbreaks. However, the lack of focus on delivering benefits to urban residents, particularly those living in most vulnerable communities has limited the contribution of urban resilience to improving and achieving sustainable and adaptable urban environments. As discussed in Chapter Four, the case study communities reported limited evidence of the actualisation of the tenets of the urban resilience concept despite the availability of locally developed initiatives by the urban planning-related institutions. Thus, urban resilience policy and programme development should integrate public awareness, which encourages case study communities to fully participate in the process of urban development and management.

This research shows that urban resilience policy and programme in Kumasi and Ghana in general should be supported by strong political will from both metropolitan and national governments, not only incorporating public awareness, but also ensuring its successful execution. Developing a more supportive policy and programme is fundamental to ensuring that the potential of the urban resilience concept regarding creating sustainable and adaptable urban environment is realised.

Therefore, urban planning institutions, working cooperatively with the governments, private sector, donor agencies, local communities and NGOs, should both develop local community oriented urban resilience policies, and ensure that they are fully implemented. This situation would ensure that local communities, disadvantaged and poor locations, not only participate in the process

of urban development, but receive the benefits which may result from the application of the urban resilience tenets.

The findings from this research show that many residents of the case study communities have limited knowledge of the urban resilience concept. With regard to the various tenets of urban resilience, policy initiative should focus on empowering local communities, especially those living in vulnerable communities, in terms of climate change and rapid urbanisation challenges. Promoting the participation of poor communities in policy decision making to ensure that their priorities are reflected in urban resilience efforts remains a key tenet of urban resilience (UNISDR, 2013). In this case, the KMA as an administrative authority in Kumasi should spearhead efforts on public education on the importance of achieving resilience. With the support of other planning related agencies (e.g., TCPD, Lands Commission, and Urban Roads Department etc) should use media platform, building permit acquisition process and land registration processes as channels to educate the public on urban resilience. This is likely to increase public awareness on urban development and climate change challenges and the need for urban resilience.

### ***5.3.3 Exploring the potential of institutional coordination in urban resilience efforts***

Actualisation of urban resilience tenets are largely based on strong institutional framework. But, as the findings from this research indicate, efforts towards urban resilience in Kumasi are driven by the activities of individual institutions without any coordinated or collaborative efforts amongst the urban planning-related institutions. This makes local efforts towards urban resilience ineffective and largely infantile. Considering that research on urban resilience advocates for strong collaboration amongst stakeholders (see Chapter Two), building strong collaboration and coordination amongst local urban planning-related institutions is imperative in realising the ideals of urban resilience philosophy in Kumasi. Although there is a general preoccupation with independent driven efforts toward urban resilience in Kumasi amongst the institutions, there is also the reality that uncoordinated efforts frequently provide limited successes (see Chelleri & Olazabal, 2012). Besides, many urban resilience interpretations provide meaning to collaborative and coordination amongst multiple stakeholders.

Thus, urban planning institutions such as TCPD in collaboration with KMA should take the lead role in inviting and involving other urban planning-related institutions such as NADMO, EPA,

Department of Urban Roads and utility services providers (e.g., water and electricity) in the process of building resilient urban environment. This would ensure that the activities of all urban planning-related institutions towards urban resilience are coordinated and harmonised to deliver utmost outcomes, in relation to creating sustainable and adaptable urban landscape in the face of rapid urbanisation and climate change challenges.

#### **5.4 Conclusion**

This research has evaluated the concept of urban resilience from the theoretical perspective, planning and development stages, as well as its outcomes on supporting sustainable and adaptable urban environment in Kumasi. Guided by four research questions, a comprehensive review of urban resilience and the emerging urban development threats, particularly climate change and rapid urbanisation literature was carried out, in addition to analysis of empirical data based on three case study communities in Kumasi. The findings from this research were analysed within the framework of the literature, followed by the presentation of results and discussion of recommendations.

The key findings from this research are that while climate change is occurring with debilitating consequences on vulnerable communities, rapid urbanisation is compounding the suffering of the local residents. Findings show a gradual warming of temperature in Kumasi, and unpredictable pattern of rainfall. This situation is generating untold hardships on the local residents in the case study communities, as flooding, destruction of natural areas, and emergence of mosquito breeding ground with its associated malaria cases have become regular experience of residents in the case study communities. This situation is further compounded by rapid urbanisation resulting in poor sanitation, poor housing conditions and inadequate social services in the case study communities. However, these findings vary considerably from one case study to another. For instance, residents in high income communities (e.g., Ahinsan Estate) reported few urbanisation and climate change induced challenges compared with those from low income slum communities (e.g., Sisaakyi and Asawase). Similar findings were reported in relation to income levels and housing conditions, with those in Ahinsan Estate having relatively good housing units (detached and semi-detached houses) and higher incomes compared to in Asawase and Sisaakyi (compound houses).

This research shows that the lack of internationally agreed definition of the concept of urban resilience is reflected in local understanding. Local urban planning-related institutions do not

recognise risk-reducing infrastructure, public spaces and slum upgrading as urban resilience tenets, as they focus more on multiple stakeholder engagement, urban development, provision of safe land for habitation, information sharing and risk assessment. The development of urban resilience-focused development plans and policies is influenced by international organisations (e.g., UNDP), who provide financial and technical support. However, local urban planning-related institutions with limited understanding of the concept and funding implement these plans. Thus, despite the availability of urban resilience efforts in Kumasi, most urban residents in the case study communities reported limited evidence of actualisation of urban resilience tenets in their neighbourhoods. The lack of national urban resilience policy has contributed to a limited understanding of the urban resilience concept.

However, this research indicates that residents of the local communities in Kumasi are willing to embrace and support the implementation of the tenets of urban resilience concept. This situation suggests that a modest commitment from the government and the urban planning-related institutions towards implementing the tenets of the urban resilience concept has the potential to generate positive outcomes in terms of creating sustainable and adaptable urban environment. This research thus recommends the formulation of urban resilience policy to support the implementation of the concept's tenets. Other recommendations include the integration of public awareness on urban resilience philosophy in urban development efforts, and promotion of institutional coordination in urban resilience initiatives in Kumasi. It is hoped that the implementation of these recommendations would lead to the creation of sustainable and adaptable urban environment where the risks of climate change and rapid urbanisation are minimised.

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**APPENDICES APPENDIX 1 DEPARTMENT OF PLANNING COLLEGE OF ARTS  
AND BUILT ENVIRONMENT**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**TOPIC: *Urban Development Imperatives in Kumasi: Towards Urban Resilience***

## HOUSEHOLD QUESTIONNAIRE

*This Research Instrument is designed to seek primary data for the conduct of the aforementioned academic work. Your support and co-operation is very much expected and your responses will be treated with utmost confidentiality.*

**Name of Community:** .....

**Code** .....

**Name of Respondent:** .....

**House Number:** .....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. Please, complete the table below by ticking or giving the appropriate response [*interviewer to complete*]

1.1. Age of respondent .....	1.2. Gender of respondent: 1. Male [ ] 2. Female [ ]	1.3 Residency Status: 1. Native resident [ ] 2. Non-native [ ]
1.4. What is the size of this household? 1. 1 [ ] 2. 2 [ ] 3. 3 [ ] 4. 4 [ ] 5. 5 [ ] 6. Over 5 [ ]	1.5. Marital Status: 1. Married [ ] 2. Single [ ] 3. Widow [ ] 4. Widower [ ] 5. Divorced [ ] Other(s) specify	1.6. Educational status 1. Tertiary [ ] 2. Secondary /technical [ ] 3. Junior High [ ] 4. Primary [ ] 5. Never [ ] 6. Other (s) specify
1.7. Ethnicity: 1. Akan [ ] 2. Tribes of Northern origin [ ] 3. Ga [ ] 4. Ewe [ ] 5. Nzema [ ] 6. Other(s) specify	1.8. Religion: 1. Christianity [ ] 2. Islam [ ] 3. Traditional [ ] Other(s) specify	1.9.. Occupation Status: 1. Employed [ ] 2. Unemployed [ ] Other(s) specify [ ]
1.10 Employed in: 1. Informal [ ] 2. Formal [ ] 3. Industrial [ ]	1.11. Household expenditure: A. Daily [ ] B. Weekly [ ] C. Monthly [ ] D. Annually [ ] (specify).....	1.12. Household income: A. Daily [ ] B. Weekly [ ] C. Monthly [ ] D. Annually [ ] (specify).....

2. What economic activity are you engaged in? A. Service [ ] B. Commerce [ ] C. Agric [ ]  
D. Industry [ ]

3. What type of house do you live in? A. Detached [ ] B. Semi-detached [ ] C. Compound [ ]  
D. Other (specify) .....

4. How long have you lived in this community? A. Less than 12 months [ ] B. 1-2 years [ ]

C. 3-5 years [ ] D. 6-10 years [ ] E. More than 10 years

5. Please, indicate the availability and condition of the following social services, by completing the table below

Basic Service /Facilities	Number	Condition/ Availability of staff
1. Health centre		
2. Primary school		
3. Junior high school		
4. Borehole		
5. Piped water		
6. Sanitation facilities		
7. Housing		
8. Roads		
9. Electricity		

**CRITERIA**

- a. Good condition (no leaking roof; quality building structure; availability of working materials/equipment);
- b. Bad condition (leaking roof; dilapidated structure; lack of materials/ equipment);
- c. Adequate teachers (availability of required numbers of trained teachers);
- d. Inadequate teachers (low numbers of trained teachers; availability of untrained teachers, locally referred to as pupils' teachers);
- e. Good sanitation (availability of public and private toilet facilities; well-maintained; effective ways of solid and liquid waste disposal); and
- f. Poor sanitation (one public toilet facility for the whole community; unkempt; indiscriminate disposal of waste and defecation)

6. Which of these urban challenges are evident in your community? *Please tick as many as apply*

( ) *Sanitation challenges* ( ) *Destruction of ecologically sensitive areas* ( ) *Flooding* ( ) *Rising temperatures*

( ) *Growing unplanned informal activities* ( ) *Transportation challenges*

please specify.....

7. How would you rank these in order of frequency of occurrence in your community? Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with

1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

8. How would you rank these in order of severity in your community? Use the following scale: **Severity:** Very severe (when the issue is the most persistent worrying challenge); Severe (when the issue is a worrying one but not a daily challenge); Less severe (when the issue is a yearly concern); Not severe (when the issue is perceived not to generate any concern or worry) **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Severity

9. If none of the above listed challenges in **question 6** is applicable, please list the applicable ones in your community and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

10. Have you heard about the concept of urban resilience? **Yes** { } **No** { }

11. If yes how did you hear about it?

- a) City Planning authorities
- b) Social media
- c) Others (Please specify) .....

12. If yes how do you understand the concept? .....

13. If no, (please explain the concept of urban resilience to respondent as

*‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘*

14. Which of these tenets of achieving urban resilience are evident and believe are necessary in your community, (based on your basic understanding g)? Please tick as many as apply

- I. Stakeholder engagement** - Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }
- II. Incorporating risk assessment** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }

- III. **Making safe land available for urban development**, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. {  }
- IV. **Provision of public space** – Ensuring that public space for streets, infrastructure and parks is identified and protected. {  }
- V. **Upgrading informal settlements**, with attention to access roads, flood-risk, other safety measures. {  }
- VI. **Installing risk-reducing infrastructure**, including drainage and sewerage systems. {  }
- VII. **Urban development contribution** – Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. {  }
- VIII. **Good information sharing system** – Developing good information on risk and communicating risk information widely. {  }
- IX. **Protecting ecosystems** to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves. {  }

15. How would you rank their order of importance in achieving urban resilience in your community?

Rank	Tenet	Criterion or Reason
1		
2		
3		
4		
5		
6		
7		
8		
9		

16. Have you been involved in any of the tenets of achieving resilience stated above? **No** {  }  
**Yes** {  }

17. If yes how? .....

18. Which processes did you go through before securing your land/house if you are the owner?  
 .....

19. What roles do you think you can play in your community’s development?.....

20. How do you want your community to look like? .....

21. What do you think can be done to make your community in the state you desire? .....

*Thank you!!!*

# KNUST



## APPENDIX 2

### DEPARTMENT OF PLANNING COLLEGE OF ARTS AND BUILT ENVIRONMENT KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

#### Interview Guide for Environmental Protection Agency, Kumasi

*This research is to search for relevant empirical data for the completion of an academic exercise on the subject —Urban Development Imperatives in Kumasi: Towards Urban Resiliencel for the award of a Master’s degree in Development Planning and Management from the Department of Planning, KNUST. Your support and cooperation is very much anticipated since data collected will be treated with absolute confidentiality.*

**Code** .....

**Name of Respondent:** ..... **Tel. No.**.....

**Position of Respondent**.....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. What are the roles of the Agency in environmental protection of Kumasi?

.....  
How would you describe the environmental conditions in Kumasi?

.....  
Which of these environmental challenges are evident in Kumasi? *Please tick as many as apply*

*Sanitation challenges*                       *Destruction of ecologically sensitive areas*

*Natural disasters* (please specify).....

*Urban sprawl*                       *Rising temperatures*

*Growing unplanned informal activities*                       *Transportation challenges*

please specify.....

2. How would you rank these in order of frequency of occurrence in Kumasi?

Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

3. How would you rank these in order of worry/importance in Kumasi? Use the following scale: **Importance/Worry:** Very important (when the issue is a most and persistent worrying challenge); important (when the issue is a worrying), Less important (when the issue is less worrying); Unimportant (when the issue is perceived not to generate any worry). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Worry/importance

4. If none of the above listed challenges in **question 3** is applicable, please list the applicable ones in Kumasi and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

5. What are the areas in the metropolis experiencing poor environmental challenges in Kumasi and why?

6. What are the effects of these challenges on your activities?

7. Have you heard about the concept of urban resilience? **Yes** { } **No** { }

8. If yes how did you hear about it?

d) From training and workshops

e) Formal education

f) Social media

g) Others

Please indicate.....

9. If yes how does your agency understand the concept of urban resilience?

.....

10. In what ways do your agency's activities promote urban resilience in Kumasi?

.....

11. What are the policy guidelines or frameworks available for building urban resilience?

.....

12. What is the effectiveness or otherwise of these policies in Kumasi?

.....

13. If no, (please explain the concept of urban resilience to respondent as

*‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘*

14. Which of these tenets in achieving urban resilience by the United Nations International Strategy for Disaster Reduction (UNISDR) is feasible in Kumasi? Please tick as many as apply

X. **Stakeholder engagement** –Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }

- XI. Incorporating risk assessment** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }
- XII. Making safe land available for urban development**, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. { }
- XIII. Provision of public space** –, Ensuring that public space for streets, infrastructure and parks is identified and protected. { }
- XIV. Upgrading informal settlements**, with attention to access roads, flood-risk, other safety measures. { }
- XV. Installing risk-reducing infrastructure**, including drainage and sewerage systems. { }
- XVI. Urban development contribution** –Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. { }
- XVII. Good information sharing system** – Developing good information on risk and communicating risk information widely. { }
- XVIII. Protecting ecosystems** to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves. { }

15. How would you rank their order of importance in achieving urban resilience in Kumasi?

Rank	Tenet	Criterion or Reason
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

16. Who are the stakeholders involved in environmental management in Kumasi?

.....

17. What are the roles of these stakeholders?

.....

18. What are the problems the Agency encounters in collaborating with other stakeholders?

.....  
19. What strategies can be employed to overcome the effects of environmental challenges in Kumasi?  
.....

20. In your agency's view, how do you want Kumasi to look like?  
.....

21. What can be done to make Kumasi look like what you desire?  
.....

*Thank you*

**APPENDIX 3 DEPARTMENT OF PLANNING COLLEGE OF ARTS AND BUILT ENVIRONMENT**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**Interview Guide for Kumasi Metropolitan Assembly, Kumasi**

*This research is to search for relevant empirical data for the completion of an academic exercise on the subject —Urban Development Imperatives in Kumasi: Towards Urban Resilience for the award of a Master's degree Development Planning and Management from the Department of Planning, KNUST. Your support and cooperation is very much anticipated since data collected will be treated with absolute confidentiality.*

**Code** .....

**Name of Respondent:** ..... **Tel. No.**.....

**Position of Respondent**.....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. What are the roles of the assembly in urban development and management of Kumasi?  
.....

How would you describe the conditions of the built environment in Kumasi?

.....

2. Which of these urban challenges are evident in Kumasi? *Please tick as many as apply*

- ( ) *Sanitation challenges*                      ( ) *Destruction of ecologically sensitive areas*  
 ( ) *Natural disasters* please specify.....  
 ( ) *Urban sprawl*      ( ) *Rising temperatures* ( ) *Growing unplanned informal activities* ( )

**Transportation challenges**

please specify.....

( ) **Increasing vulnerability**

3. How would you rank these in order of frequency of occurrence in Kumasi?

Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

4. How would you rank these in order of worry/importance in Kumasi? Use the following scale: **Importance/Worry:** Very important (when the issue is a most and persistent worrying challenge); important (when the issue is a worrying), Less important (when the issue is less worrying); Unimportant (when the issue is perceived not to generate any worry). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Worry/importance

5. If none of the above listed challenges in **question 3** is applicable, please list the applicable ones in Kumasi and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

6. What are the areas in the metropolis experiencing poor urban development in Kumasi and why?

7. What are the effects of these urban challenges on your activities?

.....

8. Have you heard about the concept of urban resilience? **Yes** { } **No** { }

9. If yes how did you outfit hear about it?

h) From training and workshops

i) Formal education

j) Social media

k) Others (Please indicate).....

10. If yes how does your assembly understand the concept of urban resilience?

.....

11. In what ways does your assembly promote resilience in Kumasi?

.....

12. What are the policy guidelines or frameworks available for building urban resilience?

.....

13. What is the effectiveness or otherwise of these policies in Kumasi?

.....I

f no, (please explain the concept of urban resilience to respondent as

***‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘***

14. Which of these tenets in achieving urban resilience by the United Nations International Strategy for Disaster Reduction (UNISDR) is applicable in Kumasi? *Please tick as many as apply*

**XIX. Stakeholder engagement** –Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }

- XX. ***Incorporating risk assessment*** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }
- XXI. ***Making safe land available for urban development***, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. { }
- XXII. ***Provision of public space*** – Ensuring that public space for streets, infrastructure and parks is identified and protected. { }
- XXIII. ***Upgrading informal settlements***, with attention to access roads, flood-risk, other safety measures. { }
- XXIV. ***Installing risk-reducing infrastructure***, including drainage and sewerage systems. { }
- XXV. ***Urban development contribution*** – Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. { }
- XXVI. ***Good information sharing system*** – Developing good information on risk and communicating risk information widely. { }
- XXVII. ***Protecting ecosystems to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves.*** { }

15. How would you rank their order of importance in achieving urban resilience in Kumasi?

Rank	Tenet	Criterion or Reason
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

16. What are the prospects of urban development in Kumasi?

.....

17. How do you regulate or guide socio-economic and physical development in the metropolis?

.....

18. Who are the stakeholders involved in urban development and management in Kumasi?

.....

19. What are the roles of these stakeholders in Kumasi's development and management?

.....

20. What are the problems the Assembly encounters in collaborating with other stakeholders?

.....

21. What are the attempts/efforts made or being undertaken in addressing issues of land development and management challenges in Kumasi?

.....

22. What strategies can be employed to overcome urbanisation and climate change in Kumasi?

.....

23. In your agency's view, how do you want Kumasi to look like?

.....

24. What can be done to make Kumasi look like what you desire?

.....

*Thank you*

**APPENDIX 4 DEPARTMENT OF PLANNING COLLEGE OF ARTS AND BUILT ENVIRONMENT**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**Interview Guide for Ashanti Regional Lands Commission, Kumasi**

*This research is to search for relevant empirical data for the completion of an academic exercise on the subject —Urban Development Imperatives in Kumasi: Towards Urban Resilience for the award of a Master's degree in Development Planning and Management from the Department of Planning, KNUST. Your support and cooperation is very much anticipated since data collected will be treated with absolute confidentiality.*

**Code** .....

**Name of Respondent:** ..... **Tel. No.**.....

**Position of Respondent**.....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. What are the roles of the Agency in urban development and management of Kumasi?

.....  
 How would you describe the conditions of the built environment in Kumasi?  
 .....

Which of these urban challenges are evident in Kumasi? *Please tick as many as apply*

- ( ) *Sanitation challenges* ( ) *Destruction of ecologically sensitive areas*  
 ( ) *Natural disasters* (please specify).....  
 ( ) *Urban sprawl* ( ) *Rising temperatures* ( ) *Growing unplanned informal activities* ( ) *Transportation challenges*

please specify.....

( ) **Increasing vulnerability**

2. How would you rank these in order of frequency of occurrence in Kumasi?

Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with

1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

3. How would you rank these in order of worry/importance in Kumasi? Use the following scale: **Importance/Worry:** Very important (when the issue is a most and persistent worrying challenge); important (when the issue is a worrying), Less important (when the issue is less worrying); Unimportant (when the issue is perceived not to generate any worry). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Worry/importance

4. If none of the above listed challenges in **question 3** is applicable, please list the applicable ones in Kumasi and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

5. What are the areas in the metropolis experiencing poor urban development in Kumasi and why?

.....

6. What are the effects of these urban challenges on your activities?

.....

7. Have you heard about the concept of urban resilience? **Yes** { } **No** { }

8. If yes how did you hear about it?

- l) From training and workshops
- m) Formal education
- n) Social media
- o) Others (Please indicate) .....

9. If yes how does your agency understand the concept of urban resilience?

.....

10. In what ways does your agency promote urban resilience in Kumasi?

.....

11. If no, *(please explain the concept of urban resilience to respondent as ‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘*

12. Which of these tenets in achieving urban resilience by the United Nations International Strategy for Disaster Reduction (UNISDR) is applicable in Kumasi? *Please tick as many as apply*

**XXVIII. Stakeholder engagement** – Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }

**XXIX. Incorporating risk assessment** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }

**XXX. Making safe land available for urban development**, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. { }

- XXXI. **Provision of public space** – Ensuring that public space for streets, infrastructure and parks is identified and protected. { }
- XXXII. **Upgrading informal settlements**, with attention to access roads, flood-risk, other safety measures. { }
- XXXIII. **Installing risk-reducing infrastructure**, including drainage and sewerage systems. { }
- XXXIV. **Urban development contribution** – Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. { }
- XXXV. **Good information sharing system** – Developing good information on risk and communicating risk information widely. { }
- XXXVI. **Protecting ecosystems** to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves. { }

13. How would you rank their order of importance in achieving urban resilience in Kumasi?

Rank	Tenet	Criterion or Reason
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

14. What are the prospects of land development in Kumasi?

.....

15. How do you regulate land development in the metropolis?

.....

Who are the stakeholders involved in land development and management in Kumasi?

.....

16. What are the roles of these stakeholders in Kumasi's land development and management?

.....

17. What are the problems the Agency encounters in collaborating with other stakeholders?

.....

18. What are the processes of land development in Kumasi?  
.....
19. What are the attempts/efforts made or being undertaken in addressing issues of land development and management challenges in Kumasi?  
.....
20. In your agency's view, how do you want Kumasi to look like?  
.....
21. What can be done to make Kumasi look like what you desire?  
.....

*Thank you*

**APPENDIX 5 DEPARTMENT OF PLANNING COLLEGE OF ARTS AND BUILT ENVIRONMENT**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**Interview Guide for Town and Country Planning Department, Kumasi**

*This research is to search for relevant empirical data for the completion of an academic exercise on the subject —Urban Development Imperatives in Kumasi: Towards Urban Resiliencell for the award of a Master's degree in Development Planning and Management from the Department of Planning, KNUST. Your support and cooperation is very much anticipated since data collected will be treated with absolute confidentiality.*

**Code** .....

**Name of Respondent:** ..... **Tel. No.**.....

**Position of Respondent.**.....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. What are the roles of the Agency in urban development and management of Kumasi?  
.....

2. How would you describe the conditions of the built environment in Kumasi?

.....

3. Which of these urban challenges are evident in Kumasi? *Please tick as many as apply*
- ( ) *Sanitation challenges*                      ( ) *Destruction of ecologically sensitive areas*
- ( ) *Natural disasters* (please specify).....
- ( ) *Urban sprawl*                      ( ) *Rising temperatures*
- ( ) *Growing unplanned informal activities*                      ( ) *Transportation challenges*
- please specify.....

( ) **Increasing vulnerability**

4. How would you rank these in order of frequency of occurrence in Kumasi?

Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

5. How would you rank these in order of worry/importance in Kumasi? Use the following scale: **Importance/Worry:** Very important (when the issue is a most and persistent worrying challenge); important (when the issue is a worrying), Less important (when the issue is less worrying); Unimportant (when the issue is perceived not to generate any worry). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Worry/importance

6. If none of the above listed challenges in **question 3** is applicable, please list the applicable ones in Kumasi and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

7. What are the areas in the metropolis experiencing poor urban development in Kumasi and why?

.....

8. What are the effects of these urban challenges on your activities?

.....

9. Have you heard about the concept of urban resilience? **Yes** { } **No** { }

10. If yes how did you hear about it?

p) From training and workshops

q) Formal education

r) Social media

s) Others (Please indicate).....

11. If yes how does your agency understand the concept of urban resilience?

.....

12. In what ways does your agency promote urban resilience in Kumasi?

.....

13. What are the policy guidelines or frameworks available for building urban resilience?

.....

14. What is the effectiveness or otherwise of these policies in Kumasi?.....

15. If no, (please explain the concept of urban resilience to respondent as

***‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘***

16. Which of these tenets in achieving urban resilience by the United Nations International Strategy for Disaster Reduction (UNISDR) is applicable in Kumasi? *Please tick as many apply*

**XXXVII. Stakeholder engagement** –Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }

- XXXVIII. Incorporating risk assessment** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }
- XXXIX. Making safe land available for urban development**, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. { }
- XL. Provision of public space** –Ensuring that public space for streets, infrastructure and parks is identified and protected. { }
- XLI. Upgrading informal settlements**, with attention to access roads, flood-risk, other safety measures. { }
- XLII. Installing risk-reducing infrastructure**, including drainage and sewerage systems. { }
- XLIII. Urban development contribution** –Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. { }
- XLIV. Good information sharing system** – Developing good information on risk and communicating risk information widely. { }
- XLV. Protecting ecosystems** to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves. { }

17. How would you rank their order of importance in achieving urban resilience in Kumasi?

Rank	Tenet	Criterion or Reason
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

18. What are the prospects of urban development in Kumasi?  
 .....

19. How do you regulate or guide physical development in the metropolis?  
 .....

20. Who are the stakeholders involved in urban development and management in Kumasi?  
 .....

21. What are the roles of these stakeholders in Kumasi’s development and management?  
.....
22. What are the problems the Agency encounters in collaborating with other stakeholders?  
.....
23. What are the processes of land development in Kumasi? .....
24. What are the attempts/efforts made or being undertaken in addressing issues of land development and management challenges in Kumasi?  
.....
25. What strategies can be employed to overcome the effects of rapid urbanisation in Kumasi?  
.....
26. In your agency’s view, how do you want Kumasi to look like?  
.....
27. What can be done to make Kumasi look like what you desire? .....

*Thank you*

**APPENDIX 6 DEPARTMENT OF PLANNING COLLEGE OF ARTS AND BUILT ENVIRONMENT**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**Interview Guide for Urban Roads, Kumasi**

*This research is to search for relevant empirical data for the completion of an academic exercise on the subject —Urban Development Imperatives in Kumasi: Towards Urban Resiliencel for the award of a Master’s degree in Development Planning and Management from the Department of Planning, KNUST. Your support and cooperation is very much anticipated since data collected will be treated with absolute confidentiality.*

**Code** .....

**Name of Respondent:** ..... **Tel. No.**.....

**Position of Respondent.**.....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. What are the roles of the Agency in urban development and management of Kumasi?

.....

2. How would you describe the conditions of the built environment in Kumasi?

.....

3. Which of these urban challenges are evident in Kumasi? *Please tick as many as apply*

*Sanitation challenges*     *Destruction of ecologically sensitive areas*

*Natural disasters* (please specify).....

*Urban sprawl*                       *Rising temperatures*

*Growing unplanned informal activities*                       *Transportation challenges*

please specify.....

**Increasing vulnerability**

4. How would you rank these in order of frequency of occurrence in Kumasi?

Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

5. How would you rank these in order of worry/importance in Kumasi? Use the following scale:

**Importance/Worry:** Very important (when the issue is a most and persistent worrying challenge); important (when the issue is a worrying), Less important (when the issue is less worrying); Unimportant (when the issue is perceived not to generate any worry). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Worry/importance

6. If none of the above listed challenges in **question 3** is not applicable, please list the applicable ones in Kumasi and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

--	--	--

7. What are the areas in the metropolis experiencing poor urban development in Kumasi and why?

.....

8. What are the effects of these urban challenges on your activities?

.....

9. Have you heard about the concept of urban resilience? **Yes** { } **No** { }

10. If yes how did you hear about it?

- t) From training and workshops
- u) Formal education
- v) Social media
- w) Others (Please indicate) .....

11. If yes how does your agency understand the concept of urban resilience?

.....

12. In what ways does your agency promote urban resilience in Kumasi?

.....

13. If no, (please explain the concept of urban resilience to respondent as

*‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘*

14. Which of these tenets in achieving urban resilience by the United Nations International Strategy for Disaster Reduction (UNISDR) is feasible in Kumasi? *Please tick as many as apply*

**XLVI. Stakeholder engagement** –Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }

**XLVII. Incorporating risk assessment** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }

- XLVIII.** *Making safe land available for urban development, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. { }*
- XLIX.** *Provision of public space – Ensuring that public space for streets, infrastructure and parks is identified and protected. { }*
- L.** *Upgrading informal settlements, with attention to access roads, flood-risk, other safety measures. { }*
- LI.** *Installing risk-reducing infrastructure, including drainage and sewerage systems. { }*
- LII.** *Urban development contribution – Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. { }*
- LIII.** *Good information sharing system – Developing good information on risk and communicating risk information widely. { }*
- LIV.** *Protecting ecosystems to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves. { }*

15. How would you rank their order of importance in achieving urban resilience in Kumasi?

Rank	Tenet	Criterion or Reason
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

16. What are the prospects of road development in Kumasi?

.....

17. How do you regulate/manage road development in the metropolis?

.....

18. Which institutions do you collaborate with in the provision and maintenance of roads in Kumasi?

.....

19. What are the problems the Agency encounters in collaborating with other stakeholders?

.....

In your agency's view, how do you want Kumasi to look like?

.....

20. What can be done to make Kumasi look like what you desire?

.....

*Thank you*

**APPENDIX 7 DEPARTMENT OF PLANNING COLLEGE OF ARTS AND BUILT ENVIRONMENT**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**Interview Guide for National Disaster Management Organisation, Kumasi** *This research is to search for relevant empirical data for the completion of an academic exercise on the subject —Urban Development Imperatives in Kumasi: Towards Urban Resilience for the award of a Master's degree in Development Planning and Management from the Department of Planning, KNUST. Your support and cooperation is very much anticipated since data collected will be treated with absolute confidentiality.*

**Code** .....

**Name of Respondent:** ..... **Tel. NO.**.....

**Position of Respondent**.....

**Date of Interview:** .....

**Time started**..... **Time completed** .....

1. What are the roles of the Agency in urban disaster prevention and management of Kumasi?

.....

2. How would you describe the conditions of the built environment in Kumasi in relationship to your agency's activities?

.....

Which of these urban challenges affect your activities in Kumasi? *Please tick*

*Sanitation challenges*                       *Destruction of ecologically sensitive areas*

*Natural disasters* (please specify).....

*Urban sprawl*                       *Rising temperatures*

*Growing unplanned informal activities*                       *Transportation challenges*

please specify.....

**Increasing vulnerability**

3. How would you rank these in order of frequency of occurrence in Kumasi?

Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

4. How would you rank these in order of worry/importance in Kumasi? Use the following scale: **Importance/Worry:** Very important (when the issue is a most and persistent worrying challenge); important (when the issue is a worrying), Less important (when the issue is less worrying); Unimportant (when the issue is perceived not to generate any worry). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Worry/importance

5. If none of the above listed challenges in **question 3** is applicable, please list the applicable ones in Kumasi and its rank in order of frequency of occurrence. Use the following scale: **Frequency:** Very frequent (when the issue is a daily challenge); frequent (when the issue is weekly-monthly challenge), Less frequent (when the issue is annual challenge); Infrequent (when the issue is perceived to be isolated). **Rank:** 1 – 5 with 1 indicating the first priority and 5 being the least priority of respondents)

Issue	Rank	Frequency

6. What are the areas in the metropolis that are prone to disasters and why?

.....

7. What are the effects of these disasters on Kumasi residents?

.....

8. Have you heard about the concept of urban resilience?

Yes { } No { }

9. If yes how did you hear about it?

x) From training and workshops

y) Formal education

z) Social media aa) Others

Please indicate.....

10. If yes how does your agency understand the concept of urban resilience?

.....

11. In what ways does your agency promote urban resilience in Kumasi?

.....

12. What are the policy guidelines or frameworks available for building urban resilience?

.....

13. What is the effectiveness or otherwise of these policies in Kumasi?

.....

14. If no, (please explain the concept of urban resilience to respondent as

*‘ the capacity of an urban area to recover and capitalise on shocks and disturbances including financial crisis and climate change challenges and still function and thrive amidst these shocks and disturbances ‘*

15. Which of these tenets in achieving urban resilience by the United Nations International Strategy for Disaster Reduction (UNISDR) is feasible in Kumasi? Please tick as many as apply

**LV. Stakeholder engagement** –Working with multiple stakeholders throughout the planning process to identify known risks, needs and potential solutions, realising the potential of communities to contribute to risk reduction. { }

- LVI. Incorporating risk assessment** – considering exposure, vulnerability and hazards, urban settlements development and services- in all urban development designs, projects and programs. { }
- LVII. Making safe land available for urban development**, avoiding construction in disaster prone areas, leaving buffers and providing recreational areas. { }
- LVIII. Provision of public space** –Ensuring that public space for streets, infrastructure and parks is identified and protected. { }
- LIX. Upgrading informal settlements**, with attention to access roads, flood-risk, other safety measures. { }
- LX. Installing risk-reducing infrastructure**, including drainage and sewerage systems. { }
- LXI. Urban development contribution** –Assessing how urban development contributes to improving the lives of the poorest or most vulnerable people in a city. { }
- LXII. Good information sharing system** –Developing good information on risk and communicating risk information widely. { }
- LXIII. Protecting ecosystems** to allow proper storm water drainage avoid extensive erosion and protect against storms and tidal waves. { }

16. How would you rank their order of importance in achieving urban resilience in Kumasi?

Rank	Tenet	Criterion or Reason
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

17. Who are the stakeholders involved in disaster management in Kumasi?

.....

18. What are the roles of these stakeholders?

.....

19. What are the problems the Agency encounters in collaborating with other stakeholders?  
.....

20. What are the attempts/efforts made or being undertaken in addressing issues of disaster prevention and management challenges in Kumasi?  
.....

21. In your agency's view, how do you want Kumasi to look like? .....

22. What can be done to make Kumasi look like what you desire?  
.....

*Thank you*

