PROVISION AND MANAGEMENT OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI

By

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DECLARATION

I hereby declare that this submission is my own work towards the M.Phil (Planning) and that, to the best of my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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DEDICATION

This thesis is dedicated to my late father, Mr Francis Kingsley Gaisie and to the late Mr Kofi Obeng, who after senior high education, recognised my potentials and initiated and supported my tertiary education. It is unfortunate death did not allow you to witness the fruit of the seed you sow but your words always stays with me.

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LIST OF ABBREVIATIONS

ADF	-	African Development Fund
AFD	-	Agence Francaise Developpement
BOO	-	Build-Operate-Own
BOT	-	Build-Operate-Transfer
CAR	-	Conventional Affordability Ratio
CBOs	-	Community Based Organisations
CDA	-	Community Development Association
CMC	-	Community Management Committee
CP	-	Community Participation
DFID	-	Department for International Development
ECE	-	Economic Commission for Europe
EU	-	European Union
FRA	-	Field Research Assistant
GH¢	-	Ghana Cedis
GLSS	-	Ghana Living Standards Survey
GoG	-	Government of Ghana
GREDA	-	Ghana Real Estate Development Association
GSS	-	Ghana Statistical Service
GWCL	-	Ghana Water Company Limited
IFAD	-	International Fund for Agricultural Development
IS	-	Informal Settlements
KAP	-	Kumasi-Atlanta Partnership
KMA	-	Kumasi Metropolitan Assembly
KMRU	-	Kumasi Metropolitan Roads Unit
KNUST	-	Kwame Nkrumah University of Science and Technology
KSSP	-	Kumasi Strategic Sanitation Project

KVIP	-	Kumasi Ventilated Improved Pit
KWSS	-	Kumasi Water Supply System
MDAs	-	Ministries, Departments and Agencies
MDGs	-	Millennium Development Goals
MEST	-	Ministry of Environment, Science and Technology
MLGRD	-	Ministry of Local Government and Rural Development
MMDAs	-	Metropolitan, Municipal and District Assemblies
MRH	-	Ministry of Roads and Highways
NDF	-	Nordic Development Fund
NDPC	-	National Development Planning Commission
NGOs	-	Non-governmental Organisations
NIMBY	-	not in my backyard
O&M	-	Operations and Maintenance
OECD	-	Organisation for Economic Cooperation and Development
PAYD	-	pay-as-you-dump
PNDCL	-	Provisional National Defence Council Law
PPP	-	Public-Private Partnership
RWSG-WA	-	Regional Water Sanitation Group for West Africa
SAP	-	Structural Adjustment Programme
SHC	-	State Housing Corporation
SPSS	-	Statistical Package for the Social Sciences
SUF	-	Slum Upgrading Facility
TCPD	-	Town and Country Planning Department
TDC	-	Tema Development Corporation
UESP	-	Urban Environmental Sanitation Programme
UNCHS	-	United Nations Commission for Human Settlements
UNDP	-	United Nations Development Programme

UNHABITAT	-	United Nations Human Settlements Programme
UNICEF	-	United Nations International Children‟s Emergency Fund
USAID	-	United States Agency for International Development
USD	-	United States Dollars
VIP	-	Ventilated Improved Pit
WB	-	World Bank
WHO	-	World Health Organisation
WMD	-	Waste Management Department
WSUP	-	Water and Sanitation for the Urban Poor
ZAWA	-	Zanzibar Water Authority

ABSTRACT

Recent reports have discussed the rapid rate of urbanisation in developing countries, the extent to which far exceeds the capacity of urban managers to deal with. One key area of concern is the rate at which rural-urban migration and dislocation of city dwellers relative to the supply of formal housing, leads to majority of city dwellers resorting to informal settlements. Regardless of the relevance of these settlements in accommodating most of the urban citizens in developing countries, they often receive the least of public expenditure. Hence, informal settlements lack the right and access to basic infrastructure and services such as water supply, sewage and drainage, paved roads, lighting and electricity supply, public transport and garbage disposal. However, the basic forms of these infrastructural facilities and services are inevitable for human sustenance.

The study was undertaken to examine how infrastructural facilities are provided and managed in informal settlements in Kumasi. It employed the use of household and physical surveys, institutional interviews as well as review of documents and reports. Four settlements representing the categories of informal settlements in the Kumasi Metropolis were selected for detailed study. The study revealed a mixed level of infrastructural facilities in the settlements, with reasonably appreciable levels of access to potable water, while access to improved sanitation and access roads remained poor. Interestingly, there is high access to improved sanitation in Ohwim, the unauthorised subdivision, emphasising its relatively improved socio-economic conditions compared to the other categories. It also showed interplay of modes in providing infrastructure in the settlements including public provision, individuals, community initiatives and public-private partnerships.

Regardless of the relative poor conditions of infrastructural facilities in the informal settlements, the study identified willingness to pay and multi-household housing environment as potentials for improving infrastructural levels. The main challenges identified in infrastructure provision are insecure tenure, haphazard development and high infrastructural standards requirements. In order to improve the conditions of infrastructure in informal settlements, the study recommends the adoption of a revolving fund, as a flexible financing scheme, to utilise the resources of residents in providing in-built toilet facilities. In addition, it recommends the recognition and empowerment of residents in controlling physical development in their settlements as well as a revision of policy regulations to promote affordable forms of infrastructural facilities.

CHAPTER ONE

BACKGROUND TO RESEARCH STUDY

1.1 Introduction

The rapid growth of population worldwide which far exceeds the rate of formal sector urban job creation presents numerous challenges to governments especially in the area of housing. The United Nations Human Settlements Programme [UN-Habitat] (2010) projects that Africa‟s population will double to about two billion residents in 2050, out of which about 60 percent will live in cities. Recent studies however suggest that between 40-70 percent of the urban population in developing countries are currently residents in informal settlements and the trend shows no signs of slowing down (Sietchiping, 2005; UN-Habitat, 2003a). A recent report by UN-Habitat (2011) reveals that while there are inadequate legal housing units to accommodate the increasing human population globally, the problem is particularly severe in developing countries. In the urban areas, the situation is even now critical as more than half of the world‟s population lives in such areas (Taylor, 2011). In fact, Ghana with an annual housing demand of 130,000 units, only 42,000 is supplied annually, leaving the deficit to be catered for by the informal housing/settlements (Afrane & Asamoah, 2011).

Informal settlements (IS) have been identified as the first stopping point for immigrants as they offer the low cost and only affordable housing that will enable them to accumulate resources for their eventual consolidation into urban society (UN-Habitat, 2003a). Informal development positively supports the poor residents of the city; by providing shelter and protection from warmth and unfriendly weather conditions. According to the UN-Habitat (2006), unplanned settlements and housing contravening zoning laws with disregard for building codes and regulations, provide shelter for half of the population in most urban settlements of developing countries. It is reported that 77 percent of additional houses in Egypt between 1966 and 1976, 53 percent of new houses in Tunisia between 1975 and 1980 can be categorized as informal (UN-Habitat, 2006). In Ghana, about 45 percent of urban dwellers reside in informal settlements and it is estimated that this figure will double if effective measures are not implemented (UN-Habitat, 2009).

Notwithstanding the enormous contributions of informal housing to local development, it poses numerous challenges as well. Inhabitants of informal houses mostly lack the right and access to basic infrastructure and services such as water supply, paved roads, sewage and drainage,

electricity, public transport and garbage disposal, which poses health and safety hazards (UN-Habitat, 2007). The high poverty levels in these informal settlements are often heightened by the neglect of city authorities to provide them with these basic infrastructural facilities and services and are consequently ignored and excluded from normal opportunities available to other urban dwellers (UN-Habitat, 2003a). The low quality of housing and basic infrastructure and services available to these settlers support the argument that poverty is increasing at alarming rates in urban areas than it is in rural settlements (Pugh, 1997; Satterthwaite, 2001; Sietchiping, 2005). Conditions of living in these settlements are remarkably poor as residents face numerous obstacles to their livelihoods including poor access to basic sanitation and water supply, solid waste management, safety and security risks and a range of health hazards (Misselhorn, 2012). This situation holds in many cities in Africa (Satterthwaite, 2011) with Ghana not being an exception.

Owing to the fact that informal settlements are mostly regarded as illegal by city authorities, no conscious efforts are made to provide urban infrastructure and services to these areas. The irony, however, is that these infrastructural facilities are required for human sustenance. In the absence of government support, residents usually manage by themselves to construct footpaths which are mostly narrow and earthen (Yu, 2002). The effects of the poor infrastructural facilities in these settlements are numerous. During the rainy season, such footpaths get easily eroded, which makes mobility highly risky and inconvenient for settlers. The absence of sewerage system further intensifies the problem as wastewater and other wastes navigate along footpaths. Also, due to the lack of transport facilities, the urban poor experience longer commuting time and cost than middle- and high-income earners (Urban Research Consortium, 1997 cited in Yu, 2002).

The inadequacy in urban management and resources mobilization capacity (institutional capacity) of city authorities has been identified as one key challenge to infrastructure provision in human settlements especially informal settlements (Kyessi, 2002; UN-Habitat, 2006). The high growth of population of cities in developing countries far outstretch the capacity of institutions in providing infrastructural facilities leading to the concentration of the available resources on formal settlements to the neglect of informal settlements. The conventional approach of providing infrastructure from a centralized system has also limited the coverage of infrastructure in most urban areas in developing countries. Informal settlers adopt myriad of approaches to supply the inevitable urban services. However, the initial attitude and response

of governments towards the self-help initiative of IS dwellers in infrastructure provision and management has been that of active hostility or neglect (Kyessi, 2002).

From the foregoing, it can be said that delivery of some basic infrastructural facilities in informal settlements cannot be overemphasized as they are considered as the melting pot for different racial groups and cultures. The improvement in the quality of services in these settlements would improve the quality of life of a substantial proportion of urban residents. This study therefore focuses on the provision and management of infrastructural facilities in informal settlements using Kumasi as a case.

1.2 Problem Statement

Kumasi remains one of the fastest growing city in Ghana with an annual growth rate of 5.4 percent (GSS, 2013a). The mix of transportation infrastructure and rapid economic development of the city has resulted in the migration of the rural poor throughout the country, especially from the north, in search of job opportunities and better living conditions. There are also people displaced internally through the redevelopment of residential properties for commercial and other uses. These phenomena result in the need for more houses which are often not met. The ultimate result is for these migrants (bridge headers) and displaced to look at the option of being accommodated in informal settlements where there is adverse poverty, poor access to sanitation facilities, water, roads and other basic infrastructure as well as unhealthy environment (Turner, 1968; Sheng 1989).

In Kumasi, the informal economic sector employs about 75 percent of its labour force (Afrane & Ahiable, 2011; King & Braimah, 2005; Boapeah, 2001). This figure underscores the relevance of the sector to the local economic development of the Metropolis. Although there is lack of data specifying how many informal workers live in informal settlements, it is believed that most of the settlers also use their homes as workplaces (Yu, 2002). Although the relevance of informal settlements in the supply of residence for many citizens is widely acknowledged, the approach of city authorities has been their neglect in infrastructure and service provision. Majority of informal settlements are not serviced with formal roads and are also characterized by poor drainage and sanitation infrastructure. This phenomenon however affects the free movement of the dwellers and consequently their economic activities. Settlers face difficulties shuttling to their workplaces. Many others whose workplaces are mixed with their homes are also challenged in transporting inputs of production. Also IS dwellers‟ accessibility to social

services like health education, water as well as sanitation is also hindered due to poor road infrastructure.

Although these settlements are initially unserviced, they manage to acquire water, electricity and some sort of social infrastructure over time (Hasan, 2006). The outcome of this neglect of formal government institutions in the supply of infrastructure to informal settlements has been self-organization where settlers provide for themselves basic necessities from resources organized by local initiatives and informally managed. However, these efforts are mostly individual based and do not benefit from the synergy of providing as a group. The self-help activities are "demand driven processes" to organize, provide and allocate infrastructure and the plots for housing by the users themselves (Kombe & Kreibich, 2000). It is against this background that the study sets to examine how infrastructural facilities are provided and managed in informal settlements.

1.3 Research Questions

Taking from the discussions above, it becomes prudent to find out how infrastructural facilities are provided and managed in informal settlements in Kumasi. In doing so, the following questions will be answered:

1. What is the nature and state of infrastructural facilities in informal settlements in Kumasi;
2. How are infrastructural facilities provided and managed in informal settlements in Kumasi;
3. Who are the actors involved in the provision and management of infrastructural facilities in informal settlement in Kumasi; and
4. What are the potentials and constraints in the provision and management of infrastructural facilities in informal settlements in Kumasi?

1.4 Objectives of the Study

The general objective of the study is to examine the approaches through which infrastructural facilities are provided and managed in informal settlements in Kumasi. Specifically, the study seeks to achieve the following objectives:

1. Examine the nature and state of infrastructural facilities in informal settlements in Kumasi;
2. Explain the approaches for the provision and management of infrastructural facilities in informal settlements in Kumasi;
3. Find out the actors involved in the provision and management of infrastructural facilities in informal settlements in Kumasi; and
4. Identify the potentials and constraints in the provision and management of infrastructural facilities in informal settlements in Kumasi.

1.5 Justification of the Study

Urbanization cannot be halted, hence, it is required that countries incorporate a range of existing legal and administrative mechanisms that will allow informal settlements to be recognized and to allow services to be improved to unlock development in an incremental way (Smit & Abrahams, 2010). While it is obvious that informal settlements pose a lot of challenges for residents, they also inarguably play an important role in providing the urban poor with a cost effective means to the urban environments (Misselhorn, 2012). Informal Settlements typically present the most affordable residential opportunities available to the urban poor with regards to their survival strategies and livelihood needs in an environment that provides only a few affordable residential options. Once settlements have been formally recognized with infrastructure put in place, people will feel sufficiently secured to start investing in their dwellings and residents will be able to achieve better access to employment, livelihood opportunities, health care, education and other amenities (Misselhorn, 2012). However, due to insufficient resources of formal government institutions, it becomes imperative to devise ways of adopting other informal resources in the provision of infrastructure in informal settlements.

The undertaking of this research will unravel the procedures through which infrastructural facilities and services are provided and managed in IS. This will reveal some potential models of infrastructure provision, thereby contributing to knowledge in the research area. Also, when the provision of infrastructure is incorporated in national policies it would usually benefit residents by reducing the time and cost of commuting to work and to access services. It is widely acknowledged that infrastructure and socio-economic development is inextricably linked (Yu, 2002). Infrastructural system enhancement is a means of maintaining or improving economic opportunities, quality of life, and eventually, incomes for people in a particular area (Litman, 2010; Weisbrod & Weisbrod, 1997). An important outcome of this study will be to

identify strategies to adopt in order to enhance IS settlers‟ local efforts in the provision and maintenance of infrastructure.

1.6 Scope of the Study

The research study was undertaken in Kumasi, one of the fastest growing and second largest city in Ghana. Owing to the nodal location of the city and its commercial importance, many rural folks migrate to Kumasi in search of economic opportunities for survival. These migrants as well as other displaced residents are unable to compete for decent accommodation in well-serviced areas and therefore end up in deprived communities. Specifically, the study was undertaken in four informal settlements selected from four categories identified in the City. It becomes curious to find out how these areas get access to urban infrastructural facilities and services such as roads and streets, drains, water and solid waste disposal. It also presents the opportunity to examine how the local efforts of providing low quality infrastructural facilities on individual basis can be harnessed for the communal good.

Contextually, the research was set to examine the mechanisms for providing and managing infrastructural facilities in informal settlements. In so doing, the study assessed the conditions of road, drainage, water, solid waste and human excreta disposal infrastructure in the study areas. It has eventually come out with strategies towards improving the level of basic community infrastructure in IS capitalizing on the local potentials.

1.7 Limitations of the Study

It is obvious that there are many contentions about defining informal settlements, especially, in the developing world where there exist parallel operations of both formal and customary (usually referred to as informal) land tenure system. This understandably affects the couching of a comprehensive definition that well-fits all areas described as informal. That notwithstanding, this was overcome by adopting lack of secure tenure and non-conformity of development to rules and regulations to describe informal settlements in this study. Eventually, four distinct categories of informal settlements were identified for the purposes of this study.

1.8 Organization of Report

This report is structured into six chapters. The first chapter presents an overview or background to the study by describing the problem, discussing the justification as well as research questions

and objectives. The causes and effects of the core problem are discussed here as well. Chapter two presents the review of theoretical concepts and terms necessary to guide the study. It encompasses discussions on the theories that explain the development of informal settlements, the factors that influence their development as well as alternative ways of extending infrastructural facilities to informal settlements and also conceptualises a suitable framework for conducting the study. The next chapter defines the research methodology adopted in undertaking the research by considering the data types, sources, methods and tools for data collection as well as describe the sampling technique adopted. The variables required for the study are also identified at this stage. It further outlines certain practical measures adopted to enhance the validity and reliability of the data as well techniques adopted in their analysis.

Chapter four also presents analysis and inferences on the nature and level of infrastructural facilities in the IS in Kumasi, establishing the differences and similarities among the specific study areas. The general governance framework for infrastructure provision in IS in Kumasi is in Chapter five of the report while Chapter six gives a précis of the major findings deduced from the study to make recommendations towards improving infrastructure in informal settlements. This chapter ends by presenting a general conclusion to the study as well as identifies areas for further research.

CHAPTER TWO PROVIDING INFRASTRUCTURE IN INFORMAL SETTLEMENTS

2.1 Introduction

This chapter reviews relevant literature on the development of informal settlements. By doing so, theories that explain the development and expansion of informal settlements are discussed, their characteristics are identified and factors that propel the expansion of such settlements are revealed. It also explains the concept of infrastructure and the mechanisms for providing them in human settlements as well their associated challenges. The nexus between infrastructure and development of human settlement is also explored in order to draw a case for its inevitability in informal settlements. It further discusses how community participation or self-help approaches are used to supply urban infrastructure drawing lessons from cases of other developing countries. A conceptual framework that summarises the variables identified from the literature and their relationship is also presented to give direction to the research study.

2.2 The Dynamics of Informal Settlements Development

2.2.1 Explaining Informal Settlements

Like many other concepts, the term *informality* has received many different interpretations from various authors. Since the early 1970s, the informal sector has been a central theme of various research and studies investigating into the dual character of the economies of developing countries and recently industrialised ones (UN-Habitat, 2006). The borderline between formality and informality in relation to economic activities, employment, human settlements, etc. still remains unclear. Taking from the origin of the concept, the numerous definitions mostly hinge on the economic sectors. The consensus, however, relates to the lack of regulation of the activities in the informal sector.

Relating this to human settlements, the term has been closely linked to illegality; where references are often made to conformity with planning and construction regulations, and more essentially to situations of tenure (Durand-Lasserve, 2006). Illegality is implied here because planning schemes and regulations of a city make up the laws governing physical development in the jurisdiction. A widely referred definition is one given by the Vienna Declaration on National Regional Policy and Programmes in 2004 on Informal Settlements, which defined informal settlements (IS) as "human settlements, which for a variety of reasons do not meet legal procedure (and have been built without respecting formal procedures of legal ownership, transfer of ownership, as well as urban planning regulations), prevail in their respective countries and hinder economic development. While there is important regional diversity in terms of their manifestation, these settlements are mainly characterised by informal or insecure land tenure, inadequate access to basic services; both social and physical infrastructure and housing finance" (p.1). While these definitions connote that informal settlements have negative impacts on development, considering the fact that they are often a product of urgent need of accommodation, they also present certain benefits especially to the urban poor.

According to Kyessi and Samson (2013), informal settlements are dense settlements comprising communities housed in self-constructed shelters under conditions of informal or traditional land tenure and are mostly characterised by rapid, unstructured and unregulated development. The UN-Habitat (2003b) also defines informal settlements as residential areas where a group of housing units have been constructed on land to which the occupants have no legal claim, or which they occupy illegally; and unplanned settlements and areas where housing is not in compliance with current planning and building regulations.

The various definitions identify the characteristics of informal settlements and indicate that they are different from formal development regulations as such residential formations, lack security of tenure, basic infrastructure, adequate housing, severe health and environmental problems and their development do not conform to formal planning regulations (Sietchiping, 2005; Al-Daily, Parrott & Stephenson, 2013). The UN-Habitat (2003b) further identifies some characteristics of informal settlements to include the following:

- Lack of secure tenure;
- Housing that contravenes the regulations of a city;
- Housing built on land that is not owned by the house owner;
- Lack or inadequate access to basic infrastructural facilities and services;
- Sub-standard housing or illegal and inadequate building structures;
- Illegal sub-division of buildings;
- Poverty, criminality and social exclusion; and
- Unhealthy living conditions and hazardous locations.

These features imply that any settlement described as informal varies based on a city"s procedures and regulations for housing/settlement development. In the context of Ghana, the Local Government Act 462, 1993 instructs all Metropolitan, Municipal and District Assemblies (MMDAs) to prepare schemes/layouts to guide the physical development in their jurisdictions. Section 48 and 49 of the Local Government Act urges district assemblies to ensure that all physical developments taking place in their jurisdictions go according to physical plans prepared and approved by them. Specifically, sub-section (1) of section 49 of the Act indicates unequivocally that "no physical development shall be carried out in a district without prior approval in the form of written permit granted by the District Planning Authority". Sub-section (2) also states that "the procedure and manner for securing a permit under sub-section (1) of this section shall be prescribed by regulations". This means that every district assembly in Ghana has the power to formulate regulations regarding development permit acquisition in their respective districts. However, the procedures do not vary significantly. To regard housing development in Kumasi as formal and approved by the local authority, a developer is required by law to apply for and be granted a development permit.

2.2.2 Theories Explaining the Development of Informal Settlements

The development of informal settlements has been explained by theorists based on the level of development of the country. The development of IS in cities of developed countries have been

explained by three main theories. These are drawn from the early twentieth century when scholars tried to explain the form of development of major cities in the West. The first is based on the Burgess concentric model of residential differentiation which saw the internal spatial organisation of cities as an outcome of „ecological" competition for niches between social classes who would compete for different land uses, with the strongest groups taking the most desirable locations and the weaker groups occupying residual spaces (UN-Habitat, 2003b). According to the model, immigrants and the urban poor often settle in the working areas and zones of transition which are the ghettos, slums, blighted areas as well as hazardous areas. This theory holds the view that informal settlements located close to the working areas, provide temporal accommodation for the migrant poor who relocate to formal areas as their economic conditions improve.

The second is based on Alonso"s neo-liberal theory, explaining the development of IS as a response to the housing needs of urban dwellers who cannot afford a formal housing owing to discriminatory urban regulations and public spending (Smith, 1980 cited by Sietchiping, 2005). The high cost of formal housing as expressed in the cost of development and that associated with following regulations to the letter, prices out low income households who settle for the only "affordable" informal housing. The post-modern theory of urban landscape or factorial ecology, also see informal settlements as the creation of skills segregation within urban spaces such that urban residents settle in enclaves with others with similar profession and social status (Flood, 2000 cited in UN-Habitat, 2003b). For instance, producer service industrial workers and university graduates segregate from households who suffer from unemployment and have little education (UN-Habitat, 2003b).

However, in the context of developing countries, four major theories are often referred to concerning the development of IS, namely: land management; colonial legacy; inadequate economy; demand and supply disequilibrium. The land management theory views informal settlements development as the response to the inadequacies of public policy intervention and guidance (Fekade, 2000). It holds the view that the rigid and out-dated land use control and regulations as well as inappropriately high infrastructure standards and building regulations in many developing countries facilitates the informalisation of urban areas (see Fekade, 2000). The colonial legacy theory also links the expansion of IS to historical and political factors, especially colonialism, post-colonial practices as well as civil and political instabilities (Mensah, Antwi & Acheampong, 2013; UN-Habitat, 2003a). The centrally controlled system of allocating lands and the cumbersome process of permit acquisition bequeathed by the

colonial structures have been outstripped by the rapid urbanisation and hence contribute to the proliferation of informal settlements (Fox, 2013). In other instances, the colonial legacy theory can be seen in the supposed social segregation of urban development bequeathed through the "apartheid" systems separating poor and unhealthy "black communities" from white colonial areas (Smiley, 2009; Kironde, 2007); which structure led to infrastructure and service deficiencies in the poor areas of the city. This structure might not change significantly many years after colonisation with the poor and service deficient areas mainly occupied by the urban poor.

The third idea also suggests that the expansion of informal settlements might have been entrenched by the introduction of a new economic system. It argues that the introduction of urban trade has led to the physical and spatial translation of income and class differences into residential discrimination and social exclusion (Huchzermeyer, 2002 in Sietchiping, 2005). According to Davis (2004), the development of IS in developing countries can be attributed to the implementation of economic policies and programmes like the structural adjustment programmes (SAP). Another point of view opines that the emergence and growth of informal settlements is as a result of the disequilibrium between the demand and supply of urban commodities such as land, infrastructural facilities and services. This view explores the sustainability and persistence of IS and argues that while frantic efforts are made to improve the conditions in existing informal settlements, new ones incidentally emerge in other parts of the city (Jacopsen *et al.*, 2002 cited in Sietchiping, 2005). This notion will particularly hold given the extent new squatter settlements spring up in the peripherals of cities.

All these theories partly explain the continuous development and expansion of informal settlements in Ghana. For example, the social segregation of various income groups is manifested spatially by the creation of slums and other informal settlements. Also, out-dated planning policies of consciously classifying some areas of the city as low income or high density residential areas are also contributory factors. Inadequacy of institutional capacities which widens the gap between the demand and supply of formal land as well as urban poverty also propels the growth of informal settlements. The theories underscore the general factors that drive the expansion of IS as explained in the next section.

2.2.3 Factors Influencing the Development of Informal Settlements

Irrespective of the sub-region or level of development of a country, some crucial factors have been identified as commonly influencing the development of informal settlements. These factors are mainly interrelated and include i) rapid urbanisation and movement of people into specific urban centres; ii) high poverty levels and the lack of low-cost houses or serviced land; iii) inefficient public administration, inappropriate planning and inadequate land administration tools; and iv) war and natural disasters to force people to move to safer places and areas that provide certain opportunities. The sets of factors are broadly classified as demographic, economic, institutional and socio-cultural.

Demographic Factors

Various authors have argued that one major cause of the proliferation of informal settlements in developing countries is rapid urbanisation (Al-Daily, Parrott & Stephenson, 2013; Malpezzi & Sa-Adu, 1996). According to Obudho and Mhlanga (1988) the development of informal settlements in Africa is a direct manifestation of the high rate of urbanisation.

Recent reports by the UN-Habitat also predict a high population growth of developing countries out of which the majority will be living in informal settlements (UN-Habitat, 2013a). Consequently, it is obvious that the levels of urbanisation in the developing countries far outpace the ability of the formal sector to adequately house the population and hence resort to the informal sector. However, rural-urban migration cannot be responsible as the major factor propelling the urbanisation in Africa as net birth rates (natural increase) is identified to account for the bulk of urban growth in larger cities on the continent (UNHabitat, 2003b, Potts, 2012). Hence contrary to the popular opinions, Fox (2013) argues that urbanisation is neither a necessary nor sufficient condition for the growth of informal settlements.

Economic Factors (Urban Poverty)

As Turner cited in Fox (2013: p.193) noted, slums will inevitably continue to exist „„as long as the poor remain poor" because informal settlements represent the spatial dimensions of urban poverty. This argument has been supported by other studies which identify that informal housing/settlements development and poverty are closely correlated (UN-Habitat, 2003b; Sietchiping, 2004). The socio-economic factors usually support the demographic arguments in that when incomes are low, households have limited resources to comply with the stringent

planning and building regulations to the letter. Also low income earners usually lack resources required for renting formal houses forcing them to settle for opportunities in the informal settlements.

The worsening spate of urban poverty raises concern about the development of informal settlements in developing countries. The increasing number of the "poorest of the poor" (i.e. women, widowers, unemployed youth and disabled) makes the picture manifestly bleak. However, in some cases, better economic conditions rather than poverty have led to certain forms of informal constructions. It is worth noting that some residents of informal settlements are not necessarily poor; but rather, the informality of their development is only used as a way to overcome the existing complex and time-consuming planning rules and long delays in the design and review of city plans and development permitting procedures as well as unrealistic land management constraints (Economic Commission for Europe [ECE], 2008). This bring to the fore another key factor which leads to informalisation of physical development but not necessarily with very poor conditions.

Institutional Factors

Another important factor that explains the development of informal settlements is connected with the rigidity of urban planning regulations associated with institutional factors such as poor governance, corruption and nepotism, which all lead to a severe shortage of land and urban housing, squatting, and breach of building regulations (Fekade, 2000). According to Owusu-Ansah and Braimah (2013), the processes for permit acquisition in Ghana are complicated, costly and uncertain thereby dissuading several developers from following the process to initiate formal development. This factor best explains why middle and high income households undertake informal housing development.

Socio-cultural Factors

Aside from the demographic, economic and institutional factors that drive the development of informal settlements, cultural factors have been identified as another key factor. Rural migrants to the city often live with or closer to their fellow tribesmen resident in informal settlements and tend to expand their development on the nearest available land. This is firmly supported by research that IS dwellers mostly have common socio-cultural background (Malpezzi & Sa-Adu, 1996), and duplicate themselves or serve as a stepping-stone for the emergence of future settlements (Sietchiping, 2004). Traditionally, informal settlements have been regarded as

transient settlements such that they are necessarily a part of the process of economic growth in a developing country (UN-Habitat, 2003b) and act as „„the staging area for the migrating poor" as they work to integrate themselves into the economic life of cities in expanding economies (cited in Fox, 2013: p.192). Other studies have revealed that residents have no intentions of leaving IS as they feel comfortable living in such settlements with their ethnic members (Mensah, Antwi & Acheampong, 2013).

2.2.4 Types of Informal Settlements

As explained earlier in section 2.2.1, informal settlements are often characterised by insecure tenure, non-conformity to planning and building regulations and poor quality of basic infrastructure required for healthy and adequate living. Gibert (2007) argues that the universal description of IS to imply worst possible living conditions carries misconceptions which account for the failure of policies and programmes targeted at their improvement.

Subsequent to this, in a study of the Eastern European sub-region, the ECE (2008) identified five distinct types of informal settlements. These are explained seriatim.

Squatter Settlements

These are the types of informal settlements that receive the most attention in literature. They are established by illegal occupants of an area who usually build their homes through selfhelp processes (UN-Habitat, 2003b). Squatter settlements emerge primarily as a result of rapid in-migration into the cities and changes to urban economies or the result of a gradual process of occupation and incremental growth (ECE, 2008). This category of settlement usually start on the peripheries of cities and/or on unoccupied public and private lands, gradually developing into towns with thousands of residents and subsequently followed by some ad-hoc development of small scale retail services in response to local demand (ECE, 2008). For instance, Ashaiman which emerged as a squatter settlement housing port workers and construction labourers in Tema is currently thriving as a town with over 100,000 inhabitants (UN-Habitat, 2003b). In addition to the large peri-urban squatter settlements, many others develop as smaller pockets of informal housing illegally built under bridges and overpasses, rooftops, pavements, on vacant plots of land close to industrial zones as well as railway reserves, steep riverbanks, landslides, waste dumps and landfill sites (UN-Habitat, 2003a; ECE, 2008). As organic as they

start, these settlements usually lack access to basic infrastructural facilities such as roads, improved water and sanitation.

Settlements for Refugees and Vulnerable People

This is category of informal settlements is developed by refugees and internally displaced people. They differ from squatter settlements in the sense that they might have emerged initially with the permission of the state or the local authority as a temporary and rapid response intervention to a major crisis. As a result, residents are officially expected to live there only in the short term but may eventually turn out to be a more permanent place of abode attracting others to the original group. Residents lack formal title to the land and have extremely poor conditions lacking basic infrastructure.

Upgraded Squatter Settlements

These are settlements that start developing as squatter settlements but evolve to more established neighbourhoods. The informality of these settlements persists in the sense that priority in upgrading is given to improving infrastructural facilities whilst neglecting the critical component of ensuring security of tenure and integrating the settlements into a broader urban structure and society. Even when individual security of tenure is achieved through such policies, they often fail to integrate the people and places into the broader urban structure and society (ECE, 2008).

Illegal Suburban Land Sub-divisions

This represents the categories of settlements that may not necessarily be of poor quality nor are they underserviced housing areas. The residents may have a title to the land, but the housing built is without development and/or building permit. Illegal subdivision involves a situation where agricultural lands and other non-residential lots are subdivided and sold by their legal owners to people who build their houses often through self-help methods. These planning schemes become illegal because they do not meet the standards of the assembly and therefore do not receive its approval. This may be due to the fact that the subdivisions might violate zoning regulations and often do not meet planning standards for right-of-way, road access and provision of public spaces (ECE, 2008). In other cases, the area may fall outside the city‟s permitted areas for development.

Sub-standard Inner-city Housing (Slums)

This category of informal settlements originally develops as planned and inner-city settlements but subsequently deteriorate gradually to exhibit slum-like conditions. According to UN-Habitat (2003a; 2003b), slums comprise areas that lack one or more of the following conditions:

- Access to improved water;
- Access to improved sanitation facilities;
- Sufficient-living area and not overcrowded; Structural quality/durability of dwellings; and Security of tenure.

Although these settlements are initially well-serviced by infrastructural facilities, further extensions and sub-division of apartments, pressure on shared facilities and obsolete technical systems might contribute to the premature aging of the housing stock (ECE, 2008).

In the context of Ghana, Afrane (2013) identifies three forms of informal settlements, namely: indigenous communities, migrant communities or "zongos" and newly emerging squatter settlements. The common feature of these typologies is the lack of development permission. Table 2.1 describes their characteristics.

Table 2.1: Types of Informal Settlements in Ghana

Typology	Land Status	Housing Quality	Infrastructure	Housing Status
Indigenous Communities	Traditional Homes	Mixed	Fairly good	Without permits
Migrant Community "Zongo"	Released by owner	Poor	Poor-Good	Without Permits
Newly Emerging Squatter Community.	Illegal No title	Very poor	Non- existence	Without permits

Source: Afrane, 2013

Juxtaposing the two sets of categorisation of the informal settlements by the ECE (2008) and Afrane (2013), it can be gathered that the indigenous communities and sub-standard innercity housing areas exhibit similar characteristics. In addition to this, as the growth of the city expands into the periphery, traditional authorities reallocate agricultural land for physical development (Aberra & King, 2005; Kotey & Kasanga, 2001) often without recourse to

planning authorities. Following from this, it can be gleaned that four main types of informal settlements can be found in Kumasi. These include informal indigenous communities, migrant communities, squatter settlements and unauthorised subdivisions. Informal indigenous communities are the old traditional settlements in the city which are unplanned with houses being mostly "family-owned" and/or do not have approved development permits. Migrant communities also refer to settlements where land is released to settlers by the owners but developments do not have planning permission. Squatter settlements, on the other hand, do not have express permission from land owners and developments do not follow any planning and development regulations. Unauthorised subdivisions also include areas where residents acquire from owners, land that are subdivided without the approval of the statutory planning body of the Assembly. These subdivisions are mostly done by unqualified surveyors and because of that, developers do not get development permission.

In as much as these categories have distinct features; one common thing that runs through all is the non-conformity of development to local planning regulations. In addition to this, they represent the areas that are last to be served with basic infrastructural facilities by state institutions and hence may resort to self-help options. The subsequent section discusses the issues concerning the options available to supply infrastructure to IS.

2.3 Concept of Infrastructure

Infrastructure is often considered to be the lifeblood of every human settlement or economy in the world because of the important role it plays in their socio-economic development. According to Smith and Da Lomba (2008), they are considered as the structural elements of an economy which facilitates the production of goods and services, without being part of the production process themselves. Notwithstanding the relevance, current trends suggest that many new formal and informal residential housing units are developed in urban centres of Sub-Saharan Africa with no basic infrastructure (Kyessi, 2002). According to Mensah and Antwi (2013), infrastructure is a broad concept that comprises public investment in physical assets and social services. They explain infrastructure to be the basic facilities, services, and installations needed for the effective functioning of every community or society which include water, sanitation facilities, electricity, transport and communications systems as well as public institutions such as schools, hospitals, and prisons.

In today‟s highly competitive world, modern infrastructural systems play critical roles in rapid socio-economic development of an economy. Adequate, well maintained and efficient infrastructure is important to people, businesses and nations. In the view of Majale (2002), infrastructure constitutes changes to the physical environment that enhances people‟s ability to meet their basic needs and become more productive. In the traditional sense, infrastructure has largely been understood to comprise hard components including road and rail transport systems, public transport systems, airports, public educational facilities, water supply and water resources, wastewater management, solid waste treatment and disposal, electric power generation and transmission, telecommunications and hazardous waste management systems (Smith & Da Lomba, 2008). However they worthily note that infrastructure cannot be taken to comprise only these physical elements but also the operating procedures, management practices and developmental policies that facilitate the effective utilisation and development of the infrastructure in response to society‟s demand. These intangibles are categorized as soft infrastructure (Bhattacharyay, 2008 cited in UN-Habitat, 2011b).

The UN-Habitat (2011b) also categorises infrastructure into economic and social infrastructure. It explains economic infrastructure to be "one which at a given point in time forms part of an economy‟s capital stock used to facilitate economic production, or serve as inputs to production (e.g. electricity, roads, and ports)" (UN-Habitat, 2011b: p6). Economic infrastructure further consists of:

- Utilities (including power, piped gas, telecommunications, water and sanitation, sewerage and solid waste disposal);
- Public works (roads and water catchments in dams, irrigation and drainage); and
- Other transport sub-sectors (railways, waterways and seaports, airports and urban transport systems).

Another category, social infrastructure, either impacts directly on economic activities by enhancing productivity levels or indirectly by streamlining activities and outcomes to enhance the quality of life (UN-Habitat, 2011a) and includes services such as human settlements education, health and recreation.

2.3.1 Mechanisms for Providing Infrastructure

Three mechanisms are identified to be used in the supply of infrastructural facilities in human settlements; these are explained as follows:

Public Sector in Infrastructure Provision

For some time now, the provision of basic infrastructure has been regarded as the sole responsibility of the public sector, in the sense that its supply with other linked services has an economic characteristic that justifies government intervention (UN-Habitat, 2011b; Smith & Da Lomba, 2008). Recognising infrastructure as a public good has been used for justification of public expenditure. This is because the improvements in individuals‟ access to water, electricity and sewage do not only improve their personal situation and well-being but at the same time tend to increase the overall economic and social outcome in the economy (Thoenen, 2007). Consequently, Kreibich (1998) observes that the public sector in many developing countries, especially in Africa, had assumed the role of providers of infrastructural services, treating them as a social service provided either entirely free or highly subsidised. This is partly due to the lumpiness of the investment required as well as the non-exclusivity and non-rivalry nature of some of the public infrastructure such that the market is unable to provide. Chan et al. (2009) point out that, through their ownerships of infrastructure, governments have usually delivered subsidised services to specific groups on the grounds of equity. For instance, in situations where the minimum threshold required for service provision is not met and hence the provision to the population will render the service not financially viable. Again, they further explain that government investments in infrastructure could be a response to natural monopolies and where the services are seen as essential to the welfare of its citizens.

In public infrastructure provision, there is difficulty in charging users, for instance the provision of roads and as a result has rendered the public sector inefficient in the provision of infrastructure while the social and environmental dimensions also receive little attention. The unsatisfactory situation is demonstrated by the fact that most public utilities are insolvent and receive huge subsidies from the state, while the quality of services rendered remains extremely poor with the coverage being partial and dwindling (Panayotou, 2000). Infrastructure owned and operated by the public sector is often characterised with poor performance, mismanagement, inefficiencies and lack of innovations (Chan et al., 2009; Panayotou, 2000). These factors have contributed to a shift of focus towards a more commercial-driven or private provision of much public infrastructure in the bid to ensure efficient production and enhance innovation, albeit within set regulations to constrain the abuse of market power. That notwithstanding, the government continues to exercise ownership over infrastructure like roads, schools, hospitals, airports, electricity and some postal services especially in developing countries.

Private Sector in Infrastructure Provision

With the rapid urbanisation rate, the task of provision, operations and maintenance of basic infrastructural services has outpaced the capacities of both central and local governments as they have had little control over the urban development processes (Majani, 2000). Owing to challenges such as excessive pressure on public budget and the need to reduce or eliminate government subsidies, the private sector currently contributes immensely to infrastructure provision. This is relevant in the face of declining incomes, lack of investment capital, the need to replace aging infrastructure assets, pressure of new technology and inability of the public sector to meet growing demand and increased advocacy by more informed consumers for improved service (Estache, 2006). Again, it is widely acknowledged and advocated that the private sector is more effective and efficient at managing infrastructure construction as well as the delivery of service once the assets are in place (World Bank, 2012).

The private sector has been applauded for its improved management and higher efficiency as well as increased access to private capital for maintenance and expansion. The two are closely related in the sense that greater efficiency leads to cost savings and the availability of more funds for further investments while effective management results in easier access to private capital and investment of private capital constitutes an added incentive for operational efficiency (Panayotou, 2000).

Public-Private Partnership in Infrastructure Provision

In the quest to leverage the benefits from the private sector involvement, governments have adopted Public-Private Partnerships (PPPs) as a way to improving infrastructure networks within their countries and enhance the delivery of services to their citizens. According to Farlam (2005) adopting this development-finance model, the state shares risk and responsibility with private investors but retains the ultimate control of assets. With this approach, it is possible to benefit from the positives of both while minimising the negatives. For instance, adopting PPPs can lead to the improvement of the efficiency of service provision while avoiding some of the disadvantages of privatisation such as unemployment, higher cost and corruption. PPPs potentially bring the efficiency of business to public service delivery while avoiding the politically contentious aspects of full privatisation. In this way, the government remain owners as the private sector is contracted to build, operate or maintain infrastructure such as roads, ports or provide essential services like electricity, water and sanitation (Farlam, 2005)

2.4 Nexus between Infrastructure and Development of Human Settlements

The impacts of infrastructure on human settlements development cannot be overemphasised. Yu (2002) argues that the absence of basic infrastructure in poor urban settlements inhibits the growth of small and medium informal sector enterprises. Poor conditions of informal settlements, characterised by the absence of "safe water, sanitation, solid waste collection and disposal, storm drainage, public transport, access roads and footpaths, street lighting, public telephones, and other neighbourhood amenities (e.g. safe play areas, community facilities), electric connection, and social services translate into squalid and unhealthful living conditions and reduces residents‟ productivity and employment options" (Kessides, 1997 cited in Yu, 2002: p.7). Also improving transportation system serves as a means of maintaining or improving economic opportunities, quality of life, which ultimately improves the incomes of people in a particular region (Litman, 2010; Weisbrod & Weisbrod, 1997). The foregoing underscores the relevance of infrastructure in the development of human settlements and is discussed seriatim.

2.4.1 Infrastructure and Economic Development

According to Kessides (1993), the contribution of infrastructure to economic development is seen in two forms; that is, by increasing productivity and by providing amenities which enhance the quality of life. Infrastructural services such as water, electricity and transport serve as intermediate inputs of production such that the reduction in cost raises the profitability of production. It also improves the productivity of other inputs of production (other capital and labour) by reducing commuting time and improving information flows. The lack of basic infrastructure like water renders households spending much time in search for such resources which could have been used in more productive ventures that will eventually improve their conditions of life. Also, road infrastructure improvement enhances mobility to resources and inputs as well as increasing proximity between the suppliers and users both of which reduce the time spent on securing resources and hence allows much time to be allocated to more productive activities and rest.

Improving infrastructural services to households increases their disposable incomes by improving their access to jobs, education and health services and raising productivity of their labour (Parikh, Parikh & McRobie, 2012; Kessides, 1993). This consequently reduces poverty in terms of both income levels and access to basic services. This is supported by Willoughby

who asserts that the contribution of infrastructure to halving income poverty is far more significant than other millennium development goals (MDGs) (cited by UN-Habitat, 2011b). In addition, improving access to infrastructure affects non-income dimensions of poverty, contributing to improvements in education, nutrition, health and social cohesion.

Investing in infrastructure development also positively increases the derived demand of the inputs as well as wages of labour employed. Calderon and Serven (2004) in Banerjee, Oetzel and Ranganathan (2006) observed that high infrastructure stock positively affects economic growth while good quality and quantity of infrastructure tend to reduce income inequality.

2.4.2 Infrastructure and Social Development

There is a positive correlation between infrastructure development and social development of residents in any settlement. Parikh, Parikh and McRobie (2012) observed in their study in India and South Africa that the provision of water and environmental sanitation infrastructure in slums reduced household expenditure on medical care whilst improving the literacy levels of residents. This finding is corroborated by Muteta et al., 1998 (as cited in Yu, 2002) in Dar es Salaam, that provision of storm water drainage infrastructure reduced the risks of diseases such as malaria, which reduced health risks and improved human capital of beneficiaries. They again note that road upgrading and the provision of drainage facilities made movements in, out and within the area easier, safer and more comfortable positing that the overall selfesteem, pride and welfare of residents are bolstered following infrastructure provision and enhancement.

2.4.3 Infrastructure and Land Values

The level of infrastructural development affects the value of land in both urban centres and urban fringes. Kyessi (2002) notes that the level of services in a settlement significantly affects the price a landed property would fetch on the market. Road infrastructure improves accessibility, and water, sanitation as well as electricity also improve the conditions of living in human settlements. This implies that the provision of basic infrastructural services in informal settlements will improve the land property values. Moreover, studies have shown that in upgrading projects where basic infrastructure is supplied, home owners have improved their housing quality thereby increasing property values (Parikh, Parikh & McRobie, 2012).

2.5 Challenges of Infrastructure Provision in Informal Settlements

According to Panayotou (2000), one billion people do not have access to safe water; an additional two billion people are without access to adequate sanitation while four billion people discard their waste without treatment. Again, 20 percent and 60 percent of the urban and rural populations respectively in developing countries are without power (Panayotou, 2000). The trend does not show any signs of improvement in the face of low economic development. Aside from the economic issues that blur the picture, a myriad of challenges are identified to be militating against the provision of infrastructural facilities and services to human settlements. These are seen from the perspective of the authority and systems required to provide and maintain the infrastructure in the fulfilment of their mandate as well as the settlement level where the infrastructure is laid. It is against this background that this report categorises the challenges under macro and micro-levels as discussed below.

2.5.1 Macro-level Development

For the purposes of this study, the challenges of infrastructure development at the macrolevel consider issues that do not directly emerge from the settlement level. They include challenges relating to national planning and regulatory frameworks.

Inappropriate Regulatory Frameworks

According to Majale (2002), regulatory frameworks that shape the lives of the poor are usually designed using top-down approaches such that they are formulated by both central and municipal governments to be applied in local communities. They set the general parameters for development in municipal areas which comprise a wide range of laws, including local government laws, ordinances, legislation and regulations related to town planning, public health, land development and building. Consequently, the poor are not able to maintain sustainable livelihoods owing to the constraints posed by the policy frameworks inhibiting their access to the essential assets and opportunities as well as the right to engage in activities required for their sustenance (Majale, 2002). Because of this, most of informal settlement settlers are forced to rely on more costly sources such as private small-scale and community-based service providers (i.e. water tankers, telecommunication centres and informal transport operators. But the high standards of infrastructure regulations fail to recognise small community-based entrepreneurs who offer these services at lower costs because they lack capital and improved technology. Again, existing procurement regulations often restrict the

involvement of the community in the implementation and management of their local infrastructure which militate against local participation and management of community improvement interventions (Majale, 2002).

Lack of Political Will

Owusu-Ansah and Braimah (2013) identify lack of political will as a key factor that hinders officials from effectively discharging their functions. The lack of political will to implement the physical plan of settlements has contributed to their haphazard spatial development where developments are undertaken without recourse to basic infrastructure. Owusu and AfutuKotey (2010) corroborates this by also identifying the absence of political will as a key factor inhibiting the implementation of development plans prepared at both national and local levels, which consequently constrains the provision of infrastructure in informal settlements. Layouts are made by unqualified personnel especially surveyors and without reference to existing and future infrastructure supply (Yankson, Kofie & Moller-Jensen, 2004). In the view of Brook and Smith (2001), the poor mostly have limited access to infrastructure because the government sometimes fail to extend such services to their neighbourhoods.

Ineffective Urban Governance

This point presents an indirect factor that affects the development of infrastructure services in human settlements. Owusu and Afutu-Kotey (2010) argue that as a result of poor urban governance, the planning and delivery of infrastructural facilities and services do not have any significant impact on the poor. Even in situations when development plans are wellstructured and well-intended, they fail to produce the intended results because of they are fraught with unresponsive, unaccountable and corrupt governance institutional setting (Owusu & Afutu-Kotey, 2010). In such situations infrastructural services are not provided and even if provided, they are of very poor quality and also not maintained.

Inadequate Data, Human and Financial Resources

A major obstacle to urban development does not only relate to the extent of population growth but also the wide gap that exist between the demographic change and institutional resources (Kyessi, 2002). The rapid growth of population in major cities and its attendant physical expansions overburden city authorities who are unable to develop their capacities at the pace that the population grows and hence leads to inefficiencies in the delivery of infrastructural

services. Owusu-Ansah and Braimah (2013) note that in the developing world, the circumstances surrounding the planning and growth management of cities is resource constraints indicating that, in many cases, local authorities are fragmented, understaffed and inexperienced to handle effective planning, implementation and monitoring. As a result of these circumstances, policymakers and urban managers have very little consistent, reliable data on the existing patterns of demand for infrastructural services, especially by the poor and marginalised, in order to respond adequately (Brook & Smith, 2001). The lack of planning and resources makes it very difficult for the governments to perform the task of providing permanent shelter and infrastructure to informal settlers (Arenas, 2002). Delays and costly procedures are also a further obstruction to infrastructure provision in informal settlements (Majale, 2002).

2.5.2 Micro-level Development

Due to the failure of governments to provide adequate infrastructure to improve the lives of informal settlements dwellers, these people sometimes help themselves in providing such infrastructure. However, they are often faced with challenges in the provision of infrastructure in their areas. According to Schubeler and World Bank (1996), the potential contribution of user participation in infrastructure provision in informal settlements is often constrained by numerous factors. Some of the issues are as follows.

Lack of Secure Tenure Rights

Residents of informal settlements usually do not possess legal title to their plots and this constitutes a constraint to their participation in infrastructure provision because, infrastructure provision requires a de facto recognition of property rights (Schubeler & World Bank, 1996). Access to secure land and housing is a pre-condition for reducing poverty; many people who live in informal settlements are under the daily threat of eviction, or without sufficient security to invest what they have in improving their homes and surroundings (Payne & Durand-Lasserve (2012). De Soto (2000) adds that, informal settlement residents lack security of tenure or legal rights to live on and fully develop the land they occupy, let alone contribute to infrastructure development. This factor hinders self-help initiatives (Kyessi, 2002).

Rigid Planning and Building standards

Another factor that hinders the provision of infrastructure by IS dwellers is rigid infrastructure and building standards. The standards stipulating the level which infrastructure is required to be built affects its cost and affordability to users (Bassett et al., 2003). These high standards require road reservations, high-grade tarmacked road surfaces, large plots of land for housing development, as well as underground water-borne sewerage. Bassett et al (2003) again point out that, requiring high standards results in limited service provision as IS dwellers are not given the permit by authorities since the conditions in such environments cannot meet such standards.

Schubeler and World Bank (1996) admit that, the full adherence to building standards increases the cost of the infrastructure beyond the income of informal settlement dwellers. Tipple (2001) also concurs by stating that substantial cost is involved in the quest of developers to fully fulfil building regulations and/or obtain planning permission for infrastructure development. Moreover charging constant regulatory levies create distortions and places undue cost burdens on urban poor living in informal settlements, which further promote and sustain dependency conditions (Lall, 2001). Yahya (2001) points out that, planning standards, procedures and regulations often impair the livelihoods of IS dwellers due to the following reasons:

- Expensive procedures;
- Regulations prevent the urban poor from engaging in income-generating activities within residential areas;
- Restriction of the choice of materials and technologies;
- Regulations favour modern and often exogenous technologies over local technologies;
- Incomprehensible standards and regulations; and Difficult access to knowledge and information.

Aside from the cost imposed on low income households by the high planning and building standards, they have also proven to be out-dated and inappropriate to meet urbanisation challenges (Kreibich, 1998). According to Kyessi (2002), „supply driven" infrastructure provision with little or no involvement of stakeholders in human settlement management and development dominated in the past failing to bridge the growing gap in low income settlements. These factors precipitated the bypassing of the alien and inhibitive formal planning standards to improvise ways of providing affordable housing and basic infrastructure services (Kombe & Kreibich, 2000).

2.6 Self-Help as an Option for Infrastructure Delivery

The provision and maintenance of infrastructure, especially public infrastructure, has conventionally been regarded as the responsibility of the public sector. Occasionally, the private sector partners the public sector in laying such infrastructure. However, owing to financial constraints, the government and market has failed to execute these mandates especially to low income groups (Ibem, 2009; World Bank, 2004; Tipple 1994). The sole reliance of communities on government for the provision and maintenance of infrastructure has proved to be ineffective and unsustainable over the years (Ibem, 2009; Kyessi, 2002). Majani (2000) notes that lack of relationship linkages between the government, the private sector, the general public and other sectors in urban development seem to have led to inefficient delivery of urban services. These factors with several agitations have consequently shifted the attention of government from being providers of infrastructure to facilitators or enablers calling for the participation of other actors including beneficiaries in infrastructure provision.

The World Bank‟s Learning Group on Participatory Development defines participation as "a process through which stakeholders influence and share control over development initiatives, and the decisions and resources which affect them" (World Bank, 1996: p.3). It can also be seen as a way of co-opting dissent, a mechanism for ensuring the receptivity, sensitivity, and even accountability of social services to the consumers (Mathbor, 2008). It reflects grassroots or bottom-up approach of addressing problems in communities. Adato, Hoddinott and Haddad (2005) argue that the support for participation is grounded on three foundations, namely: instrumentalist, philosophical and political foundations. They argue that the instrumentalists recognize that top-down and technocratic forms of development imposed on local areas often result in failure arguing that local people best understand their own needs; and that involving them in infrastructure provision and maintenance can be cost-effective by reducing capital costs. From the philosophical and political points of view, they contend that the poor people has the right to exercise more command over their lives; and for that matter should be empowered "to determine choices in life and to influence the direction of change" (p.4).

Nelson and Wright in Adato, Hoddinott and Haddad (2005) also identify two distinct ways to view participation: as a means (process) and as an end (goal). As a "means", participation is used to accomplish the aims of efficiency or effectiveness of projects (White, 1996) while as an "end"; it involves a community or group setting up a process to control its own development and for the achievement of political power. The pioneering work of Arnstein

(1969) revealed that some levels of participation as espoused by power holders are "empty rituals" which is different from having the power to influence processes. Hence, she identifies eight levels of participation in the form of a ladder (*see Figure 2.1*). From the ladder, she argues that the bottom two rungs, manipulation and therapy, connotes non-participation of beneficiaries in projects and programmes. Informing and consultation, which represents some degrees of tokenism, enables the have-nots (beneficiaries) to hear or be heard but lack the power to ensure that power holders heed to their views. Placation which represents a higher degree of tokenism allows the have-nots to advice but retains decision with the power holders. Partnership, delegated power and citizen"s control represents the stages where the beneficiaries actively contribute in decision making (*see Arnstein, 1969 for further details*).

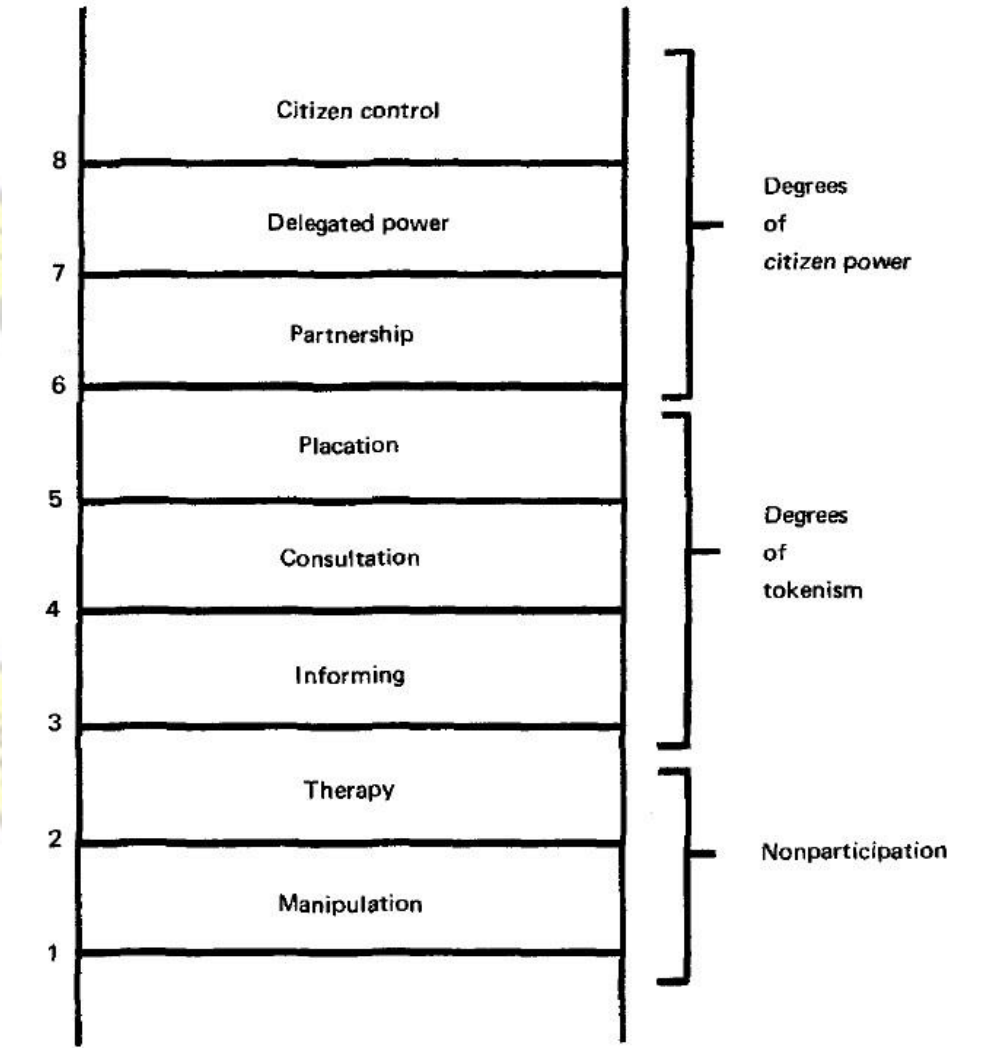


Figure 2.1: The Eight Rungs on a Ladder of Participation

Source: Arnstein (1969).

Building on Arnstein‟s work, Paul (1987) stresses on the stages where some form of participation is implied and identifies four levels of intensity of community participation, namely: information sharing; consultation; decision making and initiating action. The intensity of the participation at each stage is explained in Table 2.2.

Table 2.2: Four Levels of Intensity in Community Participation

Level of participation	Interpretations
Information Sharing	Project designers and managers may share information with beneficiaries in order to facilitate collective or individual action. Though it reflects a low level of intensity, it can have a positive impact on project outcomes to the extent it equips beneficiaries to understand and perform their tasks better.
Consultation	Beneficiaries are not only informed, but consulted on key issues at some or all stages in a project cycle. Here, there is an opportunity for beneficiaries to interact and provide feedback to the project agency which the latter could take into account in the design and implementation stages.
Decision Making	Beneficiaries have a decision making role in matters of project design and implementation. Decisions may be made exclusively by beneficiaries or jointly with others on specific issues or aspects relating to a project. Decision making implies a much greater degree of control or influence on projects by beneficiaries than under consultation or information sharing.
Initiating Action	When beneficiaries are able to take the initiative in terms of actions/decisions pertaining to a project, the intensity of community participation may be said to have reached its peak. Initiative implies a proactive capacity and the confidence to get going on one's own.

Source: Paul, (1987).

From Paul‟s (1987) interpretation of participation as explained in Table 2.2, it can be gleaned that level of involvement of project beneficiaries increases up the ladder (from information sharing through initiating action). The highest on the ladder, initiating action, is identical to what Rifkin (1988) refers to as self-mobilisation where residents takes initiatives without

relying on external institutions to effect changes. The level is closely related to the definition by Oakley and Marsden (1984) where they defined community participation as the process by which individuals, families, or communities assume responsibility for their own welfare and develop a capacity to contribute to their own and the community‟s development. In this context, participation is seen as “self-help” which represents a development strategy involving people‟s involvement in promoting community development, based on self- assessment of their capacity to bring positive changes into their environment (Afigbo cited in Ibem, 2009). Two explanations have been given as reasons for self-help initiatives; first as a reaction against the government by citizens who feel neglected and therefore organize to provide for themselves the amenities and services government refuses or is unable to provide
(Ogundipe, 2003). In another instance, it is a reflection of people‟s awareness and understanding of the meaning of government, its activities and programmes as well as their limitations (Madu & Umebali in Ibem, 2009).

The United Nations in Akpomuvie (2010: p.91-92) defines self-help as “the process by which the efforts of the people themselves are united with those of the governmental authorities to improve the economic, social and cultural conditions of the communities, to integrate these communities in the life of the nation and enable them to contribute fully to national progress”. From this definition, it can be observed that self-help does not imply exclusive efforts of only people but can involve other external support. The initiative for the attainment of this process-goal equation could derive from several sources including the individual, the community, socio-cultural organisations, institutions, governments or the government acting in concert with any of these bodies (Akpomuvie, 2010). He maintains that self-help should have its roots fully entrenched within the socio-cultural and economic setting within which it is to be practiced. According to Beall (2000), urban social movements have emerged as a result of urban poverty and the absence of effective networks for social change and have demonstrated that urban residents engage in a myriad of mutual support and self-help initiatives.

However, for self-help provision in urban infrastructure to be effective, Kyessi (2002) observes that some key elements espoused by Abrams (1964) and Turner (1967) in advocating for progressive improvement of housing development are relevant. These include:

- First, self-help model works for housing because the owner builds the house by their own effort or through the efforts of someone they commissioned to build;

- The second element is that house can be progressively improved until it meets an acceptable standard; and
- The third element is that such self-improvement will only take place if the owner has security of tenure which provides a basis for progressive improvement of the housing.

He argues that for this model to be relevant to community infrastructure provision, the principles should be held as true for infrastructure development as well.

2.6.1 Challenges to Self-Help Initiatives

The following factors have been identified as constraining community development efforts.

Heterogeneity of Community

Notwithstanding the benefits of community self-organisation in the improvement of their living conditions, their efforts are limited by community diversity (in terms of age, gender and social divides), heterogeneity of interests and lack of civil organisations (Post et. al., 2003). The disjointed nature of individual efforts at providing basic amenities does not enhance the community infrastructure provision. In order to push for a collective action, leadership, social inclusion and high community organisational abilities are required. Community-based organisations (CBOs) – like neighbourhood organisations, religious organisations, women‟s groups – usually collaborate with external actors (particularly local government, private sector and non-governmental organisations) in order to increase the scale of their activities (Lee in Post et. al., 2003).

Insecure Tenure

Another key factor that affects a community‟s initiative towards self-projects is secured tenure. As suggested by self-help housing advocates like Turner and Abrams, a key principle that urges residents to mobilise personal resources for the development and improvement of their houses is the security of tenure (Kyessi, 2002). The security of tenure is required to assure residents of long-term of temporal ownership and use of the property. Along with this, it must be recognised that local residents are capable of providing their infrastructural facilities with their resources like housing can be progressively improved.

Lack of Capacity to Implement Projects

A third factor that hinders self-help developmental project implementation has to do with capacity. Ibem (2009) complained that the members of committees set to plan, implement and monitor the projects sometimes lacked the requisite skill to carry out these activities which impedes successful completion of projects. Post et al., (2003) add that, many elected community representatives are incompetent in the delivery of services in their areas but rather enrich themselves in the implementation of community projects. They further state that, people do not have much trust in unit committees due to the fact that, they are weak in performing their duties and so they find it difficult to spearhead the implementation of projects in their localities.

2.6.2 Opportunities for Self-Help Development

Notwithstanding, the myriad of challenges that hinders self-help developmental efforts, there exist some factors that enhance these efforts. The active support from community traditional leaders helps in mobilising community members to undertake projects (Post et al., 2003). This is because such leaders are respected and this creates social cohesion for collective action. The International Fund for Agricultural Development [IFAD] (2009) also indicates that there are Non-Governmental Organizations (NGOs) which provide specialised guidance and services to communities in the implementation of projects. These NGOs help the communities in the following areas:

i. Establishing strong links with communities by entering into mutually supportive partnerships and collaboration with CBOs;
ii. Initiating strategies to mobilise incremental non-government resources for their activities on behalf of the communities;
iii. Educating community members to accept that, governments cannot exclusively resolve all community problems; and
iv. Facilitating the mobilisation of the communities" own resources to deal with the private commercial sector, allowing communities to pursue more cost-effective service delivery.

2.7 Policies for Infrastructure Provision in Informal Settlements in Ghana

Housing is regarded as not only the physical structure in which people live but it also includes entire spectrum of factors that make living acceptable and comfortable (Boamah, 2010). These factors include the infrastructural facilities and services such as access routes, water, sanitation

and electricity. In this regard, activities for providing housing ideally must come with these facilities, hence the need to revisit policies aimed at providing housing.

Housing policy in Ghana has been described as fragmented and piece-meal, and not comprehensive enough (Owusu, 2011; National Development Planning Commission [NDPC], 2005). That notwithstanding, the postures of governments over the years can show three clear policy directions. Owusu (2011) categorises these under three periods, namely: the immediate post-independent era of public housing provision (late 1950s to early 1980s); structural adjustment and economic liberalisation era (mid-1980s to early 1990s) and; poststructural adjustment and economic recovery era (mid-1990s to the present). The immediate post-independence era marks the period where there was active and direct involvement of the state in housing development marking the creation of the Tema Development Corporation (TDC) and the State Housing Corporation (SHC). Owing to the poor performance of the economy, the state subsequently shifted from its providing role to an enabling one; that is, creating the enabling environment for private sector provision. The structural adjustment and economic liberalisation era (mid-1980s to early 1990s) marks the period when the government with the support of the World Bank embarked on economic liberalisation and privatisation, which withdrew the active involvement of the state from various sectors of the economy including housing. The era marks the creation of Ghana Real Estate Development Association (GREDA) (Acquaah-Harrison, 2004). The post-structural adjustment and economic recovery era (mid-1990s to the present) marks the period of intensification of the involvement of the private sector in housing provision. This process clearly shows the role of government has consciously shifted from providers to enablers in housing development.

Faced with high cost of land and building materials as well as town planning regulations which set housing standards precluding the use of local technology and raw materials, the urban poor are not catered for by the private real estate (Owusu, 2011) leading to the proliferation of informal housing and settlements. As a conscious state policy, the mediumterm national development framework (1997– 2000) documents a bold shift of government‟s focus to site and services and upgrading as a policy even though there had been some World Bank assisted projects earlier. However, these strategies were not implemented due to lack of funds, private sector participation and political will (Acquaah-Harrison, 2004). These strategies were again presented in the new policy, the Ghana Poverty Reduction Strategy (GPRS I) [2002 – 2005], with slum upgrading being a key focus of intervention.

However, the first upgrading project implemented in Ghana was the World Bank assisted Accra District Rehabilitation Project (ADRP) piloted in East Maamobi in 1985 which improved conditions of roads, footpaths and drainage facilities as well as providing water and communal ventilated improve latrines (Banes, Huque, & Zipperer, 2000). This project improved the living conditions of about 19,000 people occupying 30 hectares at a cost of US$47,500 per hectare. Following the success of this project, larger scale projects such as Urban II and urban priority projects were rolled out in Accra, Kumasi, Tamale and Tema, which also adopted the integrated approach of the ADRP. These two projects benefited about 160,000 slum dwellers covering 264 hectares. Based on the lessons learnt from the previous projects, the Urban Environment Sanitation Project (UESP) was launched in 1996 with a key component of community upgrading project. However, this project adopted a participatory approach with management in the hands of local governments who contributed 10 percent counterpart funding (Banes, Huque, & Zipperer, 2000).

Over the years, a number of programmes have been implemented that are geared towards the provision of some basic infrastructural facilities to informal settlements in Kumasi. These are mainly led by the Kumasi Metropolitan Assembly (KMA) with support from the Government of Ghana (GoG) and its development partners. Some of these programmes and policies are discussed seriatim.

Urban Environmental Sanitation Programme (UESP) I and II

These two phased programme was initiated by the Government of Ghana, African Development Fund (ADF), Nordic Development Fund and metropolitan assemblies in the country. The first phase was implemented from 1996 to 2002. It involved an integrated urban upgrading programme aimed at improving urban environmental sanitation, drainage, vehicular access and solid waste management as well as community infrastructure upgrading in a sustainable manner with special focus on the poor in the five major cities of Ghana, namely: Accra, Kumasi, Sekondi-Takoradi, Tema and Tamale (Amoako & Cobbinah, 2011).

Subsequently the second phase, UESP II, was implemented over the period 2007-2012 and mainly targeted the Accra and Kumasi Metropolises with key emphasis on the most disadvantaged areas including informal settlements while focusing on works and institutional strengthening (*Agence Francaise Developpement* [AFD], 2013). Even though one main requirement of this project was to adopt a participatory approach, the efforts at improving waste management in the informal settlements were faced with many challenges due to lack of

involvement and awareness creation among the beneficiary community members (Kessides, 1997; Banes, Huque, & Zipperer, 2000; Amoako & Cobbinah, 2011). Worse of all, the programme failed to make funding for operations and maintenance (O&M) services available which made sustainability unsatisfactory (World Bank, 2006).

Community Infrastructure Upgrading

This project formed the upgrading component of the first phase of the UESP and was kept as simple as possible in terms of design and implemented in seven communities in Accra, Kumasi and Sekondi-Takoradi (World Bank, 2002). The World Bank (2002) in its evaluation stated that, the project was completed within scheduled time, budget and good standards of workmanship. It comprised the paving of main roads and open channel-lined storm drains as well as rehabilitation of existing public toilet facilities, communal solid waste containers and basic street lighting (Amoako & Cobbinah, 2011). This project yielded positive results as there was evidence of investment in housing improvement and small enterprises by the residents in the upgraded communities as is expected from any upgrading projects (World Bank, 2002).

European Union (EU) Micro Projects

The EU micro projects were undertaken in several districts in the Ashanti Region including Kumasi metropolis (Amoako & Cobbinah, 2011). These projects extended educational, health, water and sanitation facilities as well as income generation activities to poor communities in the Kumasi Metropolitan Area. Ultimately, the projects intervention created a lot of employment avenues for a number of unemployed youth. However, Amoako and Cobbinah (2011) observed that litigations among community leaders, lack of coordination and commitment among implementing agencies were identified as major barriers to EU projects in informal settlements in Kumasi.

The Kumasi City Alliance Programme

The Cities Alliance concept refers to a sister-city relationship that Kumasi has established with a number of cities in the developed countries. These relationships include KumasiAlmere (Netherlands) Sister Cities Agreement and the Kumasi–Atlanta Partnership (KAP) which is a partnership between Kumasi and Atlanta in the State of Georgia, United States of America. Poor communities like Asawase and Aboabo have benefited from community projects such as schools, sanitation and waste management through the Kumasi-Almere relationship. The

Kumasi-Atlanta partnership focused on strengthening the social and economic capacity of the Kumasi metropolis to reduce urban poverty.

The UN-Habitat Slum Upgrading Facility

This facility was provided by the UN-Habitat in collaboration with the Cities Alliance with the aim of eradicating slums and preventing of the emergence of new ones. It also forms part of the international commitment to reducing poverty (i.e. Millennium Development Goals) and has the central objective of assisting less developed countries to mobilize domestic capital for local slum and urban upgrading activities. The neglect of local communities and lack of coordination among other slum improvement interventions have resulted in counterproductive efforts.

Table 2.3 summarises the interventions implemented principally for improving the infrastructural conditions in informal settlements.

Table 2.3: Some Informal Settlement Upgrading Programmes in Kumasi

Programme	Duration	Beneficiary Settlements	Projects Implemented	Sustainability Challenges
Urban Environmental Sanitation Programme (UESP) I & II	1996-2012	Aboabo Asawase	Waste Management and Roads Construction	Inadequate support from slum dwellers
European Union Micro Projects	1996- 2002	Anloga	Provision of water and sanitation facilities	Litigations, lack of coordination
Community Infrastructure Upgrading	2000-2004	Asawase, Oforikrom, Anloga	Construction of public places of convenience, roads and drains, provision of water and electricity	Inadequate involvement of slum dwellers
UN-Habitat Slum Upgrading Facility (SUF)	2005-2009	Aboabo, Anloga, Oforikrom, Asawase	Eradication of Slums, Prevention of new ones	Lack of involvement of slum dwellers

Kumasi City Alliance Programme	2001-2010	Aboabo, Anloga, Oforikrom, Asawase	Schools, Training of street children, sanitation	Over reliance on donor support

Source: Amoako and Cobbinah, 2011.

The series of programmes implemented with the objective of extending basic infrastructure to deficient settlements have shown a lack of comprehensive plan for informal settlement upgrading. This is evident in the duplication of projects in same settlements. Generally, the implementation of these projects and programmes has not been successful as is evident in the deteriorating conditions in informal settlement dwellers in the City (Amoako & Cobbinah, 2011). The apparent lack of participation of beneficiaries in these programmes has accounted for their non-sustainability. One other key finding from the review of the programmes is the role of international development partners, underscoring their importance in infrastructure delivery in IS of Kumasi.

2.8 Lessons of Community Involvement in Infrastructure Provision and Management

This section of the report reviews successful cases of community participation and self-help in infrastructure provision and management in some informal settlements in developing countries. It discusses the strategies adopted as well as an evaluation into the successes and failures to derive useful lessons for undertaking the study. The cases of Hanna Nassif in Dar es Salaam, Zanzibar and Kibera are reviewed in the study.

2.8.1 Participatory Community Infrastructure Upgrading: Hanna Nassif, Dar es Salaam

According to the Ministry of Lands and Human Settlements Development in Tanzania, Hanna Nassif is one of the informal settlements that prior to 1996 suffered from lack of basic infrastructural services like storm water drains which resulted in perennial flooding in the housing areas. In addition, it was deficient in basic infrastructure including access roads and solid waste collection. However, two attempts at upgrading the settlement, as part of the second and third phases of Tanzania‟s National Site and Services and Squatter Upgrading Programme in 1976 and 1981-1986 were unsuccessful (Kyessi, 2002). In 1991, with the request of the community, the government in collaboration with donor agencies initiated Hanna Nassif Community Based Upgrading with the active participation of the local residents (Kyessi, 2002). It adopted an innovative and novel approach in its institutional structure and community management within an urban context.

The concept of the project was conceived to address the needs of the local population by addressing the basic infrastructural and environmental problems and not just focusing on poverty alleviation. It premised on the notion that the sustainability of the infrastructure improvement initiatives hinges on the involvement of the community members in both socioeconomic and technical terms. The specific elements of the project approach include the following:

- Community representation through the democratically elected Community Development Association (CDA) and wider involvement of residents in throughout the project cycle from project planning, implementation, maintenance and evaluation;
- The design of infrastructure in collaboration with community in order to adapt to the conditions of the built environment without any housing demolitions;
- The use of construction methods and techniques that incorporates the efforts of the local community including labour-based techniques and sub-contracting in the execution of civil works; and
- Project implementation through partnership between local institutions (i.e. the community, non-governmental organisations, local government, research training institutions) and international organisations. The approach recognised the varying roles and competences of the collaborating partners and appreciates the need for building synergies through linkages.

Results and Impacts

According to Kyessi (2002), this initiative had a lot of positive impacts some of which include the following:

- More than 23,000 residents do not experience floods anymore;
- Improved vehicular and pedestrian accessibility and the overall physical environment;
- A drastic reduction of water borne diseases from 4,137 cases to less than 2000 annually before 1996 and in year 2000 respectively;
- Reduction of cost, travel and waiting time for accessing water. After the installation of six water kiosks, water price has decreased from USD 0.06 per before 1998 to about USD 0.025 per 2000 for a 20-litre bucket;
- Over 60,000 worker days generated between 1997 and 2000 out of which over 50 percent were women worker days;

- Capacity training of local residents with skills including community-based projects management, accounting and artisan training. Most of these trained artisans subsequently secured jobs within and outside the settlement;
- Unlike other informal settlements in the city, by the end of 2000 over 70 percent of the property owners in Hanna Nassif were paying property tax, an increase from less than 30 percent before the project implementation; and
- The creation of three more CBOs by 2000, in addition to the one existing before the project. These CBOs have played critical roles in training members of other CBOs in Dar es Salaam. The morale and initiatives of the civic society especially concerning local participation in matters that affect their living environment has remarkably increased.

2.8.2 Community Water Project in Zanzibar

According to Mwehe, (2011) in Zanzibar, the sole responsibility for drinking water provision rests with one agency, Zanzibar Water Authority (ZAWA). Cross-sectoral linkages with other relevant department and institutions were found to be minimal and weak. ZAWA had not taken any actions to solve the problem despite the complaints by residents. There was frequent shortage of piped water in Zanzibar so residents, especially in the informal settlements, established alternative water sources, most of which were found to be very shallow and unhygienic water wells. Communities helped to dig some of the privately owned shallow wells. The water table in Zanzibar is very close to the surface in most areas and so residents just dug few centimetres on the ground to get water.

However, there were very few community owned and managed boreholes found in the informal areas, one of which was found at Kwalaamsha Shehia. The project is composed of a community borehole connected to two main tanks and a small pump station that pumps water to these tanks. The communities buy water from these tanks especially when tap water is not available. The project was initiated by the community itself due to persistent water shortages and they decided to dig their own borehole. They bought two 1,500 litre tanks where water is pumped and stored. The communities contributed some money after which the area member of parliament was approached to top up what they had managed to contribute since it was not enough to complete the entire project. The total cost for the whole project was about 1500 euros. The community chose among themselves a special committee to manage the project. A 20-litre bucket of water now cost just Tshs 50, which is much cheaper and affordable as compared to the Tshs 200 a

bucket that water vendors charge for the same volume. The proceeds from the sale of water is channelled to the maintenance of the project and to pay electricity that is used to pump water. The main tank is also connected to another tank 100 meters away in the same neighbourhood and water is pumped to a 1000 litres tank where residents buy water.

Results and Impacts

As noted by Mwehe, (2011), through the residents own initiative, the projects brought some positive impacts which include the following:

- Residents do not walk long distances to fetch water;
- Women have a lot of time to do other household chores;
- Children are able to go to school on time and study;
- Provision of alternative source of water when ZAWA water is not available; and
- People now attend to other businesses without worrying about where they would get water at the end of the day.

2.8.3 Community Managed Sanitation Services in Kibera, Kenya

Kibera is one of the largest informal settlements in Africa occupying approximately 256 hectares of land. It initially grew as a village of the Nubian soldiers of the demobilized army of British East Africa after the Second World War in 1947 but currently comprise 12 villages (Alabaster, 2011). Towards the achievement of the millennium development targets in poor urban settlements, the UN-Habitat implemented a community managed sanitation service provision model in one of its villages, Soweto East. The project was implemented through a local NGO called “Maji na Ufanisi” in collaboration with the Government of Kenya and the Kibera community.

Results and Impacts

With the participation of the local people through the NGO and the community members themselves, the project made the following achievements:

- Seven waterborne sanitation facilities were completed and commissioned under management of trained and registered community based facility management groups;

- Facilities are managed on a "user-pay" principle and revenue are accrued ploughed back to meet the operations and maintenance costs and savings in community based housing cooperatives;
- Frequency of facility usage varies with factors such as; location, peak days (weekends, up to 1000, weekdays up to 300) and peak hours (morning and evenings);
- Improved water distribution through extension of water networks and installation of up to 70,000 litres storage facility;
- 12m wide, 1.5 km road construction co-funded by UN-Habitat and the Government of Kenya;
- Establishment of a complex resource centre with an operation and management framework that include local communities; and
- Soweto Youth group formed and trained in handling waste as an enterprise

2.8.4 Emerging Issues from Case Studies

It can be gleaned from the cases above that the reliance on the government for the provision of some basic infrastructure was fraught with challenges and hence, the need to take local community initiatives. Some of the lessons from their approaches include the following:

- One key lesson from the case studies is the organisation of community efforts. This involved the setting up of committees and assigning specific functions which is relevant to give credibility for resource mobilisation and also ensure training for continued maintenance and consequently sustainability of projects.
- The projects were successfully implemented with partnership between the community members and CBOs, local government, non-governmental organisations, research training institutions as well as international organisations. The support of government agencies gives recognition of local efforts and therefore arouses their commitment. Also, the governmental agencies provided technical assistance on the design, planning and implementation of projects.
- Despite the financial problems associated with the implementation of self-help projects in informal settlements, the commitment of community members helped in the successful implementation of projects in Tanzania and Kenya. All community members contributed financially to support the project and were supported by their members of parliament.

- The involvement of all community members was achieved through several meetings as a result of proper planning by community project committee members.

2.9 Conceptualising Infrastructure Provision in Informal Settlements

The literature has revealed that several factors interplay towards the development and expansion of informal settlements. It was established and explained by the theories that within the context of rapid urbanisation rate, poverty contributes immensely to the informal settlement development. Aside from these factors, institutional challenges and other sociocultural factors facilitate their expansion. These conditions impact negatively on the levels of infrastructure in such settlements which are measured by their availability, accessibility, affordability and reliability. Unfortunately, these settlements which accommodate a very high percentage of urban population, especially in the developing countries, lack the most basic infrastructure and even if they do, appear in very deplorable state. Recognising the relevance of infrastructure to human settlement development implies that its absence or poor quality affects informal settlements in the following ways:

- The local economy and employment are hindered in terms of production and productivity levels,
- Worsening of environmental conditions which consequently affects the public health and hygiene,
- Again, the low property values greatly affect the revenue generation potentials of the local assembly.

Attempts by the state to supply infrastructural facilities often depend hugely on the support of development partners. The state‟s intervention is mostly fraught with resource constraints, highly fixed standards of infrastructure provision, and centralised nature of provision with weak local participation of beneficiaries in the design, planning, implementation and maintenance. In the bid to cater for the backlog created by over-dependence on central resources, individuals supply the services for domestic use and sometimes commercial operations. In order to leverage the benefits of efficiency and effectiveness with private supply, the state has now adopted to partner with them in public-private partnership arrangements.

However, the relationship between individual suppliers and the beneficiary communities mimics a business transaction with profit making motive while the state undertakes its governance responsibility of supply infrastructure to its citizens.

The conceptual framework provided the basis upon which the data was collected and analysed for the study. This revealed the types of data to be gathered, the likely sources which are explained in detail in Chapter 3.

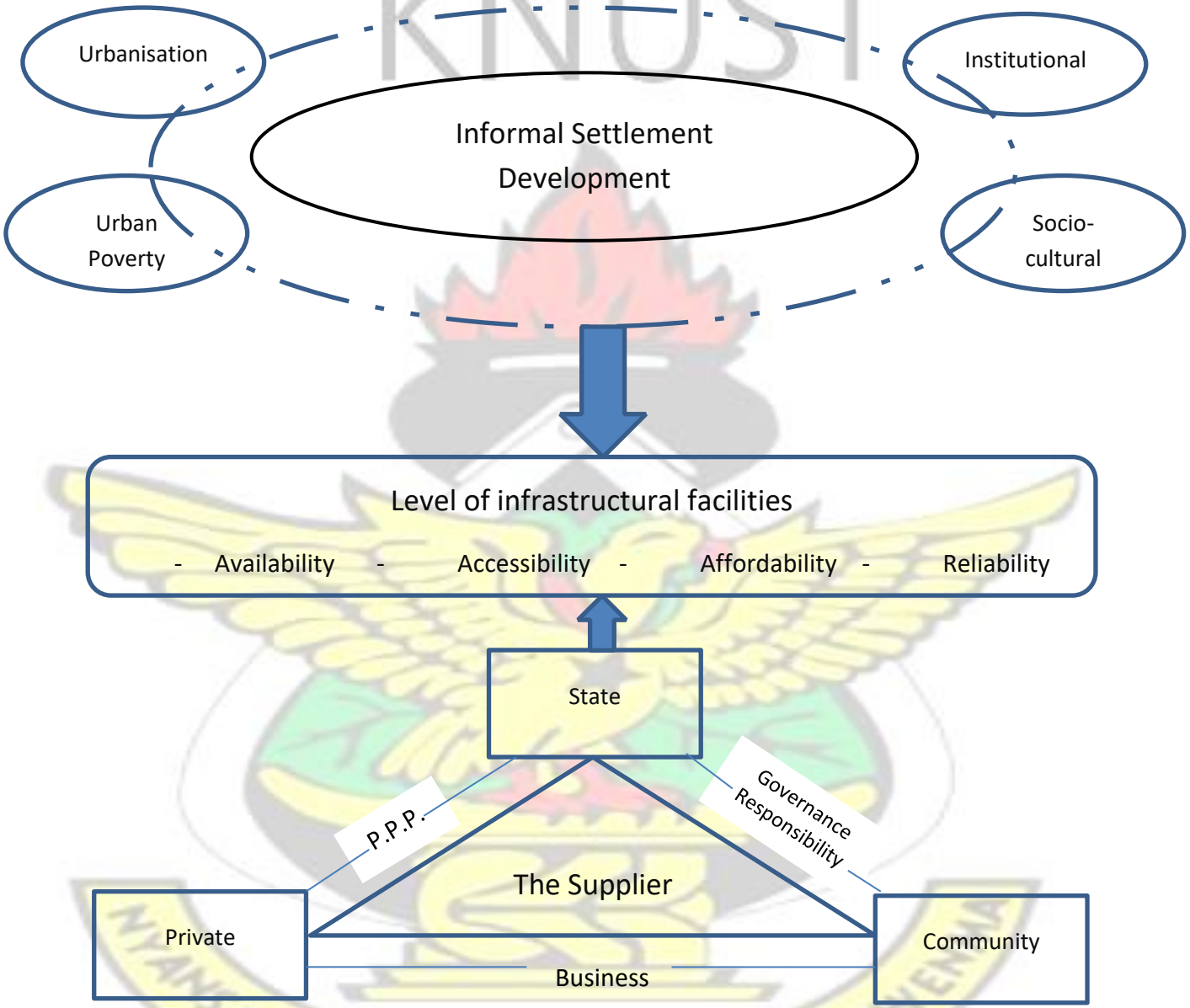

Urbanisation
Institutional
Informal Settlement Development
Urban Poverty
Socio-cultural
Level of infrastructural facilities
- Availability - Accessibility - Affordability - Reliability
State
P.P.P.
Governance Responsibility
The Supplier
Private
Community
Business

Figure 2.2: Conceptual Framework for Infrastructure Provision in Informal Settlements

Source: Author's Construct

2.10 Summary of Chapter

The chapter has presented relevant literature on providing infrastructure in informal settlements. It began by explaining the characteristics of informal settlements. It was established that irrespective of the jurisdictions, the two key factors that make human settlement informal are the lack of secured tenure to land as well as non-conformity of development to local planning and building regulations. Generally, the high rate of urbanization amidst increasing urban poverty influences the development and expansion of informal settlements. Other socio-cultural factors like ones desire to locate closer to his/her tribesmen as well as institutional deficiencies further provide fertile grounds for the expansion of informal settlements. Although these settlements mostly pose health, social and environmental risks to their residents and neighbours, their relevance to the larger city or district in accommodating many of its populace and contribution to the economic development is not contested.

As the lifeblood to every human settlement, the benefits of infrastructure are very much pronounced. Their deplorable state in informal settlements further worsens the plight of residents. However, with the growing recognition of informal settlements as part of the cityscape and structure, attempts are made at providing these basic infrastructural facilities and services to them. The poor quality, low coverage of public infrastructure amidst global economic challenges warrants a paradigm shift to a more sustainable way of providing them. Community participation or at the extreme end, self-help, has been identified as a way of achieving this objective. Notwithstanding this benefit, the use of the approach faces numerous challenges from the national policies and other local inhibiting factors. This sets the tone for the next chapter which discusses the approach adopted for undertaking the study, the data requirements and subsequently examines infrastructure delivery in IS in Kumasi to identify ways of enhancing sustainable infrastructure for human settlement development.

CHAPTER THREE RESEARCH APPROACH AND METHODOLOGY

3.1 Introduction

A research is considered scientific if it is backed by a set of logical procedures through which it is undertaken. The series of processes for undertaking a scientific study ought to be logical to be accepted as useful in contributing to knowledge acquisition. The previous chapter reviewed theoretical frameworks and concepts on informal settlements development and infrastructure provision. However, this chapter enumerates the methodology through which the study was

undertaken. It begins by explaining the design adopted and justifies the reasoning behind its choice and goes on to establish the basis for the choice of the study areas. Some sections are also devoted to the data variables, the sources of the data, and the method of collecting the data as well as the techniques used for selecting the respondents/participants. It also previews the method for presenting the data as well as tools for analysis.

3.2 Research Design and Justification

The research study generally adopted an exploratory approach in the sense that it sought to investigate the levels and mechanisms for infrastructure delivery. Given that it aimed to examine the processes and mechanisms for providing and managing infrastructural facilities and services in informal settlements, it was necessary to study a case to be able to understand the subject critically. Hence, the case study research design is adopted for this study. However, to be able to generalise the findings of the study, it is prudent to analyse and understand the phenomenon from more than one case. In this light, the study adopted the multiple case study approach; based on four specific cases.

Although it is acknowledged that the case studies explore and investigate contemporary reallife phenomenon through a detailed contextual analysis of a limited number of events or conditions and their relationships (Zainal, 2007), and mostly involves the gathering of qualitative data, the research also employed the use of questionnaires to gather some quantitative data from the IS dwellers. This was relevant in order to understand the household conditions that have implications for the management and sustainability of the services and facilities. This helped to facilitate the holistic understanding of the phenomenon being studied (Baxter & Jack, 2008). According to Tellis (1997), employing both quantitative and qualitative techniques in case study research help to explain both the process and outcome of a phenomenon through complete logic of observation, reconstruction and analysis of the cases under investigation.

3.3 Kumasi, the Case Study Area

The central location of Kumasi within the country with its role as a major transport node to all parts of Ghana makes it very attractive to migrants and other commuters (Adarkwa, 2011). The prosperity of the City in terms of local economic development and commercial function further attracts job seekers from other parts of the country in search of economic opportunities. The

influx of people further heightens the problem of inadequate supply of housing from the formal sector; making it a suitable case to carry out the study.

There is no comprehensive study that identifies all informal settlements in the City although some authors classify some areas as such (see Mensah, Antwi & Acheampong, 2013; Amoako and Cobbinah, 2011). This is basically so partly because of the confusion in its definition. However, as it emerged from the review of literature in Chapter Two (2), the common denominators are: lack of legal title to land on which they are developed; and nonconformity to approved planning schemes and regulations. Essentially, for the purposes of this study, informal settlements as used here refers to residential areas where a group of housing units have been constructed on land to which the occupants have no legal claim, or which they occupy illegally; and unplanned settlements and areas where housing is not in compliance with current planning and building regulations (UN-Habitat, 2003b).

Upon consultations with the Metropolitan Planning Department, the Town and Country Planning Department (TCPD) and academicians as well as findings from preliminary investigations, some informal settlements were identified with the use of criteria emerging from the adopted definition and are explained in section 3.3.1.

3.3.1 Categorising the Study Zones

The literature review in the previous chapter revealed five types of informal settlements that were identified in the European study by Economic Commission for Europe (ECE). However, contextualising these in the research study, three of them can be identified to be present in Kumasi, namely: squatter settlements, illegal (unauthorised) subdivisions and substandard inner-city housing areas (slums). In addition, Afrane‟s (2013) study on slum development in Ghana also identified three types of informal settlements: indigenous communities, migrant communities (Zongos) and newly emerging squatter communities. Based on the characteristics of the two sets of categorisation, it can be gleaned that the informal indigenous communities in Kumasi exhibit the characteristics of the sub-standard inner-city housing areas as identified by the ECE. This therefore establishes four distinct typologies of informal settlement for the study. They include: informal indigenous communities, migrant communities, squatter settlements and unauthorised subdivisions.

Informal indigenous communities are the old traditional settlements in the City which are unplanned with houses being mostly “family-owned” and do not have approved development

permits. Migrant communities also refer to settlements where land is released to settlers by the owners but developments do not have planning permission. Squatter settlements, on the other hand, do not have express permission from land owners and developments do not follow any planning and development regulations. Unauthorised subdivisions include areas where residents acquire from owners, land that are subdivided without the approval of the statutory planning body of the Assembly. These subdivisions are mostly done by unqualified surveyors and because of that, developers do not get development permission.

3.3.2 Selecting the Study Areas

Because the study intends to generalise on the provision and management of infrastructural facilities in informal settlements, a representation was taken from each of the four categories identified. One settlement was therefore selected from each category for the purposes of the study. Oforikrom was selected as an indigenous informal settlement because most houses lack authorisation from the city authorities (Amoako & Cobbinah, 2011) although they might own the land through the family. In the migrant community like Moshie Zongo, homeowners have the permission of land owners but lack the authorisation to develop as well as land titles. Historical accounts on Dakodwom also reveals that initial residents sought permission from original traditional land owners to settle but do not have express permission from the state that currently owns it. Ohwim is classified unauthorised subdivision because a large part of the settlement that falls within the Owabi Catchment Reserve has been subdivided for housing development without approval by KMA‟s statutory planning body. Table 3.1 shows the settlements selected from each category while Figure 3.1 shows their locations within Kumasi.

Table 3.1: Selected Settlements for the Study

Category of Informal Settlement	Selected Settlement
Informal Indigenous Communities	Oforikrom
Migrant Communities	Moshie Zongo
Squatter Settlements	Dakodwom
Unauthorised Subdivisions	Ohwim

Source: Author's Construct, 2014.

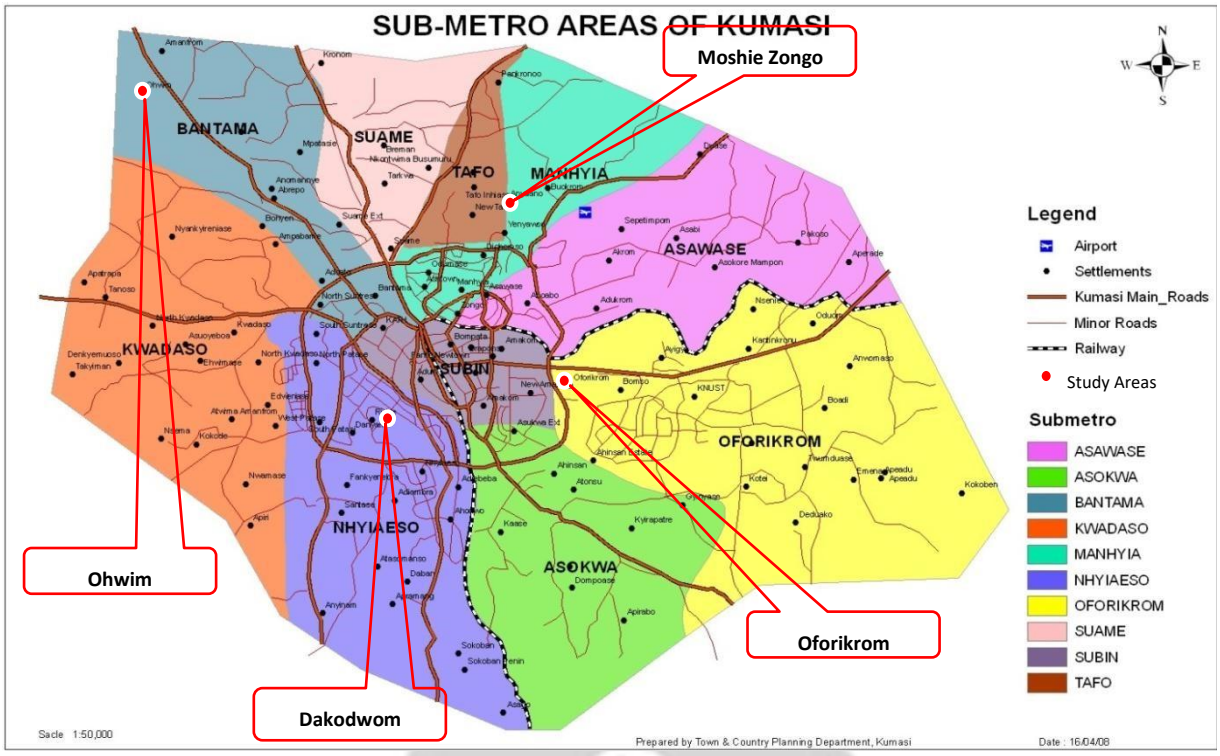


Figure 3.1: Location of Study Areas in Kumasi Metropolis

Source: Adapted from Town and Country Planning Department, 2010.

3.4 Units of Enquiry

Based on the research objectives, the basic units of enquiry required are the household heads, community based organisations and formal government institutions involved in the provision and management of infrastructural facilities in human settlements in the City. These are discussed under this section.

3.4.1 Households

With the focus of the study being to investigate the mechanisms for provision and management of infrastructural facilities in informal settlements, it was prudent to know the types of facilities available to the households. In addition, some levels of participation was expected especially, the informal approach to self-help provision and maintenance. Chowdhury in Mathbor (2008) observes that although participation in development activities refers to group action, decisions to participate in the groups are individual ones based on life experience of the individual. Also, the sustainability of the facilities requires the willingness of users to contribute towards their maintenance. Owing to these factors, the households were surveyed with the household head as the major respondent.

3.4.2 Formal Government Institutions

The delivery of infrastructural facilities has been regarded as the duty of government; and this is executed through some decentralised bodies of the Metropolitan, Municipal and District Assemblies (MMDAs). Within the scope of the study, the institutions which were contacted for their crucial role include: the Waste Management Department (WMD), Ghana Water Company Limited (GWCL), Kumasi Metropolitan Roads Unit (KMRU) the Kumasi Metropolitan Planning Office and the Town and Country Planning Department. These institutions were interviewed in order to assess their general attitude and performance in providing the facilities in informal settlements in the City. The key respondents for the institutional interviews were the heads of the respective institutions.

3.4.3 Community-Based Institutions

Local institutions like community-based organisations (CBOs), traditional leaders, assembly members and unit committees who facilitate community efforts in provision and maintenance of infrastructural facilities in the settlements were also interviewed.

3.5 Sampling

Usually due to time and resource constraints, it is required to select a representative part of the population under study through sampling. This process should be logically based in scientific theories to enable the researcher generalise his research findings from the sample to the population as a whole. This section of the report explains the procedures for determining the sample size as well as the technique used to in selecting units from the population under study.

3.5.1 Sample Size Determination

In view of the fact that not all households can be studied, a sample of the households in the study communities was selected for the study. The mathematical method of sample size calculation was employed to determine the minimum sample size for the entire study. The researcher adopted the Slovin‟s formula for sample size calculation; $n = \frac{N}{1+N(\propto)^2}$,

where n is the minimum sample size, N is the sample frame, α is the margin of error and 1, a constant. The total number of households in the study areas was used as the sample frame from

which the sample size was determined. At a confidence level of 95 percent and using 0.08 as the margin of error, the minimum sample size for the study was calculated as 155 households (*see Appendix 1*). Even though the calculated sample size was 155; 164 households were interviewed purposely to allow for more respondents from Ohwim and Dakodwom. Based on the proportion of households in each study area, the sample was distributed pro-rata amongst them (*see Table 3.2 for details*).

With regard to the institutional study, one respondent was selected from each of the formal government institutions involved in the study while the assembly members and a member of the unit committees of the respective study areas were interviewed. A representative of community based organisations in Moshie Zongo and Ohwim as well as a community leader from Dakodwom and Oforikrom were also interviewed (*see Appendix 2*). In all, about 17 respondents were interviewed in the institutional survey.

3.5.2 Sampling Techniques

In identifying the respondents for the study, both probability and non-probability sampling techniques were adopted. The non-probability technique adopted is the purposive sampling. This technique was used to select the various institutions that play specific roles in the provision of infrastructural facilities and services in human settlements in the Metropolis. By their mandates and functions, the Waste Management Department, Kumasi Metropolitan Roads Unit, and the Kumasi Metropolitan Planning Department were selected purposively for the study. Local community leaders were also selected purposively because of their leadership and organizational roles they play in planning and laying basic infrastructural facilities in their respective communities.

A two-staged sampling method was applied in selecting the respondent households. This involved identifying primary and secondary sampling units. The categories of informal settlements identified through the literature review and consultations served as the primary unit. Here, a community each was selected from the IS categories. Then the systematic sampling technique was employed in selecting households (secondary units) in the study areas. This technique was used because of its ability of ensuring that each household had equal chance of being included in the study. With this probability sampling technique, the respondent households were selected at a constant sampling interval, K (*see Appendix.3*).

Table 3.2: Sample Size for Household Survey

Study Area	Total Households (2000)	Inter-censal growth rate (%)	Estimated Households (2014*)	Sample Size	Sample Proportion (%)
Moshie Zongo	6794	4.2	12086	66	40.2
Oforikrom	7694	4.3	13872	78	47.6
Ohwim	634	4.9	1239	12	7.3
Dakodwom	320	4.4	585	8	4.9
Total	**15,442**	**-**	**27781**	**164**	**100**

Source: Population and Housing Census, 2000 **Projections.*

3.6 Data Types, Sources and Collection Methods

From the review of literature, some variables were identified as appropriate for the conduct of the research. These include: mechanisms for providing basic infrastructure; techniques and technology used; actors and resources involved; potentials and sustainability issues (including cost recovery mechanisms, maintenance strategies and willingness to pay). Generally, these data were obtained from both primary and secondary sources. The primary data sources included households, heads of institutions, community-based institutions (i.e. assembly members, unit committee members and traditional authority). The community leaders also served as key informants in view of their leadership roles in developmental activities in the community and the rich information they possess that are considered very useful for the study. The institutions that were consulted for data for the study included only those that play crucial role in infrastructure and services provision in the Metropolis. These institutions include the following:

- Kumasi Metropolitan Development Planning Office;
- Waste Management Department;
- Kumasi Metropolitan Roads Unit; and - Ghana Water Company Limited.

Questionnaires were administered to collect primary data from the households while semistructured interviews were adopted for the institutional surveys (*see Appendices 4-8*). Other data like the availability of infrastructural facilities and the extent of development of the informal settlements were collected by on-site observation (*see Appendix 9*).

Table 3.3: Variables, Sources and Methods for Collection

Variables	Source of Data	Method of Collection
Housing characteristics (housing types, tenancy arrangement, etc.)	Households	Questionnaire Administration
Availability and condition of infrastructural facilities (road, drains, water and toilets)	Households	Questionnaire administration and observation
Mode of infrastructure provision, actors and their potentials	Community-based & formal government institutions	Interviews
Potentials, motivations and incentives for self-help	Households, Community-based institutions	Questionnaire administration and interviews
Available resources for provision	Households, Community-based institutions	Questionnaire administration and interviews
Appropriate technology	Community-based & formal government institutions,	Interviews and observation
Cost recovery issues, willingness to pay, access and equity	Household, Community-based institutions	Questionnaire administration and interviews
Operations and maintenance strategies	Households, Communitybased & formal government institutions,	Questionnaire administration and interviews

Source: Author's Construct, 2014.

Secondary data, on the other hand, were obtained from published and unpublished reports, journals and notifications issued by government and para-statal bodies as well as both print and electronic media reports. Other reports that were obtained from the institutions contacted were also very useful for research. Example include: World Bank"s assessments reports on upgrading projects in Ghana. The variables, sources and methods used for collection are summarised in Table 3.3.

3.7 Validity and Reliability of Data

In order to enhance the accuracy of measurements and the ability to generalise the findings, a series of steps were followed. First, given the fact that case study designs have limited abilities to generalise, a multiple case approach was adopted. In addition, the selection of case study areas took the different typologies of informal settlements into consideration. The

administration of questionnaire in addition to the interviews and observation also broadens the enquiry units in the study. The data collected from the various sources were corroborated and triangulated with one another as well as with other secondary sources in order to ensure consistency.

In view of the workload in the field, field research assistants (FRAs) were carefully recruited and trained to assist in the household data collection. They were made to understand the research objectives and all the questions to be asked. This was done to ensure that the FRAs have a common understanding of the common terms and phrases as well as to enable them explain the questions in the local language to their respondents. A pre-test study was also conducted in Oforikrom and Ayeduase to test the research instruments designed for the study in order to ensure that they measure the variables intended to be measured as well as test the efficiency of the FRAs.

3.8 Data Processing, Presentation and Analysis

The data processing stage involved four activities: data editing, coding, entry and cleaning. Data collected from the field were edited immediately FRAs returned from field each day to ensure that all errors are corrected. After editing, the household data were coded and entered into a Statistical Package for the Social Sciences (SPSS) template to build a database for analysis. The data was then cleaned in the SPSS programme to ensure consistency and treat all missing responses made during the data entry stage. Data recorded from interviews was transcribed and used for the analysis.

The processed data were then analysed using both univariate and bivariate descriptive statistical techniques. Univariate descriptive analytical technique was employed to describe the level of infrastructural facilities available and the demographic characteristics of the study areas. Frequency distribution and measures of central tendencies (mean, median and mode) were mainly used in the univariate analysis. In order to establish relationships between variables, bivariate descriptive analysis were also employed. The Pearson‟s correlation and chi-square techniques were employed for the bivariate analysis. For instance, the chi-square test was used to measure the association between the levels of household‟s satisfaction and the type of toilet facilities they use.

3.9 Summary of Chapter

The forgoing chapter has shown the justifications for the study areas as well as the research approach adopted for the study. It indicated the four study areas were selected based on the unique characteristics that meet the features of the categorisation of informal settlements in Kumasi. The data variables to be measured in the study have also been identified together with their sources, the method of collection and the tool to use in collecting the data. It also touched on the series of strategies the researcher adopted to ensure that the results are valid and reliable as well as identified the techniques used for the analysis of the data collected. Having done all these, the stage is now set to collect valid data which would be analysed in the next chapter.

CHAPTER FOUR NATURE OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI

4.1 Introduction

The previous chapter set out the procedures and techniques for conducting the research study. However, this chapter presents the results of the data analyses and draws inferences based on the purpose of the study. It commences by giving a brief profile of the selected study areas and describes the demographic characteristics of their inhabitants. In addition to these, since infrastructural facilities and services are regarded as a key component of housing, a brief analysis of housing typology and tenure arrangements are discussed. The current situation of infrastructural facilities as pertains to the study areas is also presented along such themes including modes of facilities, cost and consumption issues. It concludes with a précis of the major findings.

4.2 Brief Description of Study Areas

4.2.1 Oforikrom

Oforikrom is an indigenous community located in the Oforikrom sub-metro of the Kumasi Metropolis about 4 km from the city centre. It is bordered to the north by the Kumasi – Accra Highway, south by Anloga and to the east and west by the Sisa River and Eastern By-Pass respectively (*see Figure 4.1*). Based on the 2000 Population and Housing Census, the community is currently estimated to have a population of 74,908 in 13,872 households with an

average household size of 5.4. Oforikrom occupies a land size of 44.75 hectares putting its density at 1674 persons per hectare.

4.2.2 Moshie Zongo

Moshie Zongo originally called "Anyaano", is a settlement located 4 km away from the city centre, in the Manhyia sub-metro of the metropolis with a population of 70,098. Its population makes up a total of 12,086 households with an average of 5.8 members. Occupying a land size of 61.11 hectares, the current population density of the settlement is 1147 persons per hectare.

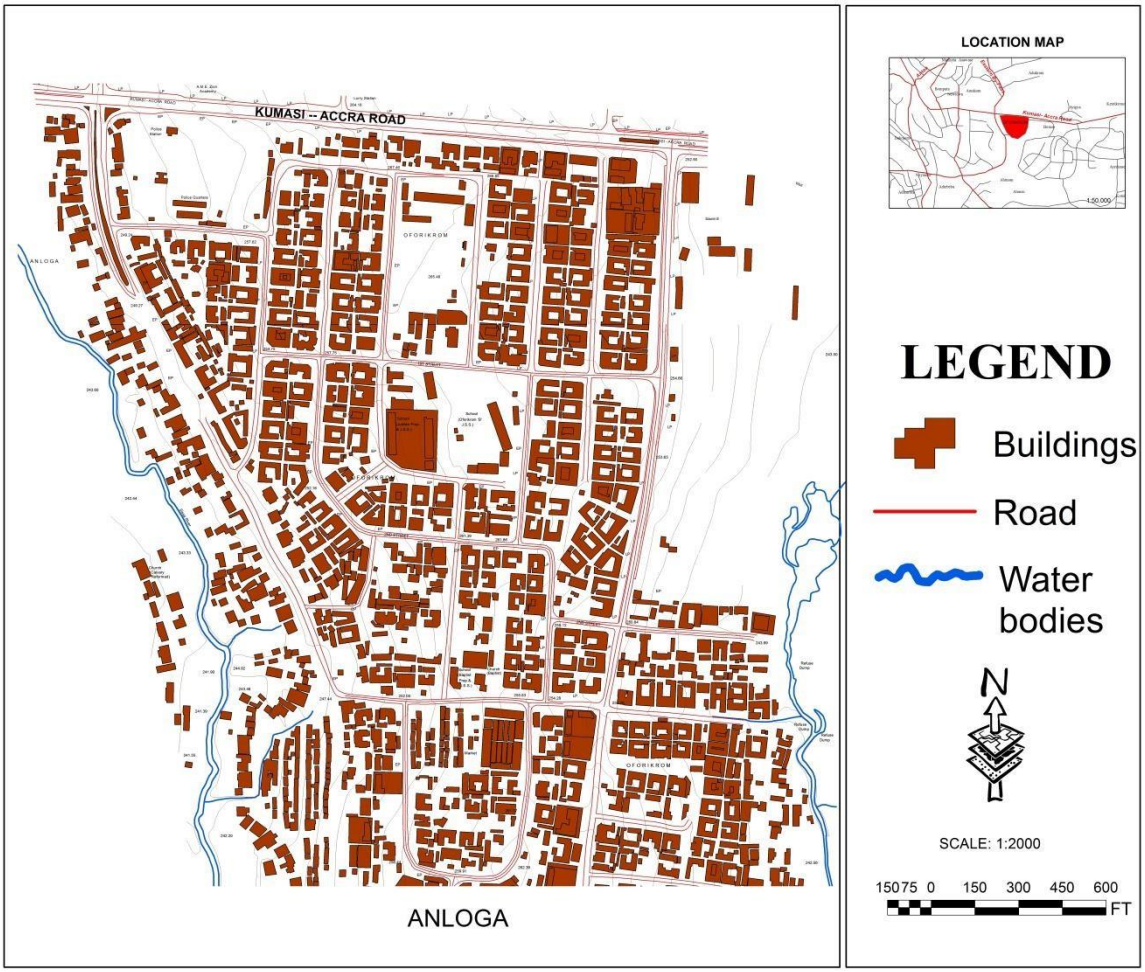


Figure 4.1: Map of Oforikrom

Source: Author's Construct, 2014

As reflected in the name (*Zongo*, meaning migrant settlement), Moshie Zongo is a migrant community made up of people from about 18 ethnic groups from northern Ghana who coexist peacefully with a few Akans and people with other ethnic affiliations. Typical of most migrant

settlements, Moshie Zongo is located on a ridge between two major water bodies, Aboabo and Agogo streams. It borders Yenyawoso to the south, Tafo Nhyaeso to the west, Buokrom Estate to the north and Sepe to the south west (*see Figure 4.2*). With its increasing population amidst the general tempo of urbanisation of the City, the reservations along these water bodies have been badly encroached upon by developers. The water bodies have consequently lost their natural character as they have been used as dumping grounds for both domestic and industrial wastes. Owing to this, areas very close to the rivers become heavily inundated during rainy season.

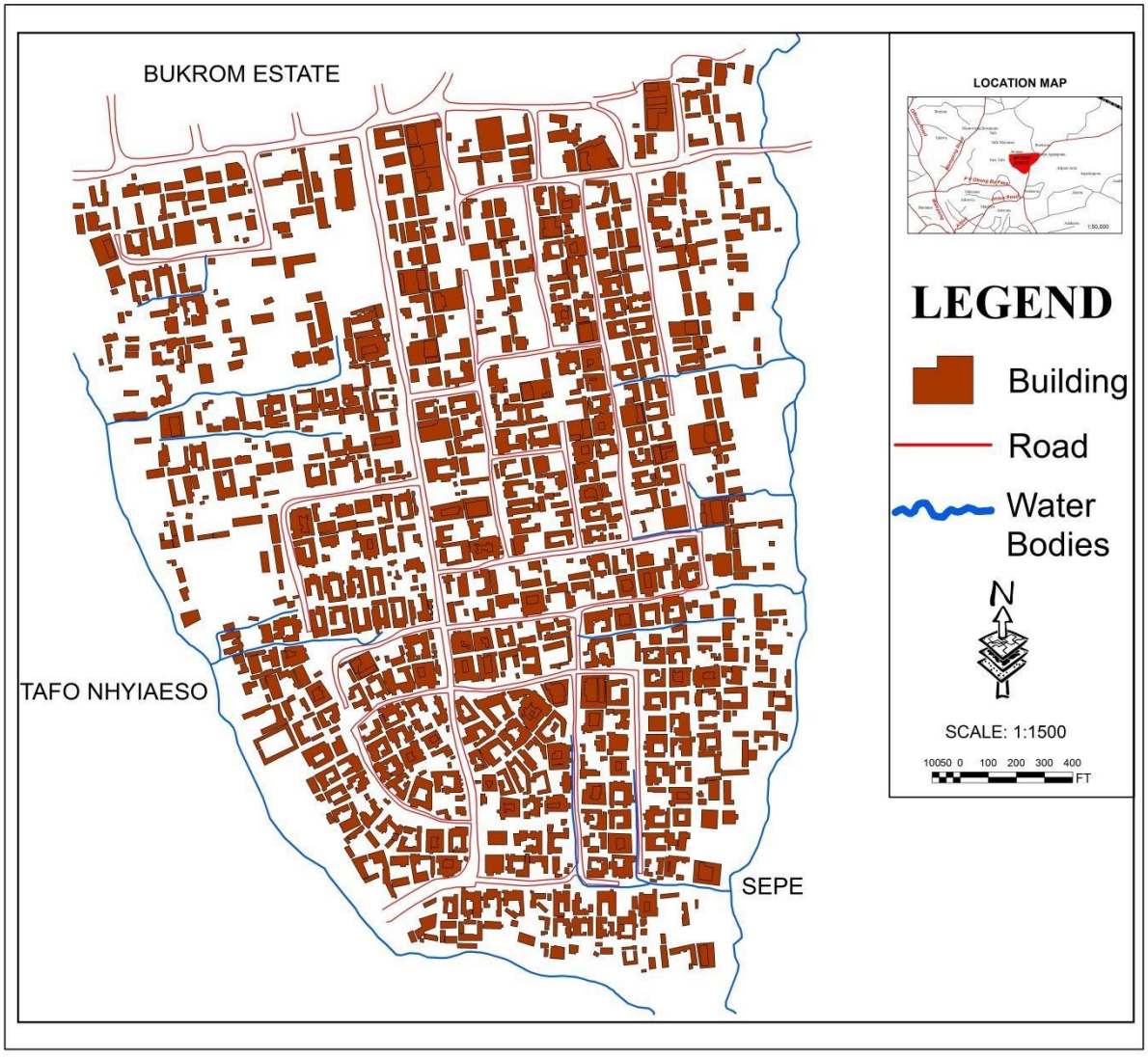


Figure 4.2: Map of Moshie Zongo

Source: Author's Construct, 2014

4.2.3 Ohwim

Ohwim is a peri-urban settlement that lies in the periphery of Kumasi in the Bantama submetro. It is located about 8 km from the centre of the city. The entire settlement falls within the Owabi Catchment Reserve, a wildlife reserve and source of water to the Owabi headworks, one of the dams that produce pipe-borne water to the Kumasi Water Supply System (KWSS) (*see Figure 4.3*). It is worth noting that the settlement began before the demarcation of the reserve in the 1920s. However, because the compensation due the residents was not paid and the people resettled, the settlement has grown from the initial 34 compound houses at the time of the demarcation to cover a land size of 120 hectares. Notwithstanding the level of development, the area does not have a planning scheme approved by the Kumasi Metropolitan Planning Authority. The sale and development of land are done according to an unapproved layout; hence, being regarded as an unauthorised subdivision for the purposes of this study. Ohwim has a population of 7,186 made up of 1,239 households. This puts the average household size of the settlement at 5.8.

4.2.4 Dakodwom

Dakodwom is a typical "fante" (*a local tribe*) community located 2.5 km from the city centre in the Nhyaeso sub-metro of the Kumasi Metropolis. Originally, the settlement which was located at the current State Experimental School site, started as a village of a fante man who sought permission from the owners of the land, the Asafo stool, and paid royalties periodically. However, the area was acquired by the State in 1943 under the Kumasi Land Ordinance for the use of the district administration. The commissioner eventually relocated the residents to its present location because of the noise level and it being seen as a threat to the colonial administration.

Currently, Dakodwom has a population of 2,867 that make up 585 households with an average size of 4.9. With a land size of 2.95 hectares, the population density of the settlement stands at 971 persons per hectare (*see Figure 4.4*). The present compact nature of housing development is explained by the desire to be close to one another and be able to assist in times of emergency. From historical accounts, the people decided to build very compactly in order to hear and assist when one shouted for help. This development has greatly affected accessibility in the area making it impossible to move from one end of the settlement to the other without traversing someone else"s compound.

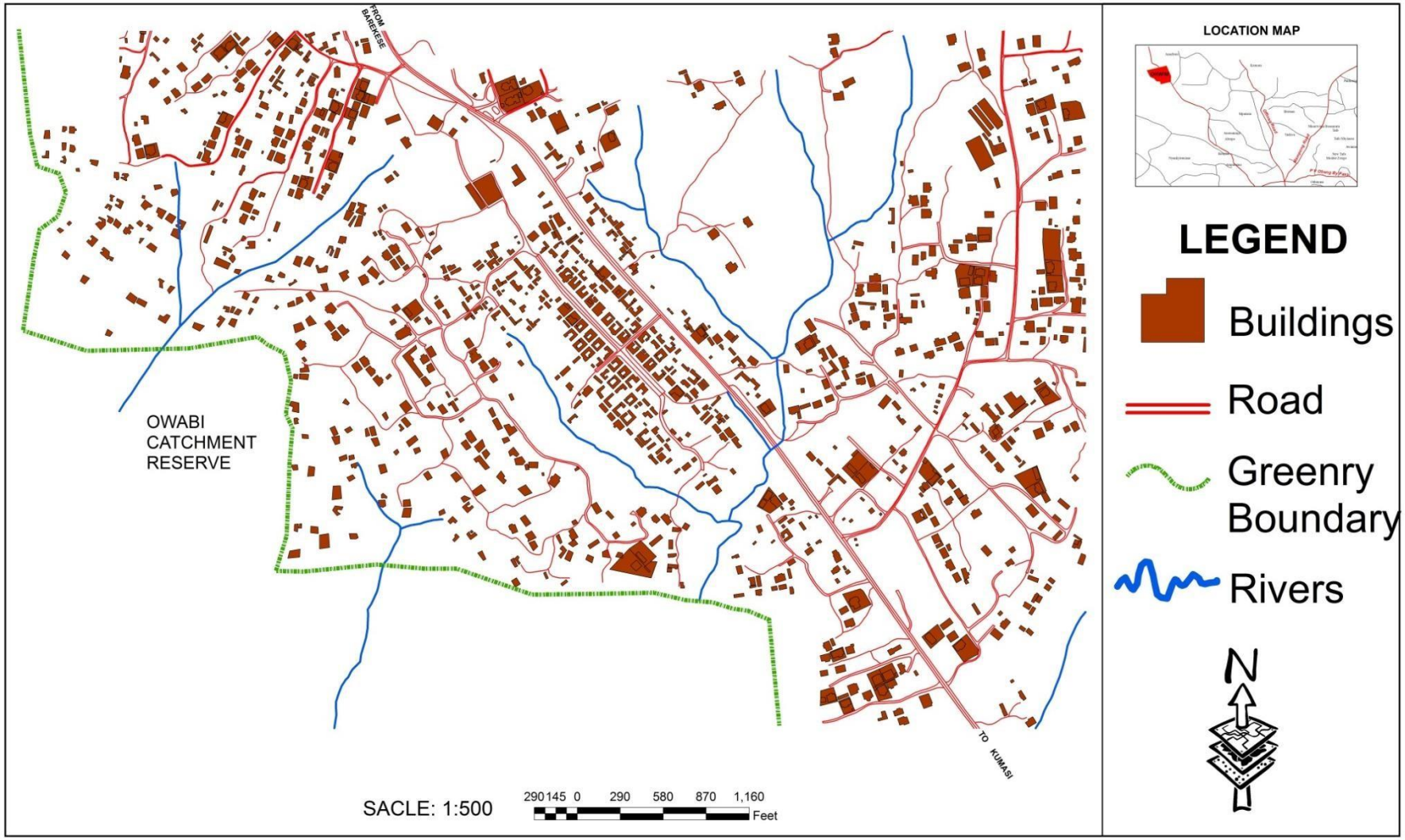


Figure 4.3: Map of Ohwim

Source: Author's Construct, 2014

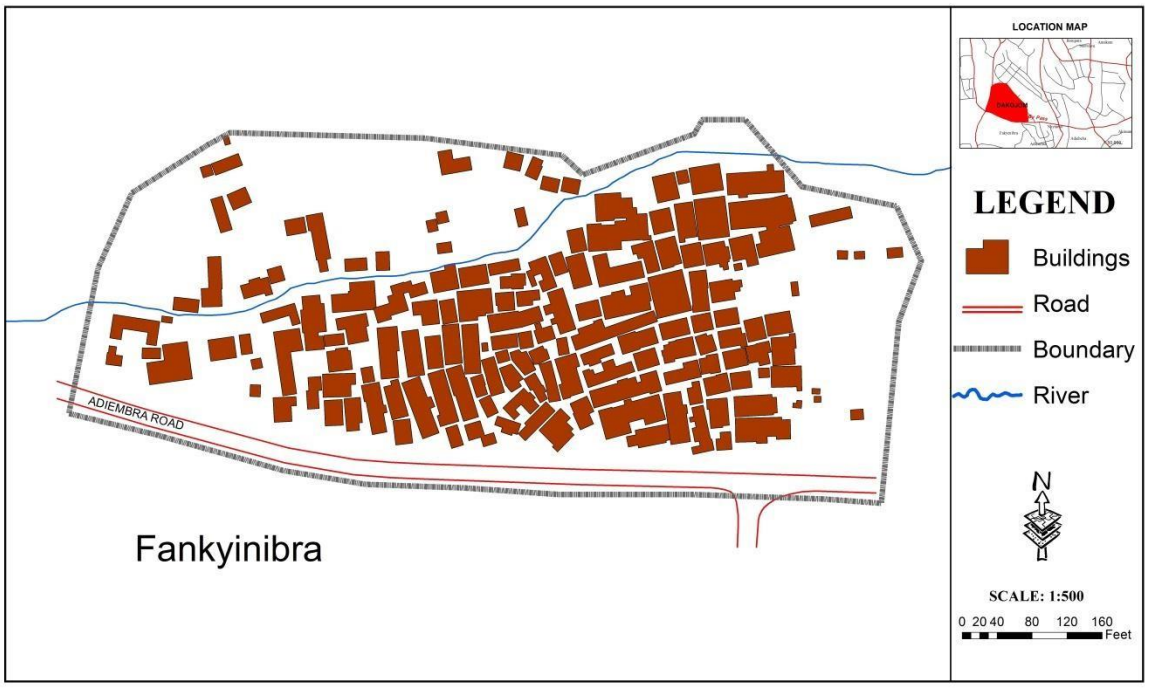


Figure 4.4: Map of Dakodwom

Source: Author's Construct, 2014

4.3 Demographic and Socio-economic Characteristics of Study Areas

This section presents the demographic and socio-economic characteristics of the households in the study areas. It discusses the population and density of the study areas, educational backgrounds and cultural as well as economic characteristics of the respondent households.

4.3.1 Population Size and Density

Many authors have argued that the rapid rate of urbanisation is a major contributory factor to the development and expansion of informal settlements around the world (see Al-Daily, Parrott & Stephenson, 2013; Malpezzi & Sa-Adu, 1996; Obudho & Mhlanga, 1988). This is driven by both natural increase and rural-urban migration. The rate of growth of Kumasi‟s population has been very high over the various censal years. Currently the annual growth rate stands at 5.5 percent (2000 – 2010 inter-censal years) increasing marginally from 5.4 percent in 2000 (GSS, 2013a). This rate is greatly influenced by migration. The mix of infrastructure and the vibrancy of its local economy as well as its function as both modern and traditional administrative capital among other things have been major pull factors attracting people from over the country and beyond. Almost half (46.6 percent) of the City‟s population are migrants from other areas in the Ashanti Region, within the country and outside the country (GSS, 2013a). With this

pressure, the informal settlements remain very critical in providing means of accommodation for the population influx because of the relatively cheaper cost of renting rooms.

Table 4.1: Population Trends and Densities of Study Communities and Kumasi, 1970 – 2014.

Study Communities	Population				Land Size (ha)	Population Density (p/ha)
	1970	1984	2000	2014*		
Moshie Zongo	4377	12097	34980	70098	61.11	1147
Oforikrom	NA	24725	38155	74908	44.75	1674
Ohwim	439	887	3279	7186	120	60
Dakodwom	629	1144	1750	2867	2.95	971
Kumasi	346336	496678	1170270	2521087[a]	25400	99

*Projected Population [a] Projections based on 2010 census figure NA - Not Available

Source: GSS (2005; 2013); KMA (2010)

The rate of population growth in the Metropolis is replicated by the informal settlements as shown in Table 4.1. Within 14 years (2000 – 2014), the population of Moshie Zongo has more than doubled; averaging over 2,500 people annually while that of Oforikrom almost doubled (over 2,180 per annum) in the same period. As can be observed from Table 4.1, apart from Ohwim, a peri-urban settlement, all other settlements have very high population densities. The high rate of population increase and densities exert a lot of pressure on the basic infrastructural facilities as their stocks have not increased similarly. This pressure poses serious hazards to public health and safety.

4.3.2 Household Size

The relevance of household size in the provision of infrastructural facilities lies in the fact that it positively affects consumption levels. For instance, the size of households influences the consumption of water and sanitation services, and consequently influences the cost of usage. The study revealed that household sizes in the informal settlements studied (i.e. 5.5) exceed that of the metropolis, 4.0 (GSS, 2013a).

Table 4.2: Household Sizes of Study Communities

Study Communities	Household Sizes								Total		Mean household size
	1-3		5-6		7-9		>10		Freq.	%	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%			

Moshie Zongo	6	9.1	40	60.6	14	21.2	6	9.1	66	100.0	5.8
Oforikrom	15	19.2	37	47.4	23	29.5	3	3.8	78	100.0	5.4
Ohwim	3	25.0	4	33.3	4	33.3	1	8.3	12	100.0	5.8
Dakodwom	1	12.5	6	75.0	1	12.5	-	-	8	100.0	4.9
Total	**25**	**15.2**	**87**	**53.0**	**42**	**25.6**	**10**	**6.1**	**164**	**100.0**	**5.5**

Source: Author's Field Survey, 2014

As can be observed from Table 4.2, Moshie Zongo and Ohwim have the highest household sizes. Nonetheless, in Ohwim most of these households reside in detached houses occupied by single households; which indicates low room occupancy rates of 2 persons per room compared with that of Moshie Zongo (i.e. 4).

4.3.3 Ethnicity and Religion

Ethnicity refers to the ethnic group which a person belongs to. As identified in the preceding Chapters, ethnicity is identified as a cultural factor that influences the development of informal settlements. Studies by Malpezzi & Sa-Adu (1996) and Mensah, Antwi & Acheampong (2013) indicate that informal settlement dwellers mostly have common sociocultural background. The study confirms this assertion as it revealed that 77.6 percent of residents in Moshie Zongo hail from Northern Ghana and 87.5 percent of residents in Dakodwom are Fantes. This is partly attributed to the fact that these settlements serve as first stop to the immigrants from their hometown and mostly feel more secured living close to their tribesmen.

Table 4.3: Ethnicity of Respondents in Study Communities

Study Area	**Ethnic Affiliation**								**Total**	
	Akan		**Ewe**		**Northern Tribes**		**Others**			
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
Moshie Zongo	14	20.9	-	-	51	77.6	1	1.5	66	100
Oforikrom	54	69.2	1	1.3	23	29.5	-	-	78	100
Ohwim	12	100.0	-	-	-	-	-	-	12	100
Dakodwom	7	87.5[1]	1	12.5	-	-	-	-	8	100
Total	**87**	**51.9**	**2**	**1.2**	**74**	**46.3**	**1**	**0.6**	**164**	**100**

[1] All belong to the Fante ethnic group

Source: Author's Field Survey, 2014

4.3.4 Educational Background

The study revealed that 81.6 percent of the residents in the informal settlements under study have either no formal education (20.7 percent) or up to basic education (61.1 percent). Only 19.4 percent of the population have received some form of education above the basic level compared to the Metropolis figure of 35 percent. This gives credence to the fact that these informal settlements mostly accommodate the low income households usually characterised by low levels of formal education. Notwithstanding this finding, Table 4.4 shows that about 25 percent of residents in Ohwim have higher education (above basic education). This reveals an interesting finding implying that not only socio-economic factors influence informal housing development or a person settling in informal areas but also other factors such as institutional factors as discussed in Chapter Two (2).

Table 4.4: Educational Background of Respondents

Study Communities	Highest Level of Education														Total	
	None		Pre-School		Primary		JHS		SHS		Voc./ Tech.		Tertiary			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Moshie Zongo	20	30.3	1	1.5	11	16.7	21	31.8	10	15.2	1	1.5	2	3	66	100
Oforikrom	13	16.7	1	1.3	9	11.5	45	57.6	8	10.3	2	2.6	0		78	100
Ohwim	1	8.3	-	-	1	8.3	7	58.4	2	16.7	-	-	1	8.3	12	100
Dakodwom	-	-	-	-	1	12.5	3	37.5	4	50	-	-	-		8	100
Total	34	20.7	2	1.2	22	13.4	76	46.5	24	14.6	3	1.8	3	1.8	164	100

Source: Author's Field Survey, 2014

Table 4.5: Employment Status and Sector of the Economically Active Population

Study Communities	Unemployed[1]	Employment Sector[2]						Total
		Commerce	Service Formal	Service Informal	Agric	Formal Industry	Informal Industry	
Moshie Zongo	14.3	59.3	11.1	22.2	1.8	-	5.6	100
Oforikrom	16.7	60.0	6.7	23.3	-	1.7	8.3	100
Ohwim	12.5	42.8	28.6	28.6	-	-	-	100
Dakodwom	22.2	57.1	-	28.6	-	-	14.3	100
Total	15.1	58.1	9.3	24.0	0.8	0.8	7.0	100

[1] Unemployed rate is calculated on the total economically active population.

[2] This shows the proportions of the employed population engaged in the various economic sectors.

Source: Author's Field Survey, 2014

4.3.5 Employment Status and Sectors

The study collected data on the employment status of the economically active population in the study communities. This group comprises the population of age 15 years or older who are working; who are not working now but have a job to return to; or are not employed but seeking for employment (GSS, 2013b). The economically active group does not include full time students and retired persons. Out of this group only 15.1 percent were unemployed which is almost equal to the unemployment rate in the City (i.e. 16 percent) (KMA, 2010). Here, the underemployed is not segregated because of the difficulty in assessing the capacities of the respondents, and hence, included in the employed since they were engaged in an activity at the time of the study. Table 4.5 shows the employment sector of the employed population in the four study communities.

The employment rate of 84.9 percent in the study communities is very significant albeit rewarding very low incomes. The table indicates that the majority (89.1 percent) of the employed population in the study communities are engaged in informal economic activities. These activities usually do not require high levels of formal education and their operators mostly earn low and unstable incomes. This figure supports Yu‟s (2002) observation that the informal settlements provide residence for many informal sector workers. However, in Ohwim, many of the workers (28.6 percent) are employed by the formal sector compared to the other areas and even higher than the number of formal workers in Kumasi (25 percent) reported by Afrane and Ahiable (2011). This further supports the assertion raised earlier that the settlement has been “invaded” by the middle class as manifested by the good quality of houses.

4.3.6 Household Income and Expenditure

The study gathered data on the incomes and expenditure of households in the study areas. The monthly household income includes the incomes of all working members. With an average household size of 5.5, an average of two members (mostly parents) constitutes the working members. Table 4.6 shows that the average monthly household income in the study areas is GH¢ 500.00 which is less than half that of national figure (GH¢ 1,387.08) recorded in 2014 in the round six of the Ghana Living Standard Survey (GLSS 6) [GSS, 2014]. Similarly, the study communities recorded lower average household expenditure (GH¢ 475.00) than recorded in the country (GH¢776.42). This shows extremely low economic conditions in the informal settlements.

Table 4.6: Monthly Household Income and Expenditure

Study Communities	Household Incomes (GH¢)								Median Income (GH¢)	Median Expenditure (GH¢)
	<200		201-500		501-1000		>1000			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%		
Moshie Zongo	1	1.6	37	54.8	23	35.5	5	8.1	500	480
Oforikrom	10	13.0	37	46.8	20	25.0	11	14.2	500	470
Ohwim	-	-	5	46.7	6	50.0	1	8.3	600	530
Dakodwom	1	12.5	4	50.0	3	37.5		-	450	416
Total	**12**	**7.5**	**83**	**49.7**	**52**	**32.1**	**17**	**10.7**	**500**	**475**

Source: Author's Field Survey, 2014

From Table 4.6, it can be seen that more than one-third (42.8 percent) of the respondent households earn more than the average income with over a tenth earning above GH¢ 1000.00. That notwithstanding, with an average monthly household expenditure of GH¢ 475.00 and an average household size of 5.5, it can be deduced that the daily per capita expenditure in the study areas stands at GH¢ 2.88 (approximately USD 1.11, *using the average exchange rate in March, 2014*). This indicates that these informal settlements are mostly occupied by poor households when benchmarked against the international poverty line defining the poor as people living on less than USD 1.25 a day (Chen & Ravallion, 2008). Even at this level, it can be gleaned from the table that Ohwim has relatively higher income than the other study communities (i.e. Moshie Zongo, Oforikrom and Dakodwom) further emphasising its occupancy by some middle class households.

4.4 Housing

By definition, housing consists of the physical structure as well as the basic infrastructural facilities and its surrounding environment. In this sense, it is relevant to analyse issues on housing in a study that investigates the process for infrastructure provision in informal settlements. This section of the report discusses the housing typology, the tenancy arrangement and type of documents indicating tenure of homeowners in the informal settlements under study.

4.4.1 Housing Typology

As expected in typical communities in the Ashanti Region, most (82.3 percent) of the houses in the study areas are compound houses. These are structures with unroofed interior compound of either rectangular or square shape with the rooms arranged around the compound with shared

facilities such as kitchen and toilet (Afrane & Asamoah, 2011). All the houses in Dakodwom are compound houses while all those in the part of Ohwim studied are detached houses (*see Table 4.7*). The multi-family compound house typology presents a potential of cost sharing in connecting infrastructural facilities to homes. For instance, the cost burden of dislodging septic tanks is shared among all households in a house which lessens the impact felt at a time. Nonetheless, this has repercussions on the consumption levels of services like water which consequently affects the fees paid since tariffs are based on the rising block system (the system where consumers pay more for consuming more of a service). The detached houses signal a changing preference for single family houses with fewer number of rooms and low population per house (*see Plate 4.1*). This further emphasises the middle class households occupying unapproved developments in Ohwim.

Table 4.7: Housing Typology in Study Communities

Study Community	Type of House								Total	
	Compound House		Detached		Semidetached		Multistorey			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Moshie Zongo	55	83.3	8	12.1	3	4.5	-	-	66	100
Oforikrom	72	92.3		-	-	-	6	7.7	78	100
Ohwim	-	-	12	100.0	-	-	-	-	12	100
Dakodwom	8	100.0	-	-	-	-	-	-	8	100
Total	**135**	**82.3**	**20**	**12.2**	**3**	**1.8**	**6**	**3.7**	**164**	**100**

Source: Author's Field Survey, 2014

Unlike informal settlements (especially squatter settlements) elsewhere which are characterised by temporary structures built with wood and metal plates, the houses in the study communities were built with sandcrete and landcrete as walling materials, albeit mostly of poor structural quality. This is partly because of the fact that residents have been allowed to settle in the areas for long as indicated by the average duration of stay of the homeowners (24 years). The duration of stay and permanent nature of the structures could influence household"s commitment and contribution towards community improvement and infrastructure provision.

Plate 4.1: A Detached House at Ohwim

Source: Author's Field Photo, 2014

4.4.2 Housing Tenure and Security

Out of the 164 households interviewed for the study, 36 of them (representing 22 percent) were homeowners. Most (about 60 percent) of the residents in the study communities are renters which is higher than the proportion of renters in Kumasi (42 percent) (KMA, 2010).

These "renter households" spend an average of GH¢ 18.39 on rent monthly. This constitutes only 4 percent of the household"s monthly expenditure. However, in Ohwim and Dakodwom, the trend is different as many of the houses are owner occupied. As stated earlier, in Dakodwom residents have some family relations as they all hail from *Aseibu*, a village in the Central Region. Because of this relation, members who could afford to build were allowed to build their own rooms and gradually these rooms are enclosed into the compound type of houses.

Table 4.8: Tenancy Status of Households in Study Communities

Study Community	Tenancy Arrangement								Total	
	Owner		Renters		Free Occupant		Family Owned			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Moshie Zongo	12	18.2	42	63.6	11	16.7	1	1.5	66	100
Oforikrom	9	11.5	54	69.2	6	7.7	9	11.5	78	100
Ohwim	10	83.3	1	8.3	1	8.3	-	-	12	100
Dakodwom	5	62.5	1	12.5		-	2	25.0	8	100

Total	**36**	**22.0**	**98**	**59.8**	**18**	**11.0**	**12**	**7.3**	**164**	**100**

Source: Author's Field Survey, 2014

Issues of security of tenure are very relevant in studies on informal settlements. As discussed earlier in the study, security of tenure is one of the main criteria for classifying an area or housing development as informal. In the quest to address insecurity of tenure in Ghana, the Lands Title Registration Law, 1986 (PNDCL 152) directed that all lands be formally registered (Kasanga & Kotey, 2001). Against this backdrop, the study investigated whether landlords have official documentations that secure their title/interest in the lands. It was discovered that only 2.8 percent of the owners have formally registered their lands and therefore have a lease. None of the homeowners in Moshie Zongo, Ohwim and Dakodwom have lease even though some (61.1 percent) have either allocation papers or site plans. However, these documents do not formally secure their interest in their lands. No homeowner in Dakodwom had any of the documents, which underlines the fact it is a squatter settlement.

This phenomenon is likely to negatively affect household"s commitment in supporting community development and infrastructure development.

Table 4.9: Type of Document Showing Title by Landowners

Study Community	Type of Document								Total	
	None		Allocation Paper		Site Plan		Lease			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Moshie Zongo	5	41.7	2	16.7	5	41.7	-	-	12	100
Oforikrom	3	33.3	4	44.4	1	11.1	1	11.1	9	100
Ohwim	-	-	2	20.0	8	80.0	-	-	10	100
Dakodwom	5	100.0	-	-	-	-	-	-	5	100
Total	**13**	**36.1**	**8**	**22.2**	**14**	**38.9**	**1**	**2.8**	**36**	**100**

Source: Author's Field Survey, 2014

4.5 Infrastructural Facilities

This section of the study presents a situational analysis on the nature of infrastructural facilities observed in the study areas. The facilities considered include water, sanitation (human excreta and solid waste disposal), roads and drainage systems. These four categories of services were considered because of their close linkages. Water and sanitation are inextricably linked as improved sanitation depends on the availability of water. Also as noted by Kyessi (2002) more

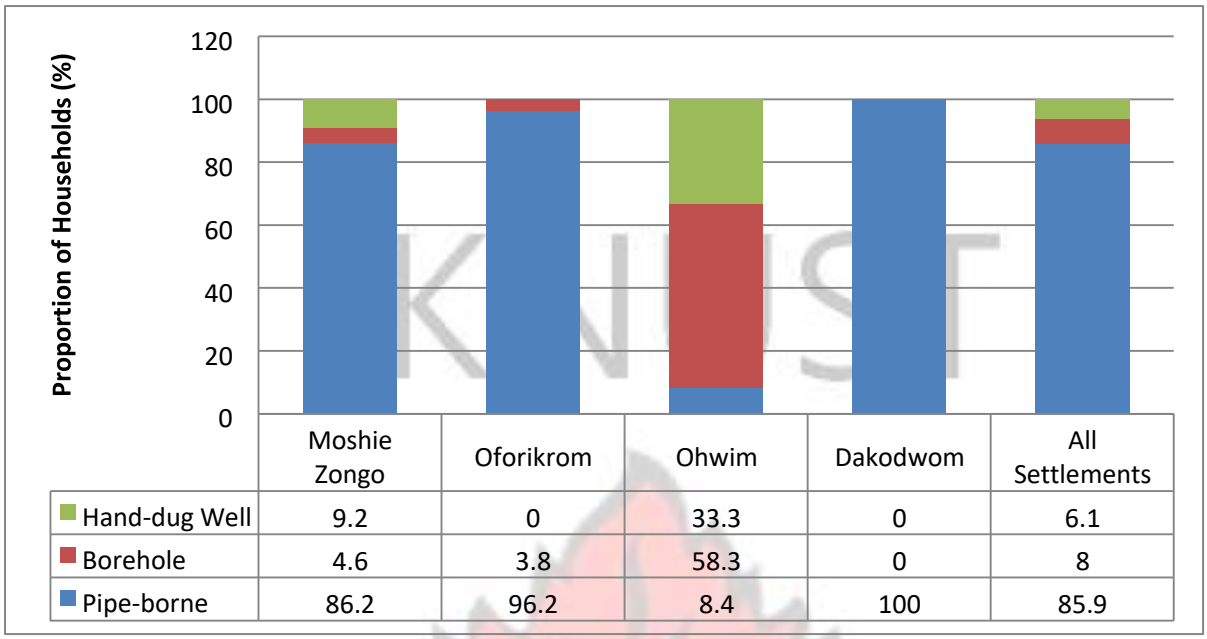
water without proper sanitation also makes living conditions worse as it has serious repercussions on public health. In the same vein, improved sanitation management often requires improved accessibility as well as drainage system. Conversely, the lack of sanitation facilities may negatively affect drainage system as natural and artificial drains may be used as dumping grounds.

4.5.1 Domestic Water Supply

Water is a very essential service needed for human sustenance. In fact, access to water is widely used as an indicator for measuring development of countries by various institutions. However, studies show that access to water to urban dwellers especially in the developing world is very challenging. Access to potable water has now become a privilege instead of a right to many citizens. The problem gets more precarious in the informal settlements and other low income housing areas in cities. The study adopts the World Health Organisation‟s (WHO‟s) definition of domestic water being "water used for all usual domestic purposes including consumption, bathing and food preparation" (WHO, 1993; 2002 cited by Howard & Bartram, 2003: p.2). This is adopted to enable the researcher contextualise the information presented. This section of the report discusses the sources of water to households in informal settlements in Kumasi, the mediums through which they are provided as well as affordability issues.

4.5.1.1 Major Sources of Water

The main sources of domestic water identified in the study areas are pipe-borne water, boreholes and hand-dug well. Unlike the phenomenon in most informal settlements in developing countries (Kyessi, 2002), the majority (85.9 percent) of households in such areas in Kumasi have access to pipe-borne water provided by the Ghana Water Company Limited (GWCL), the formal institution mandated to provide water to the Kumasi Metropolis. As depicted by Figure 4.5, all households in Dakodwom use pipe-borne water while only 8.4 percent of residents of Ohwim (which lies on the peripheral of the City) have access to the facility. This is partly explained by the fact that the area falls within Owabi catchment reserve and does not have planning permission. Owing to this, the pipelines of the GWCL have not been extended to all parts of the settlement. Even the few households which have access to pipe-borne water live close to the core area of the town where the facility was provided in the 1993/1994.



	Moshie Zongo	Oforikrom	Ohwim	Dakodwom	All Settlements
Hand-dug Well	9.2	0	33.3	0	6.1
Borehole	4.6	3.8	58.3	0	8
Pipe-borne	86.2	96.2	8.4	100	85.9

Figure 4.5: Major Sources of Water in Study Areas

Source: Author's Field Survey, 2014.

The high accessibility to water services from the formal institution indicates that despite the fact that houses in these settlements do not meet all requirements; they are linked to formal service networks. This phenomenon is very unlikely in many informal settlements around the globe (see Kyessi, 2002). Generally, it is obvious from the study that residents of informal settlements in Kumasi have access to potable water given that their sources of water available to them are pipe, boreholes and wells. However, some of these households in Moshie Zongo resort to an uncovered well in a poor sanitary condition because they cannot afford the other sources (*see Plate 4.2*).

Plate 4.2: An Uncovered Well in Moshie Zongo

Source: Author's Field Photo, 2014

4.5.1.2 Ownership and Usage of Water Facilities

As indicated earlier, it is the responsibility of the GWCL to supply water to all settlements in Kumasi through the Kumasi Water Supply System (KWSS). However with time, it has jettisoned the responsibility of providing facilities to the final consumption point. This has resulted in the fading out of public stand pipes which were hitherto provided by the company. The study revealed that all the points of water supply in the study areas were financed from both formal and non-formal sources. Most of the pipe-borne water outlets, boreholes and wells identified in the study were provided by either individuals or the community. Only one borehole facility in Moshie Zongo was identified as being provided by the local authority, the Kumasi Metropolitan Assembly, but it is locally managed by the community. As stated by the assemblyman for Ohwim,

> "Water is predominantly provided by individual residents but the community owns three public stand pipes which are operated commercially. They were installed by the community members but have been given out to some individuals to operate and maintain".

These forms of ownership ensure that the facilities are regularly maintained enhancing their sustainability.

Table 4.10: Nature of Ownership and Usage of Water Facilities Patronised by Households

Nature of Ownership	Nature of Use of Facility				Total	
	Private		Public			
	Freq.	%	Freq.	%	Freq.	%
Private	43	26.4	116	70.5	159	96.9
Community	-	-	3	1.8	3	1.8
Government	-	-	2	1.3	2	1.3
Total	**43**	**26.4**	**121**	**73.6**	**164**	**100.0**

Source: Author's Field Survey, 2014

With the usage of the facilities, the individually funded facilities are open to the general public for use. From Table 4.10, it can be observed that 70.5 percent of the respondent households patronise facilities that were provided by the individuals. This signifies that the private sector plays a chief role in providing infrastructural facilities in informal settlements. The involvement of the private sector in water provision has made water more accessible to consumers albeit more expensive compared to private connections and use. Clearly, the relevance of the public sector in the provision of the facility is dwindling as its responsibility is now mostly restricted to producing and distributing pipe-borne water to settlements in the City leaving the final supply to the private sector. This phenomenon has greatly contributed to the fading out of public stand pipes that were hitherto provided by the public sector.

4.5.1.3 Consumption Levels of Domestic Water

The median household daily water consumption level is estimated at 150 litres with the first quartile consuming about 100 litres whilst the third quartile consumes 234 litres per day. This puts the quartile deviation at 67 litres indicating that the distribution of water consumption levels in the study areas is positively skewed implying more households consume less than the average consumption levels. However, the daily per capita consumption of water is 27.3 litres. With an intermediate level of supply where households travel within 5 minutes (100m) to collect water, the World Health Organisation (WHO) recommends a daily per capita consumption of 50 litres (Howard & Bertram, 2003). This implies that the average consumption of water in informal settlements in Kumasi is 55 percent of WHO"s recommendation. The low consumption rate can partly be explained by the fact that many residents fetch from public outlets; where consumption levels exceed that of private connections. This has repercussions on the personal hygiene and health of the residents thereby affecting their social well-being.

There exists a positive but weak correlation (r = 0.3) between the monthly household income and the amount of water consumed daily. This implies that the higher the income status of households, the higher the quantity of water consumed indicating that increased economic gains increase the demand for water. However, the coefficient of determination (r^2) of 0.09 shows that only 9 percent of the variations observed in water consumption levels are explained by the linear relationship between the household income levels and amount of water consumed daily. Therefore, the consumption levels of the various households are not greatly influenced by their respective income levels. Some other factors such as household size and the distance to the facility can further explain the variations.

4.5.1.4 Physical Accessibility to Water Facilities

The physical accessibility to water facilities refers to the minimum distances households cover to fetch water in the informal settlements. Out of the 164 households surveyed, 116 (i.e. 70.7 percent) reported that their source of water is outside their houses. They recounted that they cover from 1-10 minutes (with an average of 2 minutes 28 seconds) to public water outlets to fetch water for domestic use. About 97 percent of them commute up to 5 minutes to access the nearest public water outlets which indicates that the facilities are easily physically accessible to the IS settlers. This minimises the amount of time spent in search of water thereby making it possible for children and women to spend adequate time on more productive activities.

Table 4.11: Distance Covered by Households to Public Water Outlets

Study Community	Distance Covered						Total	
	Under 5mins		5mins		Over 5mins			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Moshie Zongo	38	77.6	9	18.4	2	4.1	49	100.0
Oforikrom	44	80.0	10	18.2	1	1.8	55	100.0
Ohwim	4	100.0	0	0.0	0	0.0	4	100.0
Dakodwom	6	75.0	2	25.0	0	0.0	8	100.0
Total	**92**	**79.3**	**21**	**18.1**	**3**	**2.6**	**116**	**100.0**

Source: Author's Field Survey, 2014.

In measuring the degree of association between the water consumption level and the distance covered to a water source, the Pearson"s correlation (r) showed a negative and weak coefficient of 0.276. This implies that in the informal settlements in Kumasi, the longer the distance a household covers to reach a water facility, the lesser the amount of water consumed. Although

distance to a water facility is inversely related to the amount consumed linearly, this relationship is very weak as only about 7 percent of the variation in consumption levels is attributable to the distance from the facility or perhaps the relationship is not linear.

4.5.1.5 Affordability and Cost Issues

Affordability refers to the "ability to pay for necessary levels of consumption within normal spending patterns" (Milne, 2004: p.4). With regard to payment for the water consumed, 84.1 percent of the respondent households reported that they pay for the service while the remaining 15.9 percent do not. Those that do not pay for water mainly rely on hand-dug and borehole sources. On the other hand, on monthly household expenditure on water, the study found that households in the informal settlements spend between GH¢4.50 and GH¢90.00 with an average of GH¢ 30.00. Using the Conventional Affordability Ratio (CAR) approach, this figure constitutes about 6 percent of their monthly household income (i.e. GH¢ 30.00 of GH¢ 500.00) which is very high compared to 3.0 percent recorded in Ghana in the Ghana Living Standard Survey round 6 (GLSS 6) (GSS, 2014). Comparing same to the World Bank target ratio for water which is benchmarked at between 3 – 5 percent, it can be inferred that water is expensive and unaffordable to households in informal settlements in Kumasi. This points toward the fact that measures have to be adopted to reduce the proportion of households‟ incomes spent on water. This can only be done by either reducing the cost of supplying water or increasing households‟ income.

Table 4.12: Average Monthly Household Expenditure on Water in Study Areas

Study Community	Monthly Household Expenditure						Total	
	GH¢ 4.50 - GH¢ 27.00		GH¢ 30.00		GH¢ 36.00 - GH¢ 90.00			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Moshie Zongo	32	53.3	13	21.7	15	25.0	**60**	**100%**
Oforikrom	26	38.2	23	33.8	19	28.0	**68**	**100%**
Ohwim	1	50.0	1	50.0	-	-	**2**	**100%**
Dakodwom	6	75.0	1	12.5	1	12.5	**8**	**100%**
Total	**65**	47.1	**38**	27.5	**35**	25.4	**138**	**100%**

Source: Author's Field Survey, 2014.

Table 4.12 shows that almost half of the households in the IS spend below the average household expenditure on water. However, more households in Dakodwom spend less on water with 75 percent respectively spending below the average household expenditure. This could be

explained by the fact that the settlement has the smallest household sizes with all of them using pipe-borne water which is a relatively cheaper source.

4.5.1.6 Reliability and Satisfaction of Water Services

It is one thing having access to a water facility and another having a reliable and regular flow. The reliability of a service is as equally important (if not more) as having access to it. As much as 34 percent of the sampled households reported that they do not benefit from daily supply of pipe borne water, experiencing frequent cuts in supply. This results in household members (mostly female members) covering longer distances in search of water from other sources such as boreholes and wells, and consequently reducing the times spent on productive activities.

In assessing the households‟ satisfaction of the water provided, the Likert scale technique was adopted. A 5 – point scale with “highly dissatisfied” on one end through to “highly satisfied” on the other with “indifferent” in the middle was used. About 83 percent of the respondents indicated satisfaction with the services (59 percent satisfied and 24 percent highly satisfied) accessed from the water facilities used. The reasons given for their levels of satisfaction include the clean water and regularity of flow. This is however uncharacteristic of informal settlements which are usually faced with erratic supply of water and unwholesome sources.
The private operations of the facilities might have contributed to their effective management.

4.5.1.7 Repairs and Maintenance of Water Facilities

The repair and maintenance of an infrastructural facility is equally an important activity as the provision in the sense that it affects its sustainability. Three key factors determine the authority for the maintenance of public infrastructural facilities, namely: ownership, responsibilities and economic changes (Ryslinge, 2003). In a simplified manner, maintenance equals motivation and ability to maintain. The motivation to maintain a facility is explained by the ownership of the facility as well as the distribution of rights and responsibilities between the owners and the users. On the other hand, the ability to maintain is directly related to the income levels of the owners as well as the maintenance expenditure. The nonavailability or inadequacy of maintenance budgets often result in the collapse of facilities.

The above discussion postulates that the ownership arrangement for water facilities clearly shows where the responsibility for maintenance lies. As indicated earlier in Section 4.5.1.2, most of the water collection points in the study areas were provided and are being manned by

individuals. This implies that the maintenance responsibility rests with the owners. In addition, three of the public stand pipes in Ohwim were provided by the community but have been leased out to individuals for their operation and maintenance. Also, a community borehole in Moshie Zongo provided by the Kumasi Metropolitan Assembly (KMA) has been given to an individual for management. However, these individuals are supervised by their respective unit committees and assembly members. This indicates that all water facilities in the informal settlements are managed by individuals. This strategy ensures effective management of the facilities, as a clear responsibility is known. These individuals are responsible to collect the user fees and pay for other utility bills as well as undertake regular repairs and maintenance of the facilities. Excess of incomes over expenditure (profit margin) are deposited with banks as community funds to support community development projects.

Interestingly, there is no agreed amount of compensations to be paid to these operators.

4.5.2 Human Excreta Disposal

This section of the report discusses issues relating to the disposal and management of human excreta in the informal settlements under study. Granted that waste management involves the process spanning from generation through to the disposal, the study focuses on the stages that usually take place within the individual settlements (as is the case in Kumasi) which include generation, storage and/or transportation. As such, the types of facilities used by the households, providers as well as cost of usage are discussed.

4.5.2.1 Type of Toilet Facility Used

The study revealed that six modes of human excreta disposal are used by residents in the informal settlements, namely: water closet (14.9 percent), aqua privy (16.1 percent), the Kumasi Ventilated Improved Pit (KVIP) (62.7 percent), pit latrines (3.1 percent), pan latrines (2.5 percent) and open defecation (0.6 percent) (*see Figure 4.6*). Amongst these, only 26.8 percent of the households indicated that they have the toilet facilities within their houses. The remaining 73.2 percent trek about 400 meters to access the nearest facility. The distance partly explains why some dwellers in the settlements, especially children, engage in open defecation. Almost three-hundredth of the informal settlement dwellers use unhygienic toilet facilities (pan latrines and open defecation). This practice consequently affects the health conditions of residents as well as the ambiance of the settlements. Often times, the water bodies and public waste collection points are used as sites for open defecation. The “wrap and throw” was also

practiced by the some residents. This method of disposal involves wrapping faeces in polythene bags and disposing in water bodies and refuse collection points.

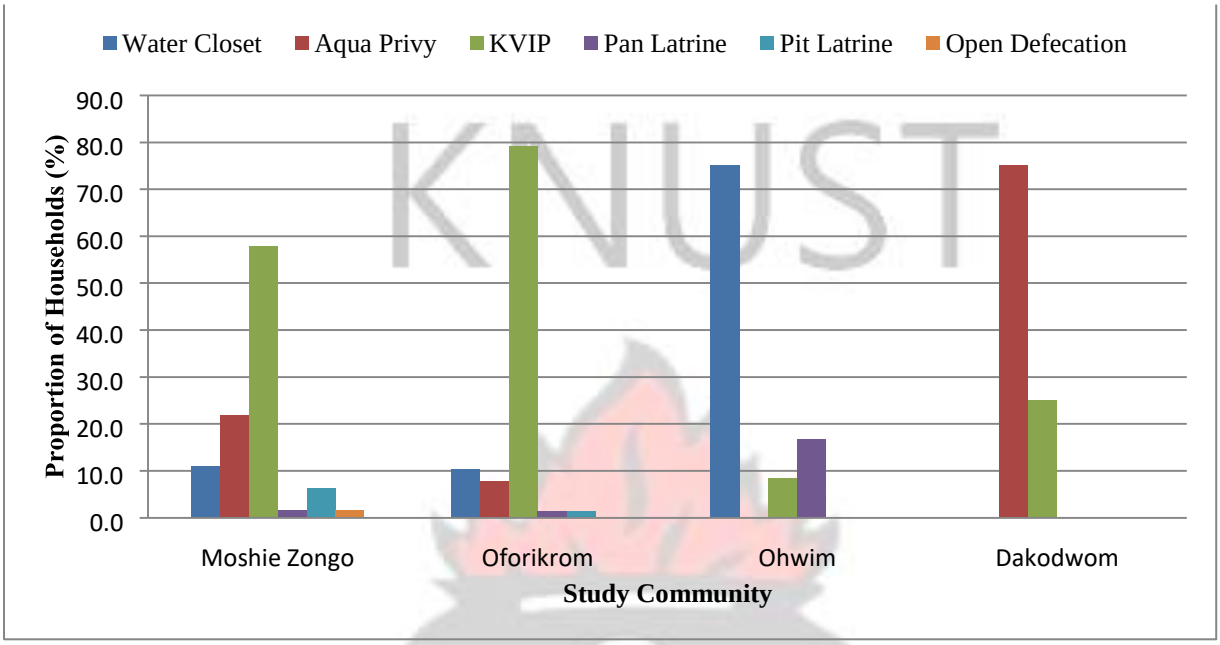


Figure 4.6: Type of Toilet Facility Used by Households

Source: Author's Field Survey, 2014.

However, it is worth noting that, two-thirds of residents in Ohwim use water closets further emphasising the higher socio-economic status compared to the other study areas.

4.5.2.2 Adequacy and Usage of Toilet Facilities

There is a mix of publicly and privately owned toilet facilities in the study areas. As much as 73.2 percent of the respondent households reported that they patronise public toilet facilities while the remaining 26.8 percent have private facilities within their compounds. This proportion is lower as compared to the number of households (33 percent) in the entire Metropolis who have private facilities within their houses. Among the households that have toilet facilities in their houses, 60 percent of the facilities are water closet with 36 percent and 4 percent, being pit latrines and pan latrines respectively. According to the WHO/UNICEF Joint Monitoring Programme, a household is said to have access to adequate and improved sanitation if it has flush toilet that is connected to a public sewer or septic tank, a ventilated improved pit latrine (VIP) or a pit latrine (Maoulidi, 2010). Based on this definition, it implies that as much as three-quarters of the residents in the informal settlements do not have access to improved sanitation which further worsens their poverty levels.

In addition to this challenge, the study observed that there is a lot of pressure on the public toilet facilities available in the study areas. Table 4.13 shows the average number of residents served by the public toilet facilities in the communities. According to the Ministry of Environment, Science and Technology (MEST) and the Town and Country Planning Department (TCPD) (2011), a standard drop hole of a toilet facility should serve a maximum of fifty users. Based on this, it is obvious that there is a lot of pressure on toilet facilities in Moshie Zongo (322 persons per hole), Oforikrom (605 persons per hole) and Dakodwom (143 persons per hole). Only Ohwim has adequate toilet facilities with only 30 people relying on a drop hole. This is explained by the fact that most (91.7 percent) households have private toilet facilities within their compounds.

Table 4.13: Dependence of Population on Public Toilet Facilities

Study Community	Number of Facilities	Number of Drop Holes	Population Served	Coverage (persons per hole)
Moshie Zongo	8	160	51,452	322
Oforikrom	5	100	60,526	605
Ohwim	1	20	596	30
Dakodwom	1	20	2,867	143
All Communities	**15**	**300**	**115,441**	**385**

Source: Author's Construct, 2014

The high dependence on public toilet facilities explains the long queues witnessed in the mornings. Consequently, the queues also discourage people who tend to openly defecate and "wrap and throw" posing serious environmental and health threats. This phenomenon has repercussions on the spread of epidemic like the recent outbreak of cholera in Kumasi, Accra and other large towns in the country.

4.5.2.3 Mode of Supply of Facilities

Three mechanisms were identified to be in place for the provision of toilet facilities in the informal settlements in Kumasi. These include private provision by homeowners, public provision through the KMA and a public-private partnership (PPP) arrangement. The private provision involves homeowners/households financing the construction of the facility within their houses or on the compounds. In some compound houses, the use of these facilities is restricted to the household of the landlords while other tenant households are forced to use public facilities.

With regards to public sector provision, the facility is developed by the Waste Management Department (WMD) of the KMA upon identifying the need for a facility in the settlements. Since most of these communities are old towns, they usually have land demarcated for public sanitary facilities donated by the local traditional authorities. In this arrangement, the assembly then finances the construction of the facility and manages it through the assembly member and the unit committees. About two-thirds of the public facilities in the study areas were provided under this arrangement. However, due to lack of funds and the inefficiencies associated with this model of management; the assembly has now introduced a public – private partnership (PPP) model for the provision and management of toilet facilities in the settlements. The most common model of PPP adopted by the KMA is the build-operatetransfer (BOT) where a private investor is permitted to finance the development of the toilet facility and allowed to operate it for a specific period of time and then transfers ownership and management to the KMA through its WMD (*see Chapter Five for more details on this model*).

Under this PPP arrangement, the assembly‟s contribution to the investment is through the allocation of the public sanitary sites (public land) and also offering technical advice. Through this, the assembly ensures that the minimum standards are adhered to in order to ensure the safety of prospective users. Table 4.14 shows the number of toilet facilities by models of provision and management in the study areas.

Table 4.14: Number of Toilet Facilities and their Models for Provision

Study Community	Model of Provision		Total
	Assembly	PPP (BOT)	
Moshie Zongo	6	2	**8**
Oforikrom	3	2	**5**
Dakodwom	1	-	**1**
Ohwim	-	1	**1**
Total	**10**	**5**	**15**

Source: Waste Management Department, KMA – 2014.

Table 4.14 shows that out of the fifteen public toilet facilities in the study areas, five of them were financed through the PPP arrangement and these are relatively newer facilities. Aside from these facilities in the records of the WMD, the study also identified some facilities that were provided by individuals but is open for public use. This was very prominent in Moshie Zongo. These facilities pose great threat to the unsuspecting users since they mostly do not meet the technical standards expected by the WMD for public facilities. For instance in Moshie Zongo, these forms of facilities are located along the water bodies (*see Plate 4.3*) with septic

tanks located in the reserves or in the worst cases non-existent subjecting the residents to health threats.

Plate 4.3: A Privately Operated Toilet Facility Located along Aboabo Stream at Moshie Zongo

Source: Author's Photo, 2014

4.5.2.4 Affordability and Cost

In relation to cost, it was observed from the study that individuals who patronise public toilet facilities pay for the use as they visit. On the average, users of these facilities pay GH¢ 0.30 per visit and with an average of two visits in a day per person; households spend GH¢ 3.30 on using public toilets daily, where they are provided with only tissue papers. This figure translates into GH¢ 99.00 per month. In furtherance to this, given an average number of households per house of 4.2, inhabitants in a house that do not have internal toilet facility spend about GH¢ 415.80 per month (i.e. GH¢ 4,989.60 annually) for using public toilet facilities. This amount suggests a potential to adopt strategies to finance internal toilet facilities by the inhabitants themselves.

4.5.2.5 Satisfaction of Use

The views of the respondents were sought on their levels of satisfaction with the use of public toilet facilities in their respective settlements. This was measured by the Likert scale. More patrons of the privately owned facilities (70.7 percent) reported they were satisfied with

services of the toilet facilities than patrons of the publicly owned facilities (33.3 percent). They intimated that the private facilities are better maintained and cleaned more regularly than the government owned facilities. This emphasises the fact that managers of private facilities are more efficient than those of public facilities.

Table 4.15: Level of Satisfaction of Use of Public Toilet Facilities by Ownership Type

Nature of Ownership	Rating of Satisfaction										Total	
	Highly Dissatisfied		Dissatisfied		Indifferent		Satisfied		Highly Satisfied			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Private	1	1.3	8	10.7	13	17.3	50	66.7	3	4.0	75	100
Government	3	6.7	9	20.0	18	40.0	13	28.9	2	4.4	45	100
Total	4	3.3	17	14.2	31	25.8	63	52.5	5	4.2	120	100

Source: Author's Field Survey, 2014.

Assessing the satisfaction by the type of facility patronised, more people who use aqua privy facilities (75 percent) expressed satisfaction with their services as compared to that of KVIP users (51 percent). A chi square test conducted revealed that there is a statistically significant association between the type of facility utilised and the patron"s level of satisfaction *(i.e. X^2 (16, N=164) = 29.71, p – value = 0.020).* However, the Crammer"s V of 0.213 indicates that the type of facility has small to moderate effect on the level of satisfaction of the users. This implies that the type of toilet technology can have some little influence on the users" satisfaction. Nevertheless, some practices like regular cleaning, supplying patrons with facilities like toilet tissue papers is required to provide an appreciable services to patrons.

4.5.3 Solid Waste Disposal

Solid waste generation in Kumasi stands at 1,500 tonnes per day with an average of 0.6kg per capita generation (KMA, 2010). Out of this, only 85 percent of the waste generated is collected for proper treatment and the rest is burnt, buried or left unattended to. This volume of waste is generated from mainly residential, commercial and industrial sources (including construction and demolition). KMA (2010) observes that most of the waste is generated at the major market places in the City; namely: Central Market, Asafo Market and Race Course Market accounting for one-fifth of the total waste generated throughout the Metropolis. This section of the report discusses issues relating to the disposal of domestic solid waste. It begins with a presentation

on the mode of disposal at the household level, the cost of disposal, user satisfaction and maintenance.

4.5.3.1 Mode of Disposal

There are two basic modes of solid waste collection used in Kumasi, namely; communal collection and house-to-house collection. The communal collection involves a system where containers (usually skip containers) are placed at a vantage point where residents commute to dispose of their waste. It is also known as the central collection system. This system is very common in most old settlements in the city especially informal settlements because of poor access to individual homes. Currently the communal collection system in Kumasi operates on a pay-as-you-dump (PAYD) policy where residents are made to pay for disposing waste. The house-to-house collection system on the other hand involves collection of waste from houses by a compactor truck. However, with deteriorating condition of roads in many low income settlements in the city, tricycles are now used to collect the waste from the homes to the central collection points. This creates a two-stage collection system that involves both forms of disposal which is very common in many communities in Kumasi. Nonetheless, the study does not distinguish between the direct collection and the two-stage systems because the focus was on the mode of disposal from the point of generation (i.e. homes). Figure 4.7 presents the modes by which informal settlers dispose of their domestic solid waste in the study areas.

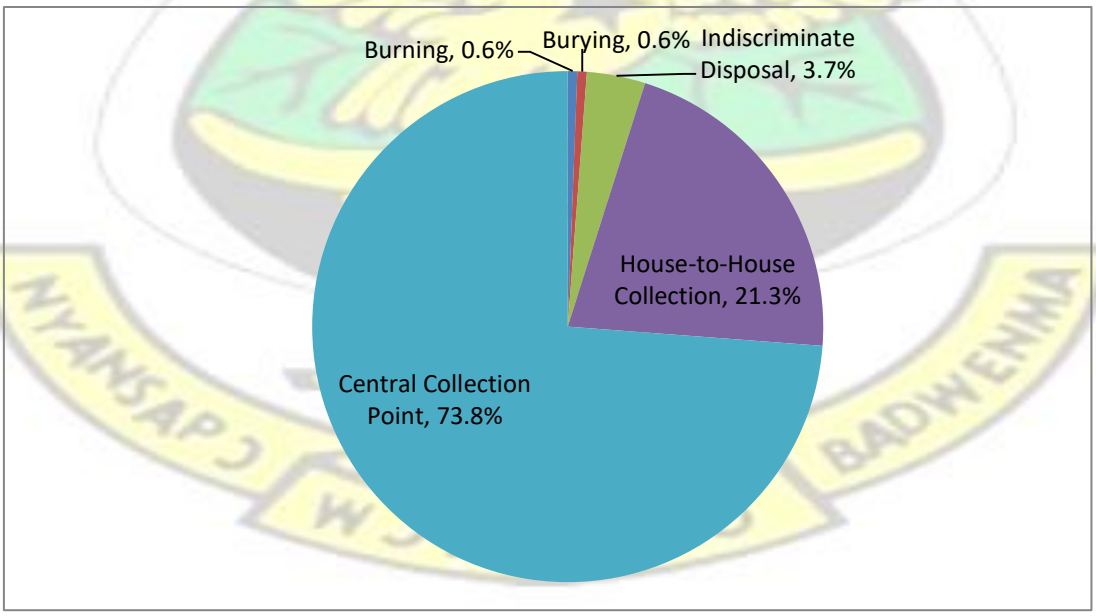


Figure 4.7: Mode of Solid Waste Disposal in Study Communities

Source: Author's Field Survey, 2014.

The study revealed that almost three-quarters (73.8 percent) of the respondent households disposed their domestic waste at the central collection points while 21.3 percent patronise the house-to-house collection system. This is basically so because of the poor condition of roads in informal settlements in Kumasi making accessibility to the homes problematic. House to house collection is seen only in areas that have relatively good access to their houses. It was observed that some households burn (0.6 percent), bury (0.6 percent) or indiscriminately dispose of (3.7 percent) their waste. This practice poses serious threats to public health and the environment.

4.5.3.2 Distance to Disposal Facilities

The distance covered to dump solid waste greatly affects households‟ behaviour on solid waste disposal. When it takes long to reach a disposal facility, residents especially children tend to adopt practices that are environmentally unfriendly such as burning and indiscriminate disposal. The study investigated the distance covered by households to use the nearest central collection points.

Table 4.16: Distances Covered by Households to Disposal Facilities

Study Community	Distance Covered						Average Distance (meters)
	Under 150m		150 – 450m		Over 450m		
	Freq.	%	Freq.	%	Freq.	%	
Moshie Zongo	11	30.6	11	30.6	14	38.9	544
Oforikrom	15	21.4	41	58.6	14	20.0	370
Ohwim	-	-	-	-	3	100.0	888
Dakodwom	1	12.5	7	87.5	-	-	316
Total	27	23.1	59	50.4	31	26.5	434

Source: Author's Field Survey, 2014

It emerged from the study as shown in Table 4.16 that households walk an average distance of 434 metres to access the central collection points. Only about a quarter (23.1 percent) of users walks an acceptable distance of 150 metres to reach the nearest collection points (MEST & TCPD, 2011). The remaining three quarters walk longer distance to use the facilities. This is

caused by the non-availability of space to locate skip containers and also the poor conditions of access roads which render them non-motorable to trucks and other motorised means of transport.

4.5.3.3 Cost on Solid Waste Disposal

Hitherto, waste disposal in the Kumasi Metropolis was free when using the central collection methods. However, due to the poor management of the sites which was attributed mainly to lack of funds for excavation and transportation to the final disposal site, KMA introduced the pay-as-you-dump (PAYD) system to ensure that the processes are self-financing. With this system, households are required to pay a fee (based on the volume) in order to drop their solid waste into the skip containers.

It was revealed from the study that households who utilise the communal collection system spend approximately GH¢ 6.00 per month. The challenge with this system is the lack of tools to measure the amount of waste for an objective charge by attendants. The amount to be paid per load of solid waste is mostly based on the discretion of the attendants which often generate arguments between them and the users. On the other hand, households who patronise house-to-house collection spend GH¢ 7.00 per month on waste disposal. The figure is very high for Ohwim because of the many single households and detached nature of houses as the charge for the service is pegged at GH¢ 20.00 monthly per house.

4.5.4 Road and Drainage

Roads usually serve as the skeleton of every human settlement. Improved road network and an efficient transport system serve as the lifeblood of every economy. This is not only restricted to national or regional economies but also local economies. Unfortunately, this benefit eludes many human settlements in developing countries because of the poor nature of the infrastructure, especially in informal settlements. The subsequent sections of the report describe the condition of roads and drains in the study areas.

4.5.4.1 Conditions of Roads

Like many other informal settlements, observation in the physical survey indicates that most of the roads in the study areas are not well defined or planned; hence, they do not portray any hierarchy. Apart from the major roads linking the study areas to adjoining areas as well as

collecting traffic in the communities that are paved, the internal roads are narrow and dusty. For instance in Moshie Zongo, all access roads that collect traffic from individual homes on to the major roads are not paved with most of them showing gullies resulting from erosion. This is worsened by the poor drainage system with unengineered open drains traversing access roads; which renders them unmotorable. In Dakodwom, the only motorable road is the Asokwa interchange – Bekwai Roundabout road that abuts the settlement on the south. There are no access roads in the community and residents only move around using footpaths created by the spaces left in between dwelling units. Oforikrom relatively has improved access roads with 54.5 percent of its total road network tarred (*see Table 4.17).* This can be explained by the fact that it benefited from the Community Infrastructure Upgrading project in 2000 – 2004 (Amoako & Cobbinah, 2011). Nonetheless, the remaining 45.5 percent have earth surfaces.

Identical to other informal peri-urban settlements within the city, roads in Ohwim do not show any defined pattern. Apart from the main Kumasi-Barekese Road which is the major thoroughfare and a local road running through the north-east of the settlement, all other roads are not tarred. All these roads emerged from paths created when trucks conveyed building materials to various sites during housing construction. As a result, most of the houses are only accessible by footpath.

Table 4.17: Road Surface Type in Study Areas

Study Area	Surface Material				Total	
	Tarred		Earth			
	km	***%***	***km***	***%***	***km***	***%***
Moshie Zongo	1.072	17.0	5.226	83.0	6.298	100.0
Oforikrom	2.700	54.5	2.253	45.5	4.953	100.0
Ohwim	1.894	33.5	3.762	66.5	5.656	100.0
Dakodwom	-	-	-	-	-	-
Total	5.666	33.5	11.241	66.5	16.907	100.0

Source: Author's Field Survey, 2014

4.5.4.2 Drainage System

In the informal settlements studied, the drainage system is not well defined and planned (*see Plate 4.4).* It was revealed from the physical survey that open concrete drains are constructed only along the tarred major roads in all four study areas. Storm water drains through the natural river channels. However in view of the high density and haphazard development in the study

areas, the natural reserves have been encroached, exposing the settlements to weather-related disaster risks like flooding. For instance, due to this poor drainage system, houses in Moshie Zongo are inundated during the rainy season. This situation is however exacerbated by the construction of houses in the water ways as well as persistent dumping of solid waste in the water courses.

Plate 4.4: Open drains in Moshie Zongo

Source: Author's Field Photo, 2014

4.6 Summary of Chapter

The foregoing discussions have presented a situational analysis of the nature of infrastructural facilities in the informal settlements studied. The chapter has clearly revealed that the residents in these settlements lack adequate security of tenure as most of them do not have formal documentations on the lands they occupy. As evident in other informal settlements, it has emphasised the poor nature of infrastructural facilities further worsening the poverty levels in these communities. Nevertheless, it has also established the fact that informality is not necessarily a function of poverty as was revealed in the case of Ohwim. It accentuates the fact that other institutional factors such as ineffective control of development can lead to the development and expansion of informal settlements. These revelations however have set the rostrum to investigate the challenges that account for the level of infrastructure delivery in informal settlements in the next chapter.

CHAPTER FIVE INFRASTRUCTURE PROVISION IN INFORMAL SETTLEMENTS IN KUMASI

5.1 Introduction

As far as population increases and cities continue to grow, the need to supply and expand infrastructural facilities becomes inevitable. Recent reports indicate that more than half of the world‟s population currently lives in urban areas (UN-Habitat, 2013) and this trend is replicated in Ghana (GSS, 2013b). Faced with inadequate resources in the formal sector, many of these urban populations live and will continue to live in informal settlements. Regardless of the role of these settlements in accommodating most of the city residents, especially the urban poor, they are hardest hit with the provision of basic infrastructural facilities and services. This chapter discusses the challenges of providing and managing infrastructure in informal settlements in Kumasi. It commences with a description of the formal governance structure for providing facilities in the Kumasi Metropolis with focus on the scope of the study (i.e. water, sanitation, roads and drains). Also, the mechanisms for providing infrastructure as identified in the study are explained as well as the actors involved in the processes.

5.2 City Governance Structure for Infrastructure Provision

The concept of governance has been variedly explained and is mostly confused with government. In this sense, governance is based on the assumption that governments have the authority and capacity to govern, to formulate and implement policy and to realise development goals (Rakodi, 1999 cited in Inkoom, 2011). However in recent times, the relevance of citizens have changed from mere “users or choosers” of public services policies made by others, to “makers and shapers” of the policies themselves (Gaventa, 2004). Against this backdrop, the Organisation for Economic Cooperation and Development (OECD) (1995: p14) defines governance as “the use of political authority and exercise of control in a society in relation to the management of its resources for social and economic development, which encompasses the role of public authorities in establishing the environment in which economic operators function and in determining the distribution of benefits as well as the nature of the relationship between the ruler and the ruled”. The function of governance therefore includes the allocation of resources to provide basic infrastructural facilities for the achievement of social and economic development goals.

According to Ashworth (1996), governance occurs at five interconnected levels namely: household, community, local and national government as well as global institutions. Global governance deals with issues outside the purview of individual governments while governance in the national space considers issues within a country (Graham *et al.,* 2003). At the local government levels, governance takes place not only at the local authority‟s offices but also the community and household levels.

Public administration in Ghana – even in the post-independence era – has mimicked the structure of the colonial administration leading to completely centralised governance and overdependence on central government for financial support (Ahwoi, 2011). It is only recently that reforms in local government systems have changed to the responsibility for development, promotion of physical and natural wellbeing, health, the environment, education, entertainment and the provision of services and utilities. Notwithstanding these conscious efforts, Ghana‟s decentralisation system especially in the area of service delivery, can best be described as deconcentration rather than devolution (Inkoom, 2011). This system only involves a process by which the agents of central government control are relocated and geographically dispersed (Sayer et al., in Yuliani, 2004). In other words, it involves the shifting of workload from centrally located officials to staff or offices outside of the national capital (Rondinelli, McCullough & Johnson, 1989). The system as operated in Kumasi is explained in the subsequent sections of this chapter.

5.2.1 Water Provision

In theory, the responsibility for service delivery in Ghana lies with the local government structures (i.e. metropolitan, municipal and district assemblies) (Republic of Ghana, 2009). However, in practice, water service delivery in urban areas is done by the Ghana Water Company Limited (GWCL), a centralised government agency with branches in the regions and districts; responsible for 82 systems supplying water to urban areas in Ghana (Nyarko & Hayward, 2011). The Ghana Water and Sewage Corporation (GWSC) Act of 1965, Act 310 which sets up the company mandates it to provide, distribute and conserve water for domestic, public and industrial purposes. In Kumasi, pipe borne water is supplied from the Kumasi Water Supply System (KWSS) which is managed by the Ashanti Regional branch of the GWCL. The KWSS is made up of two water treatment plants, namely: Owabi and Barekese Treatment Plants. Even though the two plants have an installed capacity of

122,744m^3 (27million gallons), the average daily water production was 89,301m^3 (19.6million gallons) as at 2011 (Gaisie, 2012). The underperformance of the system is mainly caused by shutdown of the plants arising from power outages. In addition to this challenge, about 35 percent of the treated water is lost through illegal connections and breakages in the distribution system (Gaisie, 2012). This situation further worsens the excess of demand over supply of the facility resulting in residents relying on informal sources to cater for the gap.

5.2.2 Sanitation Management

The most decentralised function of government in Ghana can be said to be sanitation systems. This lies in the creation of waste management or environmental sanitation departments in virtually every metropolitan, municipal and district assembly (MMDA) but the full operations as a decentralised department leave much to be desired. The waste management department (WMD) of the KMA supervises the design, construction and management of public sanitation facilities within the metropolis as well as provides financial and technical assistance for their establishment and maintenance (Maoulidi, 2010). Serious interventions in sanitation and waste management in Kumasi began with the implementation of the Kumasi Strategic Sanitation Project (KSSP) implemented within the period, 1989 – 1994. This represented conscious efforts towards the planning, design and implementation of urban sanitation programmes and to promote the formulation of sector programmes (Saywell & Hunt, 1999). The KSSP was implemented by the WMD of the KMA (which was created out of the project) with technical assistance from the UNDP-WB Regional Water & Sanitation Group for West Africa (RWSG-WA) and KNUST as a partner institute.

5.2.3 Roads and Drains

With most of the residents in Kumasi relying mainly on road transport as their means of transportation (KMA, 2010), the relevance of road networks in the city cannot be overemphasised. The Kumasi Metropolitan Roads Unit (KMRU) is responsible for the construction and maintenance of all local roads within the metropolis. Although the KMRU is clearly a decentralised institution under the KMA, it usually draws funding from the Ministry of Roads and Highways (MRH) to finance local projects.

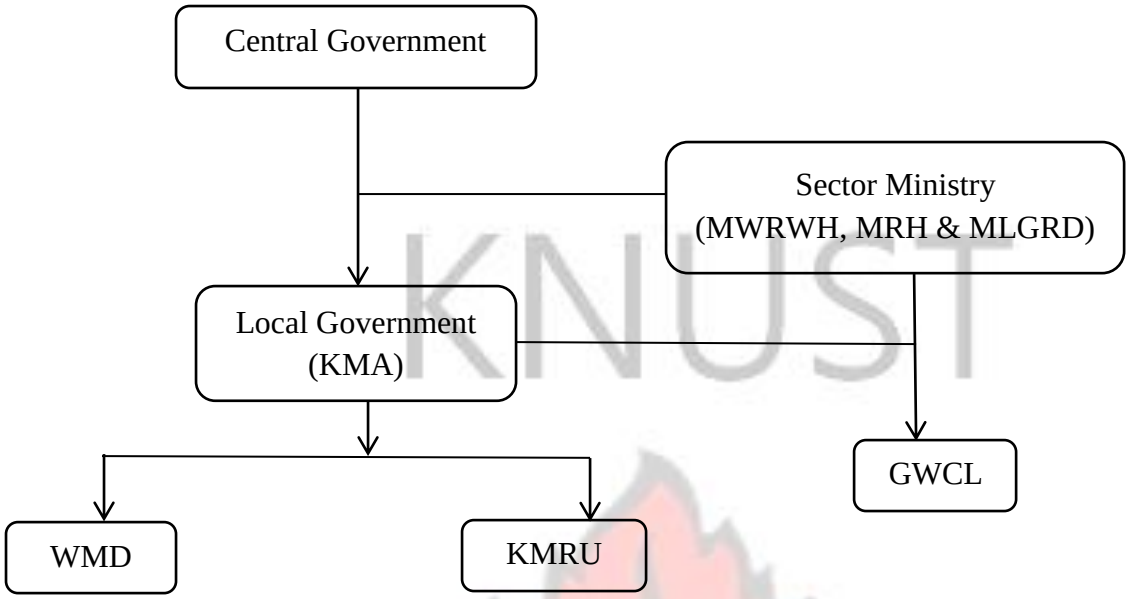


Figure 5.1: Formal Government Structure for Infrastructure Provision

Source: Author's Construct, 2014

From Figure 5.1, it can be seen that the central government (i.e. the Government of Ghana) still has the ultimate responsibility of supplying basic infrastructural facilities to human settlements in Ghana. This results from the lack of autonomy of the local government structures to mobilise adequate local resources to finance such facilities. The Government of Ghana executes infrastructure projects through the respective sector ministry which allocates resources for the projects to be managed by the relevant department under the local authority (in this case, KMA). The Legislative Instrument, LI 1961 (i.e. the Departments of District Assemblies Commencement Instrument of 2009), re-established the Waste Management Department and Department of Urban Roads under the MMDAs. Interestingly, even though the supply of water is an integral part of local governance, the responsibility remains that of a semi-autonomous institution, the GWCL. As a result of this, the Assembly overly depends on the central government agencies which are also constrained with financial resources. This however leads to the poor level of infrastructural development and maintenance as evident in informal settlements in Kumasi.

5.3 Mechanisms for Providing Infrastructure in Informal Settlements

Usually, informal settlements do not benefit from formal sources for infrastructural facilities and therefore rely on other informal sources. Nonetheless, it was gathered through the study that at some points in time, informal settlements in Kumasi benefitted from services rendered

by formal government institutions albeit mostly funded by international donor organisations such as USAID and the World Bank, among others. The study revealed a mix of mechanisms used for the provision of infrastructural facilities in informal settlements in Kumasi. These include public provision, private provision and public private partnership provision.

5.3.1 Supply by Public Institutions

As indicated earlier, one key function of governance is the supply of basic infrastructural facilities and services to citizens of a country. In Ghana, this responsibility is often executed by the local authorities through its decentralisation policy. This involves the use of public funds to finance infrastructural projects. Investment cost in pipe-borne water supply is borne by the central government with operations and maintenance cost financed from the tariffs paid by consumers. Previously, the local governments also installed public stand pipes at vantage points in communities but due to inadequate financial resources and inefficiencies in their management, this act was abolished. From the study, only one borehole in Moshie Zongo was developed by the KMA through the assistance of Water and Sanitation for the Urban Poor (WSUP), which shows the growing prominence of other sources in infrastructural delivery in human settlements in the city.

Also through the Kumasi Strategic Sanitation Project, some public toilet facilities were constructed by KMA which were managed by the respective unit committees. All public dump sites were also provided under a similar arrangement. In the informal settlements studied, about two-thirds (ten out of fifteen) of the shared toilet facilities where provided by the public sector through the WMD of KMA. In addition, central collection points for solid waste were provided by the public sector even though the private sector is involved in the collection of waste from homes and the transportation of skip containers to the final disposal sites. The study also found out that all road infrastructure in the study areas were constructed by the government. This is basically due to the huge resource requirement which is beyond the reach of the Assembly.

The conventional approach of relying on central and local government agencies in the provision of every basic infrastructure at the micro level (i.e. community level) is faced with numerous challenges. The low financial and human capacities of government agencies undermine their effort to supply basic infrastructural facilities. This is further exacerbated by the rapid increase in population in urban areas which stretches the gap between demand and the ability of the government to supply these facilities. One other challenge with this mode of provision is the

"universality" of facilities which adopts common standards to be replicated everywhere. This does not mostly incorporate local requirements of the area the infrastructure is laid but adopts common design standards.

5.3.2 Supply by Individuals

The private sector has been very instrumental in the provision of basic infrastructural facilities in informal settlements in Kumasi. Owing to the numerous challenges with the public sector provision of infrastructure facilities, it is now common for individuals and investors to provide for the deficits. The study revealed that almost all (96.9 percent) of the respondents reported that their main sources of water were provided by the private investors. Under this model, the vendors connect to the water lines as private customers and open for sale to the general public. Also, individuals sink boreholes and hand-dug wells in areas that do not have access to pipe borne water supply. This source is particularly prominent in Ohwim where almost nine out of every ten households rely on ground water sources. The indiscriminate and unregulated nature of extraction of the groundwater resources can have negative repercussions on the environment (Anornu, Kortatsi & Saeed, 2009; Nnenna, 2014).

The relevance of the private sector was not only evident in the area of water provision. The study revealed that the sector was also instrumental in the sanitation management in the IS. About 26.8 percent of respondents indicated that they have toilet facilities within their houses which were mostly provided by the homeowners. In addition to this, other individuals in Moshie Zongo have constructed toilet facilities that are open to public patronage albeit unauthorised.

5.3.3 Public Private Partnerships

According to the Government of Ghana (2011: p2), public private partnership (PPP) involves a "contractual agreement between a public entity and a private sector party with clear agreement on shared objectives for the provision of public infrastructure and services traditionally provided by the public sector". Against the backdrop of limited resources for infrastructure provision and the quest to ensure value for money, this arrangement is widely used in providing public services. The study revealed that PPP arrangements have been adopted in the provision of infrastructural facilities in informal settlements in Kumasi. This was very prominent with the construction of public toilet facilities in study areas. As already mentioned in Chapter 2,

about 33 percent (five out of fifteen) of public toilet facilities in the study areas were provided under a build–operate–transfer (BOT) strategy. Under this strategy, the WMD acting for and on behalf of the KMA, enters into a contractual agreement with private investors to provide toilet facilities based on some agreed terms. The Assembly contributes to this partnership by giving out its sanitary sites and offering technical inputs while the private investor develops the infrastructure. After the facility is supplied, the investor manages it for an agreed period (usually between 10 and 20 years) after which it is transferred to the local assembly. During this period, the investor is required to pay a monthly tax of GH¢ 100.00 to the Assembly as well as responsible to carry out repairs and maintenance of the facility.

The PPP arrangement has been very successful in the provision of facilities in informal settlements. Through this arrangement, more facilities have been delivered to these areas easing the pressure on public funds.

5.3.4 Community-led Supply

The constant neglect of formal government institutions in the provision of infrastructural facilities sometimes drives communities to initiate and develop them on their own. This is very common in rural settlements which are characterised by informal, homogenous and communal lifestyles and are driven to undertake some services through communal labour and financing (Kimura & Fukubayashi, 2013). However, as these settlements urbanise to become more formal, heterogeneous and self-centred as in the case of informal settlements, the drive to communally initiating projects dwindles. As observed from the study, the Ohwim community had provided some public water facilities through their own initiatives. The entire process of planning, designing, developing and management of these projects was done by the community. As was reported in their case, the setting up of trusted local institutions was a sine qua non for initiating community projects.

5.4 Actors Involved in Infrastructure Provision in IS in Kumasi

The provision and management of infrastructural facilities in IS in Kumasi involves a number of actors. These actors include formal government institutions, private investors, community groups, non-profit making organisations and international donor organisations.

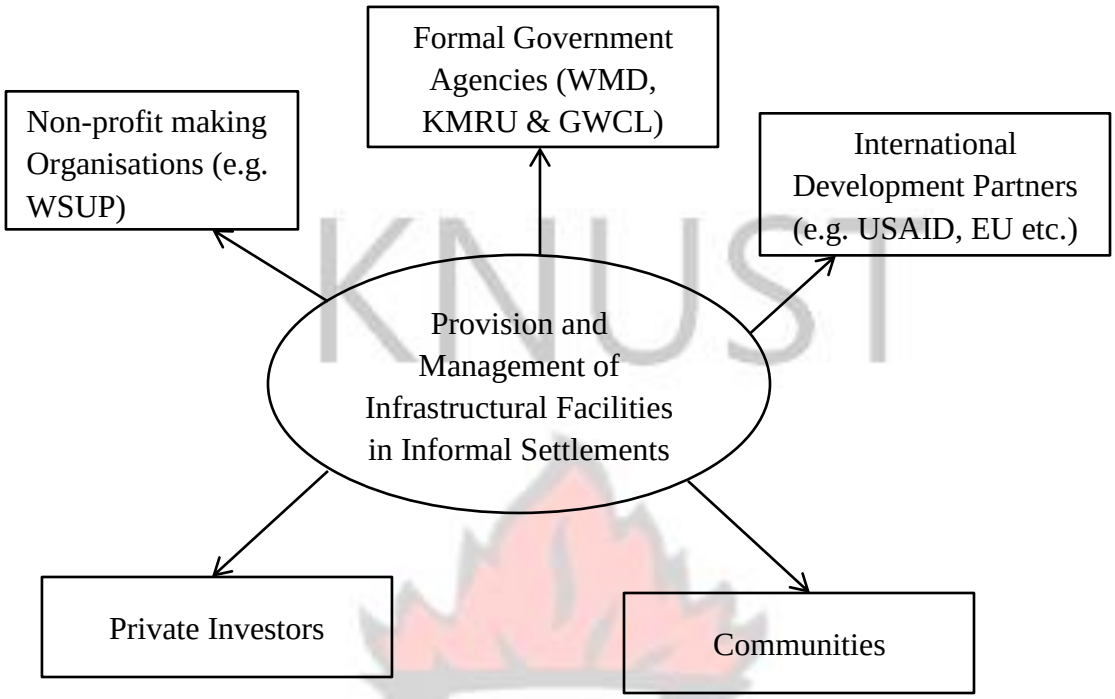


Figure 5.2: Actors in Provision and Management of Infrastructural Facilities

Source: Author's Construct, 2014

5.4.1 Formal Government Agencies

As stated earlier, Ghana"s decentralisation strategy has shifted the responsibility of providing basic infrastructural facilities to the local governments at the Metropolitan, Municipal and District Assembly (MMDA) level. This duty is often executed through their decentralised departments such as the WMD and roads departments; among others. In this regard, these formal government institutions often serve as the implementing agencies in projects geared towards the supply of infrastructural facilities in informal settlements. Also, with the emerging private sector involvement in the supply of these facilities, the government institutions offer technical assistance to investors as well as ensure that the facilities provided meet certain minimum standards. The roles of the departments under KMA in the provision of facilities in informal settlements are summarised in Table 5.1.

Table 5.1: Roles of Decentralised Departments of KMA in Infrastructure Provision in Informal Settlements in Kumasi.

Department	Role

Waste Management Department	Regulate, coordinate and supervise the provision of infrastructural facilities, services and programmes for effective waste management towards the improvement of environmental sanitation, the protection of the environment and the promotion of public health.
Kumasi Metropolitan Roads Unit	Responsible for the planning, development of road programmes as well as provision and management of the urban road network in support of quality transport systems.
Ghana Water Company Limited	Responsible for water production, distribution and conservation for domestic, public and industrial uses in urban areas.

Source: Compiled from Government of Ghana (2009); Fuest and Haffner, (2007)

5.4.2 International Development Partners

International donor organisations have been very instrumental in the supply of infrastructural facilities in informal settlements in Kumasi through their financial and technical support in infrastructure development projects. These include both bilateral agencies such as the United States Agency for International Development (USAID), Nordic Development Fund (NDF) as well as multilateral agencies such as United Nations Development Programme (UNDP), World Bank (WB), European Union, UNCHS and the African Development Fund (ADF). These organisations usually support infrastructure provision in low income residential areas by offering financial and technical supports to programmes and projects. Some of the key programmes that were supported by the development partners include the Kumasi Sanitation Strategic Project (KSSP), the Urban Environmental Sanitation Projects I and II (UESP I & II). These projects have largely focused on the supply of storm drainage, sanitation, solid waste management and community infrastructure (World Bank, 2002) which Oforikrom benefited.

5.4.3 Private Investors

Another emerging group that supports the provision of infrastructural facilities in Kumasi is private investors. This group ranges from individual customers of GWCL who offer pipe borne water for sale to households which do not have private connections; to investors who go into public private partnership agreement with city authorities to provide infrastructural facilities in informal settlements in the City. This group of actors have gained much prominence in the wake of city authorities rolling out policies aimed at recovering investments made in supplying

services and also ensuring their sustainability through effective and efficient management. An example is the public private partnership agreements where investors are a party to supplying toilet facilities in the informal settlements.

5.4.4 Community

The role of the community in the provision and maintenance of infrastructural facilities in informal settlements cannot be overemphasised. This is because they are the beneficiaries and users of the facilities and have key roles to play in ensuring their sustainability. The study revealed that the role of the community in the infrastructural delivery ranges from passively participating in the process through to the control of the entire process. For instance, the UESP sought to involve beneficiary communities through community participation and establishing sustainable maintenance arrangements focusing on bottom-up approach (World Bank, 2002). This was done through identification of focus groups in beneficiary communities, household surveys, preparation of a database, and group stakeholder discussions leading to agreement on general principles and scope of the program (World Bank, 2002).

Also, communities have engaged in direct provision of infrastructural facilities recently. The study found out that the Ohwim community mobilised resources from residents to install public stand pipes. Financial resources were drawn from a community fund set up from contributions of families towards funeral donations. Affluent individuals also supported by offering additional materials, and communal labour was used for laying pipelines. Another key contribution was the sale of pieces of land by the chief to support the project as well as offering land on which the stand pipes were located. However, as the settlement gets urbanised and relationships becoming more formal, breach of trust of fund managers led to the collapse of the fund and efficiencies in the management of the facilities.

Generally, the sustainability of infrastructural facilities depends greatly on the maintenance culture of owners or users; which also depends on the availability of funds. This, however, hinges on the willingness of the users (community) to pay for the use of the services.

Moreover, existing community structure and some residents play immense role in the management and maintenance of the facilities.

5.4.5 Non-Profit Oriented Organisations

As discussed earlier, the conventional institutions tasked with the provision of infrastructural facilities are faced with inadequate resources and hence are unable to supply facilities to most urban areas. Often times, the urban poor most of whom live in informal settlements and periurban areas are last to be serviced by the formal government institutions (Addo-Yobo & Njiru, 2006 in Nyarko & Hayward, 2011). Owing to this, non-conventional actors including non-profit making organisations often assist in that regard.

In Kumasi, through the assistance of Water and Sanitation for the Urban Poor (WSUP), some low income communities like Moshie Zongo and Kotei have access to water and sanitation services. This agency liaises between funding agencies, GWCL and KMA to develop viable community and private sector led approaches towards the improvement of water and sanitation services in low income urban areas. With funding from agencies like DFID, USAID and Vitol Foundation, WSUP identifies poor communities with water and sanitation need, and assists in providing the service through a community based institution called Community Management Committee (CMC).

5.5 Participation in Infrastructure Provision

Various researchers argue that the involvement of beneficiaries in the development and implementation of an intervention is essential as it breeds ownership of the facility consequently enhancing its maintenance and sustainability (Adato, Hoddinott & Haddad, 2005: Ibem, 2009). As explained earlier in Chapter Two (2), participation of beneficiaries in service provision is achieved in different ways: loosely from mere informing to selfinitiatives (Arnstein, 1969; Paul, 1987). Taking from this understanding, some forms of participation can be gleaned from the processes of supplying infrastructural facilities in informal settlements in Kumasi.

The scope of participation revealed by the study can be categorised under four areas including community participation in public sector provision, public private partnerships, individual provision and community driven projects. The UESP depicts the first form of participation as it adopted a bottom-up approach of infrastructure provision by embracing community participation and sustainable maintenance arrangements (World Bank, 2002). This involved the identification and consultation of beneficiaries on the work to be done through household surveys and stakeholder discussions. Also, community members were parties to facilities and

management planning as well as community management committees (CMC). The second form of participation involves a partnership between private investors in the community and the respective decentralised agency as is dominant in the case of public toilets. As stated earlier in Chapter Four (4), 33 percent of public toilet facilities in the study areas were constructed under this arrangement. Residents invest by contributing to the inputs for constructing the facilities and consequently sharing in the benefits from them. This form of participation mostly limits the involvement of potential users of the facilities as responsibilities are only shared between the investor and governing body. Furthermore, the interest of the resident investor becomes more profit oriented than seeking for communal benefits.

The private infrastructure provision describes individuals developing the facilities and operating them under the build-own-operate (BOO) strategy. This form is mostly predominant with water provision as most of the commercial water outlets were provided by individual residents for profit making motives. A high level of participation observed in the study is community-driven water infrastructure project implemented in Ohwim in the early 1990s. This form of participation represents an informal mechanism through which communities cater for the backlog of infrastructure created by the over-reliance on conventional sources. It involves residents of the informal settlements being involved throughout the infrastructure provision process: planning, design, implementation, operation and maintenance. This involved the community members contributing financial, material and human resources to install public stand pipes in the community. The financial resources were drawn from a community development fund set up from the remainder of funeral donations from residents and other contributions. Aside these contributions, the community organised communal labour to dig trenches in which pipelines were laid.

5.6 Sustainability Issues

5.6.1 Willingness to Pay

The sustainability of basic urban infrastructural facilities largely depends on the ability to maintain which requires the commitment of financial resources. This requires that facilities provided would be self–financing and this is greatly influenced by the willingness of the users to pay for the service used. Usually, the investment costs of huge infrastructural installations are borne by the government with the assistance of international development partners. At the micro scale, a complex mix of public, private, communal and benevolent sources interplay in

the finance of basic infrastructural facilities in informal settlements. However, the operation and maintenance costs are usually catered for by charging user fees for the use of the facilities. The study showed that about 87.7 percent of respondent households paid for the use of water in the communities while as high as 95.1 percent paid for the use of sanitation systems. Only 4.9 percent of the households could not pay for the sanitation services and, hence, adopted indiscriminate disposal, burying and burning as their means of solid waste disposal. This situation provides a good basis to develop a flexible financing scheme in support of homeowners to construct internal facilities as the levels of money paid as user fees indicates the willingness and ability to pay for improved services.

5.6.2 Operation and Maintenance

The sustainability of infrastructural facilities depends greatly on their operational activities and maintenance. With regards to facilities provided by the private sector, they are maintained by the owners with funding from charges paid by users. Those provided under PPP arrangements are also operated and maintained by the private investor partners. On the other hand, with water facilities provided by the community themselves (as is the case in Ohwim) and the public sector with the assistance of the non-profit making organisations, they are managed by a community management committee (CMC). This committee‟s membership comprises representatives from traditional leaders, women‟s group, youth groups and unit committees. Its responsibilities include repairs, setting tariffs and collecting revenues. However, these responsibilities are often delegated to private operators as are in the cases of the mechanised borehole systems and the public stand pipes in Moshie Zongo and Ohwim respectively. Transferring these management functions to these operators has proved more efficient due to proper bookkeeping. The operators record all receipts and payments which are vetted periodically by the CMCs. With this system in place the facilities generate revenues to support future community development projects. The assembly member for Ohwim stressed that:

> “This is actually one of the sources of income for the community. Monies generated daily are deposited in the community‟s account at Nwabiagya Rural Bank”.

However, the challenge with this arrangement is the lack of trust in the operators by some community members. In Moshie Zongo, community members frequently agitate about the lack of openness in the management of finances. Such a situation could be averted by instituting measures to ensure transparency and frequent accounting not only to the CMCs but all

stakeholders in the community. In that case, the revenues and expenditures accrued in the management of the communal facilities will be available to everyone who is concerned.

Amidst the general poor conditions of access roads and drainage infrastructure in the IS, the maintenance of major roads and drainage facilities still remains the duty of the KMRU. This is because of the high level of expertise and resources required to perform such activity. However, the study revealed that in newly developing areas of Ohwim, home owners pull resources together to construct and repair drains to prevent the destruction of their houses (*see Plate 5.1*). The monies paid by the affected homeowners are used to purchase materials as well as pay for the workmanship of artisans.

Plate 5.1: A Drain Constructed by Homeowners within Vicinity of Ohwim

Source: Author's Field Photo, 2014

5.7 Challenges of Infrastructure Provision in Informal Settlements in Kumasi

As was presented in the earlier sections of this report, the provision and management of informal settlements in informal settlements in Kumasi is faced with a myriad of challenges. Key amongst these challenges are discussed in this section.

5.7.1 Tempo of Urbanisation and Population Increase in Informal Settlements

For the first time, more than half (50.9 percent) of Ghana‟s population lived in urban areas as recorded in the 2010 census (GSS, 2013b) thereby increasing the demand for basic urban infrastructural facilities. The irony is that because of the low financial and human capacities,

this is not matched with government‟s investment in infrastructure creating huge deficits (Ncube, Lufumpa & Ndikumana, 2010). The obvious result manifests in several social and environmental problems. The hardest hit by these problems are slums and other informal settlement dwellers. The rapid growth of population poses serious challenges in providing and maintaining infrastructure in informal settlements. Growing averagely at a rate of 4.9 percent, the population of the informal settlements under study (i.e. Moshie Zongo, Oforikrom, Ohwim and Dakodwom) have more than doubled from 77,164 in 2000 to 155,059 in 2014. This, however, does not correspond to the investment in basic facilities like roads, drains, water etc. Even in the efforts to provide these facilities, the high densities of the settlements make it very difficult in laying them. The high population growth has resulted in indiscriminate and unauthorised expansion blocking access roads as well as natural drainage systems. In addition, poor sanitation management further worsens the environmental conditions of the informal settlements exposing them to disaster risks.

5.7.2 Urban Poverty Levels

Evidence suggests that the proportion of the urban poor will outstrip the rate of urban population growth which will propel increased incidence of slums and other informal settlements formation (UN-Habitat, 2003b). Most of these informal settlements lack basic infrastructural facilities like potable water, improved sanitation and drainage systems. KMA sanitation bye-laws recommend that each house within the Kumasi metropolis should have private toilet facilities as public toilets are not considered as improved facilities (Maoulidi, 2010). Nonetheless, the study revealed that approximately three-quarters of the IS dwellers patronise shared latrines. This is partly explained by the fact that most of the residents are poor as indicated by their daily per capita expenditure falling below the international poverty line of USD 1.25. Interestingly, the combined effects of daily payment are enormous as households spend about GH₵ 3.30 on using public toilets daily. The high poverty levels in these areas restrain the households‟ commitment to finance basic infrastructural facilities like toilets in their homes; hence, their dependence on public sources.

5.7.3 Models of Infrastructural Facilities (Standards)

The Kumasi Sanitation Strategic Plan prepared in 1999 proposed different models of toilet facilities for different areas in the city based on densities. According to the plan, simplified sewerage system was to be built for high-population density areas, Kumasi VentilatedImproved

Pits (KVIPs) for medium-density areas and Water Closets with septic systems for low-density areas. Sadly, since 2005 (the end year for the implementation of this plan), the plan has not been reviewed to accommodate current needs. As dictated by this plan, the informal settlements under study which are high density areas, require a simplified sewerage system. However, this high standard of facility has discouraged the use of local resources towards the achievement of this end. Obviously this overambitious proposal requires huge financial resources from the central government and its development partners, the lack of which has rendered it non-implementable. In addition, the uncontrolled nature of physical development in the IS renders such policies unrealistic to embark on.

5.7.4 Availability of Space for Laying Infrastructure

Owing to the high population densities, any available spaces are usually converted to dwelling units. For instance in Moshie Zongo, some houses have converted their internal toilet spaces into habitable rooms to create additional rooms for settlers while spaces between houses which hitherto served as access roads to houses have been encroached with room extensions and stores. These phenomena have limited the available spaces where infrastructure like roads, drains and toilet facilities could have been constructed.

5.7.5 Challenges of Participation

Conventionally, infrastructural projects have been planned and designed by the policy makers and dumped on beneficiaries in informal settlements. This approach led to the disregard for local institutions like the community-based organisations (CBOs) which has resulted in their low capacity. In view of the foregoing, the residents lack the capacity to effectively participate in the infrastructural planning and management processes. Observing this trend, the UNESP adopted measures to involve beneficiaries in project implementation.

However, it is evident from the socio-economic analysis that informal settlements exhibit heterogeneous characteristics. This is demonstrated in the differences in income levels, educational and ethnic backgrounds. The benefits of this heterogeneity are that it enables cross-subsidization in cost sharing and some professional and technical inputs in infrastructure development. Nonetheless, this often creates some “elitist syndrome” which deters optimum commitment by all groups to fully participate in community initiated projects. The two sides of this were seen in the community developed water project in Ohwim. As discussed in Chapter

4, wealthy members of the community contributed extra resources like pipes, aside the funeral contributions made. Conversely, the breach of trust among groups which manage the projects led to the collapse of community development fund which was the major source of finance for community infrastructural projects.

5.8 Summary of Chapter

This chapter discussed the governance structure for providing infrastructural facilities in Kumasi. It argued that although the institutions tasked to perform this function are formed under the decentralised system, their operations and financing mechanisms do not present them as wholly decentralised institutions under the KMA. Their activities best describe the deconcentration of central functions from centralised MDAs to institutions under the MMDAs. Also, the chapter has described the mechanisms through which infrastructural facilities are provided in IS. It identified mechanisms such as public provision, private provision, public private partnerships and community initiatives, that interplay to supply the minimum level of infrastructural facilities available in the IS in Kumasi. It was established that because of resource constraints and inefficiencies in the public system, there has been a paradigm shift to focus on the other non-conventional approaches.

The key actors involved in the supply of facilities are also identified to include the formal government agencies, the private investors, community members, non-profit making organisations and international development partners. The willingness of users to pay for public services exhibited by the huge amount spent on unwholesome facilities is recognized as a potential to develop and expand sustainable public services. The chapter also identified the challenges to service provision to include urbanisation and population increase, urban poverty and high standards of provision among others. These set the tone to make recommendations on how to improve the delivery of infrastructural services in informal settlements which is discussed in the next chapter.

CHAPTER SIX SUMMARY OF MAJOR FINDINGS, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

Chapters 4 and 5 presented analysis on the data gathered by revealing the nature of infrastructural facilities in the informal settlements under study and the mechanisms through

which infrastructural facilities are provided as well as the challenges with their provision. This chapter summarises the major findings that emerged from the entire study and draws implications for policy formulation. It also makes recommendations towards the improvement of infrastructural facilities in informal settlements and provides the general conclusions to the study.

6.2 Major Findings

The summary of key findings from the study is made along the research questions in order to ensure that they were adequately answered by the study. These are discussed seriatim.

6.2.1 Nature and State of Infrastructural Facilities in Informal Settlements

6.2.1.1 Availability

The study identified different levels of infrastructural facilities in the informal settlements under study. It showed that most of the residents have improved sources of water but have serious issues with toilet facilities. With regard to water, three main sources were used by the IS dwellers, namely: pipe borne water, borehole and hand-dug wells. Interestingly, unlike other informal settlements elsewhere, most of the dwellers had access to the formal water services delivered by the Ghana Water Company Limited (GWCL). The only exception is the unapproved sub-division, Ohwim, where majority of the residents rely on either boreholes or wells for water and a few people who are within the proximity of the core area of the settlements have access to pipe borne sources. Also, concerning human excreta disposal, the study found that the means of disposal in the settlements were water closets, aqua privy facilities, KVIPs, pan latrines and pit latrines. Some other residents practised open defecation which poses serious environmental and health concerns. However, most of these residents do not have the facilities within their homes and hence rely on public facilities. This implies majority of IS dwellers do not have access to adequate and improved sanitation, going by the

WHO/Joint Monitoring Programme‟s standards for human excreta disposal (Maoulidi, 2010).

In the area of solid waste management, it was observed that both communal and house-tohouse collection systems are practiced in informal settlements in Kumasi. However, owing to the poor conditions of roads in the areas, tricycles are used to collect solid waste from houses to the central collection points for onward transportation by skip trucks to the final disposal site in Oti. As a result, unlike the use of compactor trucks in fairly accessible areas in the city, the

system as practiced in the IS mimics a two stage system of collection. In spite of the fact that majority of the residents have access to an acceptable means of disposal, central collection points are not regularly cleared. For instance, in Moshie Zongo, the heap of refuse covers the entire space of land reserved for refuse disposal breeding flies to nearby homes. Also, some residents adopt unsustainable means of disposing of refuse like burning, burying and indiscriminate disposal; which further worsen the poor environmental sanitation in the settlements. Also, aside from not being serviced with access roads, the few access roads in the study areas are in very poor conditions. Only a third of the roads have tarred surfaces which are mostly the major roads leading to the communities. The settlements are mostly deprived of drainage systems with only tarred major roads having drains along them. The access roads and lanes are mostly criss-crossed by open gutters draining grey water, further blighting the ambiance of the settlements and exposing residents to sanitation related diseases.

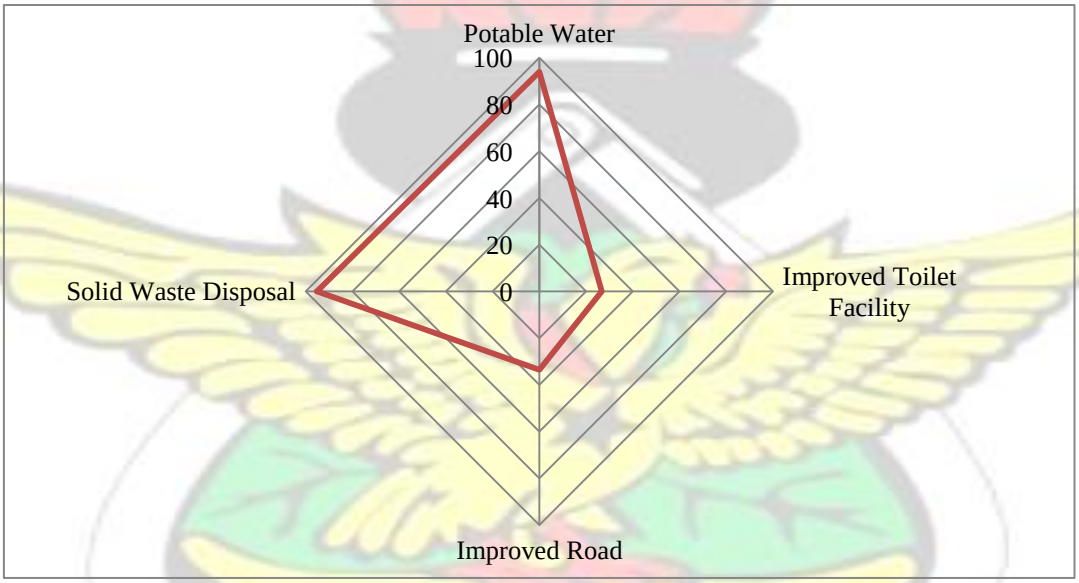


Figure 6.1: General Level of Improved Infrastructure Available to IS Dwellers

Source: Author's Construct, 2014

Considering the acceptable levels of infrastructure as given by the earlier criteria (i.e. potable water sources, home-built toilet facilities, improved road surfaces and refuse disposal facilities), generally it can be said that the IS studied showed a moderate level of infrastructural facilities. Figure 6.1 shows that altogether, the level of basic facilities available to the dwellers stands at 60 percent indicated by the red polygon. Nevertheless, the nature of toilet facilities and roads are of inferior quality.

6.2.1.2 Physical Accessibility

In the context of infrastructural services planning, accessibility can be defined as the ease with which users reach the services. This is affected by distance, ability to pay as well as other socio-cultural factors. Physical accessibility, however, considers the distance or time taken to reach the service. The study revealed that 29.3 percent of residents in the informal settlements have water connections within their houses. In addition, the majority (97.4 percent) of them who patronise public sources walked for not more than five minutes to reach water outlets. This implies water facilities are physically accessible. On the contrary, with regards to toilet facilities, most of the public toilet users (75.8 percent) walk more than 400 meters to the nearest facility suggesting poor accessibility to toilet facilities in the study areas. Concerning accessibility to refuse collection points, the study revealed that households walk, on average, a distance of 434 meters to the nearest points. More than three-quarters (76.9 percent) of the residents cover above 150 meters to reach the disposal sites indicating very poor accessibility compared to Ghana‟s planning standards (MEST & TCPD, 2011).

6.2.1.3 Adequacy, Reliability and Satisfaction

From the study, majority (83 percent) of the respondent households expressed satisfaction with water service delivery, a response explained by the regularity of flow and wholesomeness of the service, which is uncharacteristic of informal settlements in general. Nonetheless, the consumption levels were low as daily per capita consumption is estimated at
27.3 litres compared to WHO‟s standards of 50 litres (Howard and Bertram, 2003). In relation to human excreta disposal, it was revealed through the study that the public toilet facilities were inadequate as about 385 of patrons depend on a drop hole designed to serve only 50 users (MEST & TCPD, 2011). Oforikrom presents an extremely poor condition as about 600 residents are served by each drop hole. This trend does not play out in Ohwim where most of the houses have internal toilet facilities. Generally, more than half (56.7 percent) of residents expressed satisfaction with the services rendered by the public toilet facilities. Specifically, more people who patronise privately owned facilities (70.7 percent) were satisfied compared to those who use publicly (District Assembly) owned facilities (33.3 percent). This underscores the effective management of privately owned facilities compared to the District Assembly owned facilities. Also, a chi square test conducted underscored the validity and statistical significance of the sample used for the study. The statistical analysis revealed a close association between facility used and users‟ level of satisfaction.

The length of roads in the study area totalled 16.9km out of which, 33.5 percent was tarred while the remaining 66.5 percent had earth surfaces. The internal roads are narrow and dusty with gullies caused by erosion. This is worsened by the poor drainage system with unengineered open drains traversing access roads and rendering them unmotorable. It was observed through the study that only major roads had storm drains abutting them. Also, natural drains in the settlements are silted with solid waste which consequently leads to flooding in areas close by.

6.2.1.4 Affordability and Cost Issues

Affordability refers to the "ability to pay for necessary levels of consumption within normal spending patterns" (Milne, 2004: p.4). This is very necessary as it provides opportunities to effectively operate facilities to ensure sustainability. The study revealed that the 84.1 percent of households who pay for the use of water spend 6 percent of their monthly incomes on water. This is considered unaffordable when compared to the World Bank"s target ratio of 3 – 5 percent and 3 percent as reported by GLSS 6 (Milne, 2004; GSS, 2014). Even though the difference may appear marginal, the low income levels make the impact unbearable to the households. In relation to cost on human excreta disposal, users of public toilet facilities pay an average of GH¢ 0.30 per visit for a frequency of two daily which translates into GH¢ 99.00 per household each month. Considering an average number of households of 4.2, occupants of a house in the IS spend about GH¢ 415.80 per month or GH¢ 4,989.60 annually on public toilet facilities. This amount provides a potential to financing internal toilet facilities. A similar situation was observed with regards to the cost of refuse disposal. A household in the IS spends GH¢ 6.00 on average each month on disposing refuse at the central collection point. Together with his/her co-tenants, they spend GH¢ 33.00 which is more than what their counterparts in Ohwim spend for patronising house-to-house collection system (i.e. GH¢ 20.00 per house per month).

6.2.2 Modes of Infrastructure Provision and Management

As stated earlier, the study identified four key modes of supplying infrastructural facilities in the informal settlements, namely: public provision, private provision, public-private partnerships (PPP) and community initiatives. Public provision involves the public sector actively involved in the supply or delivery of services. This was identified in the case of water where the GWCL produces and distributes pipe borne water to communities. This is also true

with regards to road and drainage system construction as well as some sanitation infrastructure, mainly public toilets and refuse collection containers. The primary motive of the public sector engaging directly in this area is to ensure public good. Nonetheless, with the challenge of inadequate financial capacity of the public sector, creating a backlog of services, the private sector engages in the process to supply services. This mode was identified as being used for internal facilities and public facilities with profit making motives.

Sandwiched between these approaches are the PPP where the public and private sectors collaborate to supply a given facility. The study revealed that this approach was noticeable with public toilet facilities. The common form as operated in the study areas is the buildoperate-transfer (BOT) model. In some cases, the communities themselves engage in the supply and management of the facilities as was found in Ohwim‟s water supply system. Community initiatives like this are mostly demand driven and arise from the critical need for a service.

6.2.3 Actors Involved in the Provision and Management of Infrastructural Facilities

The study revealed a myriad of actors who are involved in the provision and management of infrastructural services in informal settlements. These actors generally play the roles of providers, financiers, managers and beneficiaries or users. The formal government institutions like the GWCL, WMD and KMRU supply facilities as well as offer technical support to private investors to ensure that the services provided meet certain minimum standards. Also, some private investors engage in the supply of facilities by financing their development; this was very prominent with the supply of water and toilet facilities. International development partners such as USAID, UNDP and EU also play the role of financiers and offer technical expertise in infrastructural development projects and programmes. In few instances, non-profit making organisations like Water and Sanitation for the Urban Poor (WSUP) has developed and implemented water and sanitation infrastructure projects in informal settlements like Moshie Zongo. The communities are also seen as the beneficiaries or users, and recently as providers and managers of infrastructural facilities in informal settlements.

6.2.4 Potentials and Constraints to Infrastructure Provision in Informal Settlements

6.2.4.1 Potentials

Potential in this context is used to refer to some characteristics or features that can be harnessed to improve the delivery of infrastructural services in informal settlements. Taken from this

definition, some potentials can be discerned from the study which can be tapped to enhance service delivery. First, the payment for the use of public services like public toilet facilities indicates that households have the ability to pay for improved facilities provided the financing arrangement is made flexible. This potential can be enhanced by the high residential densities of the settlements. The multi-household nature of the houses in the study areas presents an opportunity to share cost in the supply of facilities which tends to minimise the effect on individual households.

6.2.4.2 Constraints

On the other hand, some factors inhibit the development of infrastructural facilities in IS. First, the insecure tenure in these settlements affects the commitment levels of resident to support developing infrastructure. As observed from the study, about 97.2 percent of landlords interviewed did not have formal documentation (i.e. lease) on the land occupied. Secondly, the haphazard nature of physical development in informal settlements restrains the supply of urban infrastructure. For instance the non-availability of space has resulted in narrow access roads, inadequate refuse collection points as well as well as unengineered drainage systems.

Infrastructure delivery in informal settlements is also hindered by the high standards expected from public institutions. For example, the Kumasi Strategic Sanitation Plan (KSSP) proposed that a simplified sewerage system was to be built for high-population density areas, Kumasi Ventilated-Improved Pits (KVIPs) for medium-density areas and Water Closets with septic systems for low-density areas. Based on this proposal, the informal settlements under study require a simplified sewerage system but this has not been implemented partly because of the cost involved. Interestingly, the study observes that the existing mode is expensive considering the amount residents spend on public toilet facilities. Again, the existing facilities are inadequate and cannot be regarded as improved sanitation sources.

6.3 Recommendations

The synthesis of the data in Chapters 4 and 5 has exposed the situations pertaining to infrastructural provision in informal settlements. It is therefore imperative that recommendations be made to improve the levels of infrastructure as well as the processes for providing them. This section is based on the issues identified from the study and lessons drawn from literature to make such recommendations.

6.3.1 Promote Affordable Models

The high standards of infrastructure set by governmental institutions have not helped to improve living conditions in informal settlements. Consequently, the approach to supplying services has been unaffordable, and hence the reliance on sub-standard facilities. It is therefore recommended that more affordable technologies be encouraged in these areas. For instance technologies that recycle waste like compositing and biogas production should be encouraged. However, this would require a review of the existing sanitation plans and policies to incorporate these technologies.

6.3.2 Non-conventional Financing Mechanisms - Revolving Fund

One key challenge that threatens improved service levels in informal settlements is lack of funding. Conventionally, the responsibility for infrastructure provision and maintenance rested on the local governments but in the light of low financial capacity of the district assemblies, this is not sustainable. Consequent to this, households spend huge amounts of money on using sub-standard facilities operated by private investors as in the case with toilet facilities. It is recommended that local government (i.e. KMA) adopts a financing scheme which can be used to support residents in informal settlements to construct toilet facilities within their houses. With this strategy, inhabitants should be made to pay for the use of the facility as they would do for public toilet facilities until such a time that the investment is recouped to hand over the facility fully to the house. The repaid amount can be put into revolving fund to finance same for other houses. This has the potential to reduce the pressure on public facilities and improve the housing and environmental conditions in these settlements. In addition, it serves as a means towards enforcing the Assembly‟s bye-laws on sanitation.

6.3.3 Controlling Development at the Local Level

Development control is a function that ensures that physical development takes place in an orderly manner. In the bid to securing and protecting spaces for infrastructure delivery, the top-down approach of controlling development where building inspectors patrol around communities to check development has proved unsuccessful over the years. It is therefore imperative to empower local residents to perform this function. The residents should be sensitised on the need to control physical development within their environs and encouraged to adopt the NIMBY (not in my backyard) attitude to prevent people from occupying public

spaces like roads. Moreover, local structures and institutions like the unit committees and traditional authorities should be empowered to control physical developments in their respective communities. Such an approach will inspire the spirit of stewardship among community members to prevent development that obstructs good living conditions like encroachment and unhygienic siting of facilities. Nonetheless, this would first require recognition of their relevance in development control and making available development plans to them to monitor conformity by developers. Most importantly, the success of this will hinge on the recognition and securing tenure in order to legitimise their stay in the informal settlements.

6.4 Suggested Areas for Further Research

The study identified that as the informal settlements grow and become more heterogeneous, the communal spirit which characterised them in the formation stages dwindles. As was observed in the case of Ohwim, the settlement lost the structures and commitment it possessed in supplying infrastructural facilities and hence led to the collapse of communal facilities. It is therefore necessary to study about how this communal spirit could be maintained to support the delivery of self-help projects as the urbanisation of communities become more complex.

Another issue that emerged from the study is the fact that even though the role of management of Kumasi is devolved to the KMA; the functions of providing critical infrastructural facilities are not wholly decentralised. It is suggested that studies are undertaken to examine the relationship between the implementation of decentralisation in Ghana and urban development and management. This would fully reveal how urban development is affected by the current decentralisation practices in order to inform policies on urban governance and management.

6.5 Conclusion

With the unprecedented rate of population growth in Kumasi, much of it is inarguably accommodated by informal settlements. However, the conditions of infrastructural facilities in these settlements remain precarious with few strides made in water service delivery as revealed by the study. Even though there are means of human excreta and solid waste disposal in these settlements, the conditions are poor because of ineffective management practices. Apart from major roads, the informal settlements have very poor access roads with only Oforikrom which has relatively improved road conditions attributed to their upgrading in 2004. The poor

drainage system is also worsened by haphazard development and silting of natural water bodies exposing residents to perennial flooding and health hazards.

The four modes of infrastructure provision spanning from total public sector control through total community initiatives were identified to be operating in the study areas. Sadly, the community initiatives appear to fall through as the settlement expands. As a result, there is overreliance on projects from government with external support which are unreliable and unsustainable. It is obvious from the study that the informal settlements possess some potentials that can be harnessed to improve infrastructural services. Notwithstanding the widespread poverty levels, the residents tend to eventually pay more for inferior services which when managed well can help improve service conditions.

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APPENDICES

Appendix 1: SAMPLE

SIZE DETERMINATION

Sample size formula:

$$n=\frac{N}{1+N(\propto)^{2}}$$

Where; n is the sample size N is the sample frame α is the margin of

error defined at 95 percent confidence level (α =0.08).

The sample size was defined from the total number of the six study areas.

$$n=\frac{27781}{1+27781(0.08)^{2}}$$ n=

$$\frac{27781}{1+27781(0.0064)}$$

$$n=\frac{27781}{1+177.7984}$$

$$n=\frac{27781}{178.7984}$$

n = 155

Hence, the minimum sample selected for the study was 155 households.

:

Appendix 2 NUMBER OF INSTITUTIONAL RESPONDENTS

Institution	Number of Respondents
Waste Management Department	1
Kumasi Metropolitan Roads Unit	1
Ghana Water Company Limited	1
Town and Country Planning Department	1
Kumasi Metropolitan Planning Office	1
Assembly members	4
Unit committee members	4
CBO members	2
Traditional leaders	2
Total	**17**

:

Appendix 3 DETERMINING THE KTH VALUE FOR SYSTEMATIC SAMPLING

In selecting households for the study, the systematic sampling technique (a probability sampling technique) was adopted. This involved the calculations of a sampling interval (Kth value) at which space the households were selected. This is given by the formula: K=N/n, where, - K is the Kth respondent to be interviewed after the first sample unit has been selected randomly; - N, the sample frame; and n is the sample size. This is presented as follows:

Study Community	Sampling Frame (N)	Sample Size (n)	Kth Value
Moshie Zongo	1,320	66	20th
Oforikrom	1,057	78	14th
Dakodwom	127	8	16th
Ohwim	317	12	26th
Total	**2,821**	**164**	

Here, the total number of houses in each settlement was used as the sampling frame in order to ensure that respondents are fairly distributed in the study areas. For instance, after randomly selecting the first house from which the first household was interviewed in Moshie Zongo, research assistants moved to every twentieth house for the subsequent respondents until the sample proportion was exhausted. Same was applied to the other study areas using their respective calculated sampling interval, K.

Appendix 4 HOUSEHOLD QUESTIONNAIRES

:

Questionnaire ID: ……

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING DEPARTMENT OF PLANNING

The Researcher is an MPhil. Planning Student at the Department of Planning, KNUST who is carrying out a research on the topic - "THE PROVISION AND MANAGEMENT OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI". The study is basically an academic exercise and you are assured of the confidentiality of information provided.

Name of Respondent: …… Name of Interviewer: ……...

Place of Residence: …… House No: ……

Date of Interview: ……. Time: ……..to……..

A. <u>PERSONAL INFORMATION (HOUSEHOLD HEAD)</u>

1. Age of Respondents: ……..

2. Sex 1. **[ ]** Male 2. **[ ]** Female

3. Household Size: …….

4. Ethnicity: ……...

5. Religion 1. [ ] Christian 2. [ ] Moslem 3. [ ] Traditional 4. [ ] Others (specify)……...

6. Level of Education 1. **[ ]** None 2. **[ ]** Pre-school 3. [ ] Primary 4. **[ ]** JHS 5. **[ ]** SHS 6. **[ ]** Vocational/Technical 7**. [ ]** Tertiary (*Including university, Polytechnic, CoE, NTC*)

7. Marital Status 1. **[ ]** Single (Never married) 2. [ ] Consensual Union 3. **[ ]** Married 4. **[ ]** Widow(er) 5. **[ ]** Divorced 6. **[ ]** Separated

8. Are you employed? 1. [ ] Yes 2. [ ] No *{If no, proceed to question 10}.*

9. Occupation 1. **[ ]** Commerce 2. **[ ]** Service Formal 3. **[ ]** Service Informal 4. **[ ]** Agric 5. **[ ]** Formal Industry 6. **[ ]** Informal Industry 7. **[ ]** Others, *(specify)*……....

10. How long have you lived in this community? …….

11. Type of House 1. [ ] Compound House 2. [ ] Detached 3. [ ] Semi-detached 4. [ ] Multi-storey

12. Tenancy Arrangement 1. [ ] Owner 2. [ ] Tenant 3. [ ] Free Occupant 4. [ ] Family Owned

13. If owner, what document do you have to show title? 1. [ ] None 2. [ ] Lease 3. [ ] Site Plan 4. [ ] Allocation Paper 5. [ ] Others (*specify*)……

B. INFRASTRUCTURAL FACILITIES

I. Water and Sanitation

14. What is the main source of water for your household?

1. **[ ]** Pipe- borne 2. **[ ]** Borehole 3. **[ ]** Hand-dug well 4. **[ ]** Others (specify)

…….

15. Where is the source of water located? 1. **[ ]** in the house 2. **[ ]** outside the house

16. If out of the house, how far is the source of water from your house?

.....meters/mins

17. What is the nature of usage of the facility? 1. **[ ]** Private 2. **[ ]** Public

18. What is the nature of the ownership? 1. **[ ]** Private 2. **[ ]** Community 3. **[ ]** Government *{If private, proceed to Q26}*

19. If it is community or government owned, was the community involved in its planning and development? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q26}*

20. If yes, in what ways did the community contribute? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation 5. [ ] Community Initiative

21. If resource contribution, please list the types of resources ……

22. Were you involved at any stage of the planning and development of the facility? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q26}*

23. If yes how? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation

24. If resource contribution, please list the types of resources ……

25. What motivated you to get involved? ……

……

26. How many litres of water do the entire household consume/use per day? …….. (**NB:** standard 1 Jerry Can = 20L; Bucket = 20L)

27. Do you pay for the water you use? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q29}* **28.** If yes, how much do you spend on water per day? GHC.....

29. How often does the water flow?

1. **[ ]** Daily 2. **[ ]** Weekly 3. **[ ]** Twice a week 4. **[ ]** Thrice a week 5. **[ ]** others (specify) ……

30. What do you think is the cause of the flow rate? ……

……

31. Please rate the level of satisfaction in the delivery of water

1. **[ ]** Highly Dissatisfied. 2. **[ ]** Dissatisfied 3. **[ ]** Indifferent 4. **[ ]** Satisfied 5. **[ ]** Highly Satisfied.

32. What are your reasons for the rating? ……...

……

33. Who is responsible for maintaining the facility? (Tick one that applies)

1. **[ ]** None 2. **[ ]** Water Management Committees 3. **[ ]** Community Leaders 4. **[ ]** GWCL/Public Works 5. **[ ]** Community members/users 6. **[ ]** Owner/private 7. **[ ]** Other

(*specify*)……..

34. What problems do you face with water supply?

.....

.....

35. What solutions will you suggest to address these problems?

……

……

II. Human Excreta Disposal

36. What type of toilet facility do you use?

1. **[ ]** Water closet 2. **[ ]** KVIP 3. **[ ]** Pan Latrine 4. **[ ]** Pit latrine 5. **[ ]** Open Defecation 6. **[ ]** Others (specify) ……

37. Where is it located? 1. **[ ]** inside the house 2. **[ ]** outside the house

38. If outside the house, how far is it from your house? .....meters/mins

39. What is the nature of usage of the facility? 1. **[ ]** private 2. **[ ]** public

40. What is the nature of the ownership? 1. **[ ]** Private 2. **[ ]** Community 3. **[ ]** Government *{if private, please proceed to Q48}*

41. If it is community or government owned, was the community involved in its planning and development? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q48}*

42. If yes, in what ways did the community contribute? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation 5. [ ] Community Initiative

43. If resource contribution, please list the types of resources ……

44. Were you involved at any stage of the planning and development of the facility? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q48}*

45. If yes how? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation

46. If resource contribution, please list the types of resources ……

47. What motivated you to get involved? ……

……

48. Do you pay for visiting the facility? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q50}*

49. How much do you pay per visit? ……..

50. Please rate your level of satisfaction in the use of the facility.

1. **[ ]** Highly Dissatisfied. 2. **[ ]** Dissatisfied 3. **[ ]** Indifferent 4. **[ ]** Satisfied 5. **[ ]** Highly Satisfied.

51. What are your reasons for the rating? ……...

……

52. Who is responsible for maintaining the facility? (Tick one that applies)

1. **[ ]** None 2. **[ ]** Sanitation Management Committees 3. **[ ]** Community Leaders 4. **[ ]** Waste Departmrnt/Assembly 5. **[ ]** Community members/users 6. **[ ]** Owner/private
7. **[ ]** Other (*specify*)……..

53. What problem(s) do you face with human excreta disposal? ..……

……

54. What solution(s) will you suggest to address these problems? ……

……

III. Refuse Disposal

55. How do you dispose off your refuse?

1. **[ ]** Burying 2. **[ ]** Indiscriminate disposal 3. **[ ]** House-to-House refuse collection
4. **[ ]** Burning 5. **[ ]** Public dump Site

56. How far is it from your house? .....meters/mins *(Ignore if house-to-house)*

57. How much do you spend on solid waste disposal every month? …….

58. Who is responsible for maintaining the facility? (Tick one that applies)

1. **[ ]** None 2. **[ ]** Sanitation Management Committees 3. **[ ]** Community Leaders 4. **[ ]** Waste Department/Assembly 5. **[ ]** Community members/users 6. **[ ]** Owner/private 7. **[ ]** Other (*specify*)……..

59. What problems do you face with refuse disposal? ……

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60. What solution(s) will you suggest to address the problem(s)? ……

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IV. Drainage

61. Has the community contributed to maintaining drains before? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q67}*

62. If yes, in what ways did the community contribute? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation 5. [ ] Community Initiative

63. If resource contribution, please the type of resource ……

64. Have you contributed in drain maintenance in this community? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q67}*

65. If yes, how? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation

66. If resource contribution, please the type of resource ……

67. What motivated you to contribute? ……..

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68. What challenges do the community face concerning drainage?

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69. What solutions do you suggest can be adopted to address the challenges?

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V. Roads

70. Has the community contributed to maintaining roads before? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q76}*

71. If yes, in what ways did the community contribute? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation 5. [ ] Community Initiative

72. If resource contribution, please the type of resource ……

73. Have you contributed in road maintenance in this community? 1. **[ ]** Yes 2. **[ ]** No *{If no, proceed to Q76}*

74. If yes, how? 1. [ ] Financial contribution 2. [ ] Resource contribution 3. [ ] Committee membership 4. [ ] Consultation

75. If resource contribution, please the type of resource ……

76. What motivated you to contribute? ……..

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77. What challenges do the community face concerning roads?

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78. What solutions do you suggest can be adopted to address the challenges?

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C. <u>INCOME & EXPENDITURE</u>

79. Average monthly household income …….

80. Average monthly household expenditure items

Expenditure Item	**Average Cost (GH ¢)**
Rent/Housing	
Food	
Transport	
Education	
Health	
Electricity	
Other items (*Specify*)	

Total	

THANK YOU VERY MUCH

Appendix 5: INTERVIEW GUIDE FOR ASSEMBLY MEMBERS/TRADITIONAL LEADERS & CBOs

Questionnaire ID: ……

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING DEPARTMENT OF PLANNING

The Researcher is an MPhil. Planning Student at the Department of Planning, KNUST who is carrying out a research on the topic - "THE PROVISION AND MANAGEMENT OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI". The study is basically an academic exercise and you are assured of the confidentiality of information provided.

Name of Settlement: ……

Designation of Respondent: ……

Age of Respondent: …….. Sex a. [ ] Male b. [ ] Female

NB: (To be administered on roads, water, toilet facilities and refuse disposal points)

Availability of Facility

1. What are the sources of (water) in this community?

Mechanism for Provision

2. Who constructed the infrastructural facility?
3. Was the community involved in planning and implementation of the facility?
4. Which category of community members were involved?
5. How was the community involved in the planning and implementation of the facility?
6. In what ways did your community contribute in the provision of infrastructure?

7. Are there any community based organisations and groups in the community that support infrastructure provision?
8. Are there instances where individual members of the community provide any of such infrastructural facilities?
9. If yes, what are their motivations for contributing?

Operations & Maintenance

10. Do users contribute to the maintenance of the facility? If yes, how?
11. Is the facility open to all members of the community? If no, who can‟t access and why?
12. How is the facility maintained?
13. Is the community involved in the maintenance of the facility?
14. How does the community contribute in the maintenance of the facility?

Other Issues

15. What basic infrastructural facilities are lacking in this community?
16. How do you cope with the lack of such facilities?
17. What are the general challenges you encounter in infrastructure provision and maintenance in this community?
18. How do you address these challenges?
19. What solutions do you suggest can address the challenges?

THANK YOU VERY MUCH

Appendix 6: QUESTIONNAIRE FOR KUMASI METROPOLITAN ROADS UNIT (KMRU)

Questionnaire ID: ……

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING DEPARTMENT OF PLANNING

The Researcher is an MPhil. Planning Student at the Department of Planning, KNUST who is carrying out a research on the topic - "THE PROVISION AND MANAGEMENT OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI". The study is basically an academic exercise and you are assured of the confidentiality of information provided.

1. Please explain the road infrastructure provision process used by your outfit.

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2. How are the projects financed?

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3. What is your general policy for providing road infrastructure in informal settlements in the city?

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4. How are the community/beneficiaries involved?

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5. At what stage are the community/beneficiaries involved?

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6. What do you think entices the community to get involved in the provision?

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7. What is the policy on the maintenance of the infrastructural facility?

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8. How are the community/beneficiaries involved in the maintenance of infrastructural facility?

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9. Are there instances where the communities themselves initiate infrastructure projects?

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10. What do you think accounts for that?

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11. What potentials do you think the communities possess that could be tapped for providing and maintaining infrastructural facilities?

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12. How are they being utilised currently?

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13. What is hindering the community involvement in infrastructure provision and maintenance in informal settlements?

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14. What are the challenges you encounter in providing and maintaining infrastructural facility in informal settlements in the city?

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15. What do you suggest ought to be done in addressing these infrastructural facilities?

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THANK YOU VERY MUCH

Appendix 7: QUESTIONNAIRE FOR GHANA WATER COMPANY LIMITED (GWCL)

Questionnaire ID: ……

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING DEPARTMENT OF PLANNING

The Researcher is an MPhil. Planning Student at the Department of Planning, KNUST who is carrying out a research on the topic - "THE PROVISION AND MANAGEMENT OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI". The study is basically an academic exercise and you are assured of the confidentiality of information provided.

1. Please explain the water infrastructure provision process used by your outfit.

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2. How are the projects financed?

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3. What is your general policy for providing water facilities in informal settlements in the city?

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4. How are the community/beneficiaries involved?

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5. At what stage are the community/beneficiaries involved?

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6. What do you think entices the community to get involved in the provision?

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7. What is the policy on the maintenance of the infrastructural facility?

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8. How are the community/beneficiaries involved in the maintenance of infrastructural facility?

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9. Are there instances where the communities themselves initiate infrastructure projects?

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10. What do you think accounts for that?

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11. What potentials do you think the communities possess that could be tapped for providing and maintaining infrastructural facilities?

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12. How are they being utilised currently?

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13. What is hindering the community involvement in infrastructure provision and maintenance in informal settlements?

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14. What are the challenges you encounter in providing and maintaining infrastructural facility in informal settlements in the city?

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15. What do you suggest ought to be done in addressing these infrastructural facilities?

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THANK YOU VERY MUCH

Appendix 8: QUESTIONNAIRE FOR WASTE MANAGEMENT DEPARTMENT (WMD)

Questionnaire ID: ……

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF ARCHITECTURE AND PLANNING DEPARTMENT OF PLANNING

The Researcher is an MPhil. Planning Student at the Department of Planning, KNUST who is carrying out a research on the topic - "THE PROVISION AND MANAGEMENT OF INFRASTRUCTURAL FACILITIES IN INFORMAL SETTLEMENTS IN KUMASI". The study is basically an academic exercise and you are assured of the confidentiality of information provided.

1 Please explain the sanitation infrastructure provision process used by your outfit (*both toilet and solid waste disposal facilities*).

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2. How are the projects financed?

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3. What is your general policy for providing sanitation infrastructure in informal settlements in the city?

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4. How are the community/beneficiaries involved?

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5. At what stage are the community/beneficiaries involved?

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6. What do you think entices the community to get involved in the provision?

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7. What is the policy on the maintenance of the infrastructural facility?

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8. How are the community/beneficiaries involved in the maintenance of infrastructural facility?

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9. Are there instances where the communities themselves initiate infrastructure projects?

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10. What do you think accounts for that?

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11. What potentials do you think the communities possess that could be tapped for providing and maintaining infrastructural facilities?

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12. How are they being utilised currently?

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13. What is hindering the community involvement in infrastructure provision and maintenance in informal settlements?

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14. What are the challenges you encounter in providing and maintaining infrastructural facility in informal settlements in the city?

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15. What do you suggest ought to be done in addressing these infrastructural facilities?

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THANK YOU VERY MUCH

Appendix 9: OBSERVATIONAL GUIDE

1. What are the hierarchies and conditions of roads in the community?
2. Are there drains in the community?
3. What is the nature of drains?
4. What are the locations and conditions of toilet and refuse dumping facilities?