THE EFFECTS OF SLUM CHARACTERISTICS ON THE SOCIO-ECONOMIC CONDITION OF THE RESIDENTS IN KADUNA SOUTH LOCAL GOVERNMENT AREA, KADUNA STATE, NIGERIA

BY

MUSA FAIZA

DEPARTMENT OF GEOGRAPHY,
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA

SEPTEMBER, 2016

THE EFFECTS OF SLUM CHARACTERISTICS ON THE SOCIO-ECONOMIC CONDITION OF THE INHABITANTS IN KADUNA SOUTH L.G.A, KADUNA STATE, NIGERIA

BY

MUSA FAIZA
MSC/SCI/6042/2011-2012
(REMOTE SENSING AND GIS)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER DEGREE IN REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM

DEPARTMENT OF GEOGRAPHY,
FACULTY OF SCIENCE,
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA

SEPTEMBER, 2016

DECLARATION

I solemnly declare that the work in the dissertation titled 'THE EFFECT OF SLUM CHARACTERISTICS ON THE SOCIO-ECONOMIC CONDITION OF THE INHABITANTS IN KADUNA SOUTH L.G.A, KADUNA STATE, NIGERIA' was written by me in the Department of Geography under the supervision of prof. E. O. EGUISI and prof J. G. LAAH. The information from the literature has been duly acknowledged in the text and the list of references provided. No art of this dissertation was previously resented for another degree or diploma at any university.

Faiza MUSA _____ _____

Signature Date

CERTIFICATION

This dissertation titled 'THE EFFECT OF SLUM CHARACTERISTICS ON THE SOCIO-ECONOMIC CONDITION OF THE INHABITANTS IN KADUNA SOUTH L.G.A, KADUNA STATE, NIGERIA' by Faiza MUSA meets the regulation governing the award of Degree of Master of Science (MSc) in Remote Sensing/GIS, Ahmadu Bello University Zaria, and is approved for its contribution to knowledge and literary presentation.

Prof. E.O. Iguisi Chairman, Supervisory Committee	_____ (Signature)	_____ Date
Prof. J.G. Laah Member, Supervisory Committee	_____ (Signature)	_____ Date
Dr A.U. Kibon Head of Department	_____ (Signature)	_____ Date
Prof. K. Bala Dean, School of Postgraduate Studies	_____ (Signature)	_____ Date

DEDICATION

This work is dedicated to all slum dwellers across the globe.

ACKNOWLEDGEMENTS

In the course of carrying out this study, I benefited the support from many individuals to whom I would like to extend my sincere gratitude. My utmost thanks goes to my supervisors Prof E. O. Eguisi and Prof J. G. Laah who have been a source of intellectual inspiration and guidance. Their constructive comments, enthusiasm, continuous guidance and feedback throughout the dissertation process made this study possible. Their valuable insight and comments greatly contributed towards shaping this work to the present form. I am greatly indebted to my parents who generously granted funding and every other support for my study to attain my career intension and professional target. Thank you for without your supports this study would not have been made.

I would like to thank the entire academic and non-academic staff of Geography Department, Ahmadu Bello University Zaria, for their guidance, inspiring lectures, in-depth knowledge and practical exercises and research skills during my study.

I would like to express my heartfelt resect and sincerest appreciation to my fellow students. Special thanks go to Mr. Ayodele Samuel (AY Geospatial), Adamu Wakirwa, Abdullahi Abdulhakeem (Treaty), Wulga and a number of others who assisted me. Thank you!

ABSTRACT

Improving quality of life in the slum is one of the development goals for new millennium. The existence of slums is essentially a manifestation of poverty, along with the economic and industrial development-slums will continue to exist and grow further which constitute a major challenge to development.This work used both Geographic Information System (GIS) tools and traditional fieldwork methodology to obtain detailed, up-to-date data on two slums (Down Quarters and Gangare) in Kaduna South Local Government Area of Kaduna State. The concept of Object Oriented Approach (OOA) was used on Arc GIS 10 software for database generation, analysis and thematic map preparation. These various maps give the detail information of total slum area, building footprints, population density, condition of roads, land ownership, house quality, occupancy ratio, slum profile, other physical parameters, etc. The result revealed that there is a strong positive relationship between slum characteristics and the socioeconomics of the residents. The poor outcomes that slum residents exhibit of education, employment, occupation and awareness (socioeconomics) are rooted in three key characteristics of slum settlements: limited access to safe drinking water (S1); poor environmental sanitation (S2) and poor environmental conditions and infrastructure/services (S3). The result emphasizes the need for measures to improve the physical environment of the dwelling places like basic amenities of toilets, proper drainage, sewerage system and adequate water supply. It is recommended that the dwellers, private individuals and programmes aimed at improving the wellbeing of slum dwellers should address comprehensively the underlying structural, economic, hygienic, and service-oriented barriers to good and productive lives among slum residents.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDIX

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

High rates of urban growth that have unfolded in the context of stagnating economies with poor planning and governance have created a new face of abject poverty concentrated in informal settlements, commonly referred to as slums (UN-HABITAT, 2010; Zulu, 2011). Currently, nearly 10 million people worldwide are living in urban slums and by 2030, urban slum population will grow to about 2 billion (Moreno, 2003)

However, significant improvement has been made on the issue of slum dwellers in countries of the advanced emerging economies whereas so little has been achieved in developing countries, particularly in Sub-Saharan Africa (SSA) (UN-HABITAT, 2010; Zulu 2011).While the proportion of slum dwellers is decreasing, their absolute number is actually increasing, particularly in the world's poorest regions such as SSA. Urban residents living in slum settlements have declined from 70% to 62% between 1990 and 2010, the actual number of slum dwellers has doubled from 103 million to 200 million over this period (UN-Habitat, 2010b; Sori, 2012)

Nigeria typifies Africa's escalating urban crisis, with projections that about 43% of its urban population to live in urban centers by 2015 thereby intensifying the problem slum formation. The provision of conventional housing in a conducive environment is therefore one of serious challenges in Nigeria due to this rapid rate of urbanization (Mabogunje, 2001, Davis, 2004 and Bahir, 2010). As Lugalla (1995) stated, high urban population, poverty, and the low capacity of Third World government are the main factors that mainly aggravate the problem. In most urban areas, the pace and scale of the growth have out skipped the capacity to maintain acceptable standards of public health, physical infrastructural development,

sustainable economic growth, therefore giving rise to informal settlements (slums) which in turn affects the quality of life in general (UNCHS, 1996; Mallo & Obasanya, 2012)

A settlement is considered a slum if the households lack one or more of the following characteristics or facilities: structural quality and durability of dwellings, access to safe water, sufficient-living area, access to sanitation facilities, and especially, security of tenure (Beall and Fox, 2009; Gulyani and Bassett, 2010; Arimah, 2011; Sumantha, 2014).

United Nations (UN) has emphasized on the multi-dimensional characteristics of slums which includes lack of basic services, substandard housing or illegal and inadequate dwellings, overcrowding and high density, unhealthy living conditions and hazardous locations, insecure tenure or irregular/informal settlements, poverty, social exclusion and settlement size (UN-Habitat, 2008). The fact that they lack all these conditions and the necessity for employment to generate an income to satisfy their needs makes this informal urban environment a fertile ground for illegal informal activities including violence and crime (UN-HABITAT, 2007). According to Indymedia (2008), slums are commonly seen as breeding grounds for social problems such as crime, drug addiction, alcoholism, high rates of mental illness, and suicide.

Slum dwellers have a very poor socio-economic background believed to be associated to poverty that prevails amongst them (UN HABITAT, 2010). Socio-economic status is an individual's relative social and economic standing in society based on an amalgamation of four variables namely; educational attainment, economic activity (which encompasses business pursuits and occupational prestige), income and awareness. Livelihood in a harsh environment has placed the slum inhabitants at the bottom of the socioeconomic hierarchy thus characterized by low income, unstable employment, and poor status of formal jobs, poor housing conditions, and constant struggle for survival (Businge, 2011). Also they are

distinguished by low access to limited information/awareness (Olanrewaju, 2004). The nexus between the socioeconomic status of an individual on the one hand and his environmental condition on the other is an emerging research as the relationship between these mutually reinforcing sets of variables becomes increasingly clear (Businge, 2011).

In slums, the decline in living conditions is accompanied by rapid deterioration of existing socioeconomic status of the urban poor living in these settlements as they are especially vulnerable to economic shocks; they lack access to services, safety nets and political representation (UN-HABITAT, 2007). Slum dwellers are unable to obtain adequate food, clean water and other basic services, and they are usually poorly educated thus making it hard for them to find any formal job. They further have little ability to provide for themselves, living in hazardous locations such as swamps, canal setback, rail line setback, marginal lands, and at the same time in a state of uncertainty as they have no tenure over the land they occupy. This makes them more vulnerable to environmental degradation, threat of eviction, ejection and demolition (Mareng, 2010).World Health Organization (WHO) notes that poor sanitation in conjunction with inadequate medical facilities/services accounts for a great percentage of the high mortality in slums thereby reducing the productivity of such areas (Najam, 2006).

The reality associated with these informal settlements is the poverty levels within which their inhabitants live, and the social exclusion to which they are subjected to as a consequence of, among other factors, a lack of sufficient income to satisfy their basic needs (Paudel, 2003).Their daily challenges according to (Baharoglu and Kessides, 2004) include; limited access to employment opportunities and income, inadequate and insecure housing and services, violent and unhealthy environments, and limited access to educational opportunities. As one might expect, these conditions can have severe consequences on the social and economic profiles of the people (Patel, 2009; UN-HABITAT, 2003)

Accordingly, obtaining reliable spatial information is the basis for any action of enhancing the well-being of urban slum dwellers (Hofman, 2008; Negera, 2012). Spatial information has traditionally been acquired through field surveys only which are time consuming and limited to capture urban dynamic process (Niebergall, 2008; Negera, 2012). Currently, very high resolution (VHR) satellite imagery integrated with geographic information systems (GIS) provides spatially consistent datasets that cover large areas with high detail and temporal frequency. These tools are preferable to field surveys, as they are cheaper to build, easier to use, and more robust and flexible in their application (Sliuzas, 2004; Negera, 2012) thereby providing a wider range of information that is more up-to-date. With these tools it should be possible to develop reliable methods to identify, classify and analyze the physical and social development processes of slums.

Earth Observation (EO) has been used in various studies as a basis to identify and monitor slum settlements. For example, Hofmann et al. (2008) demonstrated how slum settlements can be detected from VHR satellite image data using an object-based image analysis approach. Busgeeth *et al*. (2008) discussed the potential application of Remote Sensing (RS) in monitoring slum settlements in developing countries. Similarly, Lemma, *et al*. (2006) developed a methodology through the integration of local knowledge and geographic information technology (GIT) for monitoring slum condition. Recently, Mathenge (2011) developed a conceptual framework for slum identification and mapping based on domain expert knowledge from VHR imagery.

Earlier studies focused much on the physical appearance of dwelling units with the aim to assess the dimensions of the slum problem externally. But recent studies have considered socio-economic aspect of slums very crucial. For instance, Bello (2002) emphasized that slum areas are locus of poverty where various factors that enhance slum development and growth are noticeable. He admitted that absence/inadequacy of infrastructures (especially

educational) are potent factors that intensifies poverty in such areas, giving birth to more crimes, unwanted pregnancies/abortions, broken homes, theft and the like.

According to Wahab (2001), the problems facing slum and squatter settlements in Nigeria presently have effects on social equity, human health and well-being, economic welfare, socio-political stability, housing infrastructure, community facilities and services as well as sustainability of natural resources. He went further to state that poverty in informal settlements is not just a collection of characteristics; it is also a dynamic condition of vulnerability or susceptibility to risks. The fact that they lack all these conditions and the necessity for employment to generate an income to satisfy their needs makes this informal urban environment a fertile ground for illegal informal activities including violence and crime (UN-HABITAT, 2007).

So also, earlier Remote Sensing and GIS slum works have focused on slum detection and mapping. Generally, slum identification has been carried out in different ways. For example, Shekhar (2012) carried out a study on detecting slums from quick bird data in Pune using an object oriented approach describing the approach as giving the best classification with more than 80% accuracy. Hassan (2011) carried out a study on detecting slums from SPOT data in Casablanca Morocco using an Object Based Approach. This study developed new approaches based mainly on object-oriented classification of high spatial resolution satellite images for the detection of slums. The approach has been developed for mapping the urban land through by integration of several types of information (spectral, spatial, and contextual). However, using geographical information system (GIS) as a tool to further show an assessment of the effects of such slums on the social and economic conditions of its inhabitants is rarely investigated.

1.2 Statement Of Research Problem

Kaduna state, being the third most populous state in Nigeria (6,066,562 million) after Kano and Lagos (NPC, 2008) is experiencing the problem of rapid urbanization and as population influx is exerting undue pressure on land, housing and social facilities, it is giving birth to new slum areas and expanding the existing ones. This development is further taking a new dimension as a result of the frequent crisis taking place in the state. As stated by Muggah (2007), more slums equal more violence and they serve as potential violent time bomb epically with high population density, economic deprivation, high number of broken families, high unemployment, and high level of illiteracy among others (UNDP, 2009).

It is factual that the quality of the environment affects not only the well-being of the people, but also their productivity, their manner of living as well as the ordinary decencies of their lives (Ebong, 1983). Lepers' slum also known as Hayin Gabriel in Zaria is a typical example of what social and economic status is like in slums of the state. It is a poverty- stricken area where the inhabitants' sources of livelihood is unpredictable as the winds, the basic amenities of life are lacking and men, women and children are living as lower animals, putting their hope on fate (Midat, 2012).

Several studies have been carried out (both field and RS/GIS related) in Nigeria and other parts of the world on slums which has made it clear that residents of such settlements are regularly exposed to the harsh realities of spatial and environmental marginalization that accompany living in informal settlements. Using the Pressure-State-Response Model, Napier (2000) carried out a research on informal settlement and sustainable livelihood in sub-Saharan Africa. Results shows that the sub-Saharan slums have the worst living conditions and the residents of which are the poor people (low income structures, poor literacy level and from broken homes), are exposed to a typical range of hazard, including famine, flood, fire,

the spread of certain type of diseases (often water related), and the effect of poor indoor air quality.

Rukhsana and Sheraz (2006) quantified the socioeconomic deprivation of squatter settlements inhabitants in Lahore, Pakistan using Socio Economic Opportunity Index (SEOI) to evaluate the level of deprivation of inhabitants of the squatter settlement. In SEOI four important variables; income, health, education and housing are taken into account and Atkinson formula was used to show that over half of the inhabitants are deprived of basic social and economic opportunities thus necessitating them to occupy the base of the socioeconomic pyramid.

Angeles (2009) carried out a Census and Mapping of Slums (CMS), using geographic information systems (GIS) tools and digital satellite imagery combined with more traditional fieldwork methodologies, to obtain detailed, up-to-date and new information about slum life in all slums of six major cities in Bangladesh (including Dhaka).The CMS found that Bangladeshi slums are very diverse: there are wide intra- and intercity variations in population size, density, the percent of urban populations living in slums, and sanitation conditions. Findings also show that common beliefs about slums may be outdated; *of note*, tenure insecurity was found to be an issue in only a small minority of slums.

Funmilayo (2012) examined the relationship between the environmental quality and the social, economic and cultural characteristics of the residents of Apete slum in Ibadan, Nigeria. Using both Content Analysis and Correlation Analysis, results show that there is a significant relationship between the environmental condition and the socio-economic structure of the residents. The study reveals how hazardous location of the slum as well as unhealthy living condition has brought about the spread of disease, criminality and social exclusion among others.

Akinbabijo (2012) carried out a research in some chosen slum residential districts within a 5km radius of the Kaduna South industrial hub in Kaduna using a well-structured sets of questionnaires. In presenting the linkages between social and physical aspects of the environment, Data acquired on collation reveals that 76.7% of the respondents fall within the deprived low income group, while 46.0% and 40.9% opined that low rents and proximity to place of work attracted them respectively to these residential districts.

Das (2014) carried out a study on slum redevelopment strategy using GIS based multi-criteria system. The socio-economic was inserted into Arc GIS 10 software for database generation, analysis and thematic map preparation. These various maps give the detail information of total slum area, building footprints, reservation, land inventory, dwelling units, population density, condition of roads, number of private plots, number of government plots, provision of livelihood spaces, gross area of slum, land price of slum, land ownership and reservation, house quality, number of households, occupational condition, slum profile, slum location, other physical parameters, etc. The Final assessment from the results indicate either the feasible slum area can be developed by in-situ development or there is a provision to be migrated in the zone

However, no study has been carried out on slums of Kaduna State using GIS and Remote Sensing technique and no geo-database has been generated for any of such slums to the best of my knowledge. Also, no study on relationship between slum condition and socio-economics of the residents has been carried out in Nigeria yet as some developing countries such as India, Egypt and the like have done with field observations showing a strong link between the two variables.

Furthermore, very few studies have been carried out on slums of Kaduna state and the existing works are only centered towards the physical conditions of the areas, mode of formation of the slums and impact of such slums on the larger society neglecting the

conditions of the socio-economics of the inhabitants and above all the link between the two variables. Lastly, no study on slums of Kaduna has worked on two opposite slum areas for comparison purpose. Against the backdrop of the above, this research intends to carry out an assessment on the effects of settlement characteristics on the socioeconomics of the inhabitants in two different slum areas of Kaduna south local Government Area, Kaduna State. The study therefore attempts to address the following questions:

a. What is the state of settlement characteristics in the slum areas?
b. What are the socioeconomic conditions of the people in the study area?
c. What is the significance of the relationship between settlement characteristics and socioeconomics of the people?

1.3 Aim and Objectives of the Study

The aim of the study is to determine the effects of slum characteristics on the socio-economic condition of the inhabitants in Kaduna South L.G.A, Kaduna State.The objectives of the study are to:

i. generate a slum geo-database to show the environmental condition and settlement characteristics.
ii. assess the social and economic conditions of the inhabitants
iii. examine the relationship between settlement characteristics and socioeconomics of the people.

1.4 Scope of the Study

The study will work on two slum settlements namely Down Quarters and Gangare located in Kakuri Ward and Tudun Wada South Ward respectively, of Kaduna South LGA of Kaduna State. The study used a questionnaire to capture information on the socioeconomic condition

of the residents as well as shelter characteristics of the areas. It also covered issues on basic facilities/services and environmental hygiene in the areas. The information on this study will be restricted to 2014 only as a result of the massive movement of people into the areas due to the crisis in the state and also the higher cost of housing elsewhere. It will determine variables under the following parameters:

1.4.1 Parameters for Settlement Characteristics

Availability of basic facilities/services (power supply, road network, health care centers, public schools, drainage system), access to improved water, access to improved sanitation (waste management and environmental hygiene) and overcrowding (population size, density, occupancy ratio), housing quality/durability of dwellings (condition of housing facilities), and security of tenure (ownership).

1.4.2 Social and Economic Parameters

Social (education and awareness) and economic (employment and income).

1.5 Significance of the Study

The challenges faced by the poor who reside in slums are widely recognized in international and national programs on sustainable development. One of such is Target 11 of the Millennium Development Goals (MDG) where the United Nations (UN) has made it one of her targets to achieve a “significant improvement” in the lives of at least 100 million slum dwellers around the world by 2020, with the hope of tackling the multiple deprivations of a settlement, including eliminating poverty and mitigating social inequality (UN-HABTAT, 2007).Addressing the challenge of slums is therefore critical for the achievement of this goal Overlaid onto an understanding of slums in Nigeria, is a large amount of emerging information about the social and economic impacts on residents living in such settlements

and the data generated will be of tremendous use to policies and programmes as well as other NGOs.

CHAPTER TWO

CONCEPTUAL FRAME WORK AND LITERATURE REVIEW

2.1 Introduction

This chapter discusses the theoretical and empirical background information to the topic "effect of slum characteristics on the socioeconomics of the inhabitants" in general and in the context of SSA countries. The chapter reviews on some of the concepts, thoughts, and ideas of the formulated problem and relates the concepts with approaches and methods that have addressed similar problem.

2.2 Definition of Slum

Defining slum has been difficult because it is conceived differently amongst countries and even between regions in the same country (Shekhar, 2012; Kohli, 2011). Until 2002, there wasn't a universal or internationally agreed definition of slum regardless of efforts made by NGOs, UN and others in improving the lives of slum dwellers since 1970s (Shekhar, 2012). Many cities of the world tend to define slums differently, although efforts have been made for years to establish objective measures with which to delineate the major problem areas. For example, favela (Brazil), Barrio or tugurio (Latin America), Basti (Bangladesh), Bidonville (France/Africa), Kampung (Indonesia), Katchi abadi (Pakistan), Masseque (Angola), Ghetto (USA), Shantytown, squatter cities, etc. (Cities Alliance for Cities Without Slums, 2000).

In other to come out with a more unified and acceptable definition of slum, the UN Expert Group made a tremendous move and succeeded in coming up with a definition encompassing common problems that spell out such settlements globally. They define slum as

"*A group of individuals living under the same roof, in urban area that lack at least one of the following housing conditions: access to improved water, access to adequate sanitation, access to secure tenure, housing durability, and sufficient living area"*

(UN HABITAT, 2003).

In another context, the United Nation's definition of slum emphasizes on the illegal character of informal settlements. They defined it as:

"1. Areas where groups of housing units have been constructed on land that the occupants have no legal claim to, or occupy illegally; 2. Unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorized housing)." (UN STAT, 2005)

On the contrary, the definition of Mason, & Fraser, (1998) takes the environmental, socioeconomic and living conditions more into account. They describe slum as:

> *"... dense settlements comprising communities housed in self-constructed shelters under conditions of informal or traditional land tenure .... They are a common feature of developing countries and are typically the product of an urgent need for shelter by the urban poor. As such they are characterized by a dense proliferation of small, makeshift shelters built from diverse materials (such as plastic, tin sheeting and wooden planks), by degradation of the local ecosystem (for example, erosion and poor water quality and sanitation) and by severe social problems."*

Other definitions that rather stress out on the condition of such areas include that by Marta (2011) saying that a household is a slum if it lacks one or more of the following characteristics: structural quality and durability of dwellings, access to safe water, sufficient-living area, access to sanitation facilities, and security of tenure. A slum is also viewed as an area that is physically, socially and emotionally harmful to the residents at large and where the social and environmental factors are proven to cause problems and pathologies for the residents (UN-Habitat, 2010). According to Indymedia (2008), slum are breeding grounds for social problems such as crime, drug addiction, alcoholism, high rates of mental illness, and suicide.

2.3 Causes and Effects of Slum Formation

There are many factors that contribute to the continued formation and expansion of slums. Among these are rapid rural-to-urban migration, policy failure, increasing urban poverty and inequality, population growth and globalization. While more people are migrating from rural areas to towns and cities, urban areas are not expanding enough, there are not enough affordable houses, and municipalities are not being able to provide enough accommodation. Therefore, the in-migrants are forced to occupy illegal settlements on marginal lands at the urban periphery, along railways and riversides, or on other hazardous areas that is not suitable for development leading to expansion of slums (Chen, 1998). Not only rural-urban migration, urbanization or population growth etc. that is the cause of slum formation, but also the failure of governments, failed policies, corruption, inappropriate regulation, dysfunctional land markets, unresponsive financial systems etc. to provide low income people with essential public infrastructure and services (UN Habitat, 2003, Zulu, 2011).

It's a common believe by many people that slums are inevitable as long as population growth and rapid urbanization are there. The existence and formation of slums are however neither an inevitable consequence of population growth nor an inevitable result of rapid urbanization (Ooi & Phua, 2007; Tanbencock, 2009). Both urbanization and population growth are bound to happen but are not problems in themselves. Rather urbanization is necessary for the wealth generation and economy of most nations. However, the benefits of urbanization do not come suddenly; they need well-designed public policies benefits that can lead to healthy economies, and ensure equitable distribution of resources. When public policies benefits only political or economic elites, urbanization will almost inevitably result in instability, as cities become unlivable for rich and poor alike (Shackelford & Davis, 2003, UN Habitat, 2010a).

The consequences of slums especially on the inhabitants are mostly resulting from of lack of basic public services and facilities to sustain the slum dwellers. It therefore exposes them to

many problems related to health and income (Alberti & Waddell, 2000). For instance, water-borne diseases, such as malaria, cholera, typhoid, and malnutrition, child mortality are common in slum settlements. There are also wide range of both economic and social problems and psychological burdens on slum dwellers which often leads to homelessness and social exclusion. In economic terms, the inhabitants operate a considerable public and private investments, which remain outside of the formal economy and investment cycles (De Soto, 2003).

In addition, slum dwellers are prone to polluted and hazardous areas, for example, next to toxic plants, on areas threatened by landslip or waste disposal areas, flood, and environmental hazardous and they are vulnerable to risks.

2.4 Characteristics of Slums

The concept of slum changes over time. This is so due to the dynamic nature of urban areas as neighborhoods in cities are subject to changes over time. Some slums are gentrified while some formerly decent areas decay. This is because what is a slum at one point in time may improve and what was once an area of decent living may worsen (Negera, 2012).

United Nations (UN) has emphasized on the multi-dimensional characteristics of slums which includes:

2.4.1 Illegal Tenure/ Ownership of Land (Informal)

UN-Habitat defines slums as contiguous settlements where inhabitants are characterized as having insecure residential status as they have no right to ownership of the land they occupy. According to Srinivas (2003) slums are characterized by unauthorized use of vacant public or private land, illegal subdivision and/or rental of land, unauthorized construction of structures and buildings, reliance on low cost and locally available scrap construction materials, absence

of restrictive standards and regulations, reliance on family labour and artisanal techniques for construction, non-availability of mortgage or any other subsidized finance.

2.4.2 Substandard Housing Units

Housing is regarded as one of the basic human needs ranking second after food and thereafter clothing. It is a pre-requisite for the survival of man (Onibokun, 1985). The World Health Organisation (WHO) describes housing as residential environment which includes the physical structure used for shelter, all necessary services, facilities, equipment and devices needed or desired for the physical and mental health and social well-being of the family and individuals. Slums are characterized by group of people who live in old houses with bad structures located in poor environments where they are exposed to ill health from polluted water. Such houses are without toilet and other essential utilities. Their drains are often filled with refuse deposits, which hamper the free flow of run-offs (Olanrewaju, 2004)

The United Nations Habitat Report (2001) affirmed that a large proportion of the slum dwellers live and work in very poor condition. Apart from the fact that they inhabit many different low quality forms of housing, there are two other basic environmental problems that are evidently noticeable. One is the presence of pathogens in the human environment due to lack of basic infrastructure and services. The second is crowded and cramped living conditions. The report shows that lack of infrastructures, readily available drinking water, sewerage facilities to dispose human wastes hygienically, garbage and refuse disposal facilities as well as lack of basic measure to prevent and provide primary health care to ensure that many debilitating and endemic among the urban poor holds. Such diseases include diarrhea, dysentery, typhoid, intestinal parasites and food poisoning.

2.4.3 Poor Infrastructure

Infrastructure is the prerequisite for the development of any economy even at the local level (Srinivasu, 2013). Transport, telecommunications, energy**,** water, health, housing, and educational facilities are vital to the household life as well as to the economic activity. It is an important pre-condition for sustainable economic and social development. When the provision of such infrastructures are left out by the government and necessary bodies in charge, it eventually leads to deterioration of productivity of subject settlements as well as increase the level of poverty.

Lack of basic services, substandard housing or illegal and inadequate dwellings, overcrowding and high density, unhealthy living conditions and hazardous locations, insecure tenure or irregular/informal settlements, poverty, social exclusion and settlement size (UN-HABITAT, 2008). These physical characteristics makes it possible to identify such settlements from other settlement areas using Very High Resolution (VHR) satellite image data (Hofmann, 2008). It is assumed that the identification of one or more of these indicators in the VHR image could be an indication for locating slum areas.

The socioeconomic characteristics of the inhabitants include high population density, economic deprivation, and high number of broken families, high unemployment, and high level of illiteracy among others (UNDP, 2009). The fact that they lack all these conditions and the necessity for employment to generate an income to satisfy their needs makes this informal urban environment a fertile ground for illegal informal activities including violence and crime (UN-HABITAT, 2007). Hereof, slums encompasses, to various extents, bad environmental condition (prone to hazards) which affects the inhabitants' livelihood and vice versa (Niebergall, 2008).

2.5 Links between Socio-Economics and Slum Characteristics

A study was carried out by Srinivasu in 2013 using growth theories by empirical evidences to establish the relationship between infrastructure and economic growth. The research came to the conclusion that infrastructure goes a long way in poverty reduction in the Indian context. Infrastructure plays a crucial role in promoting economic growth and thereby contributes to the reduction of economic disparity, poverty and deprivations in any given community. Greater access of the poor to education and health services, water and sanitation, road network and electricity is needed to bring equitable development and social empowerment. Infrastructures make significant contribution towards growth by increasing the factor productivity of land, labour and capital in the production process, especially safe drinking water and sanitation, basic educational facilities strongly influence to the quality of life of the people.

Infrastructure refers to all basic inputs into and requirements for the proper functioning of the economy. There are two generally accepted categories, namely, economic and social infrastructure. *Economic infrastructure* is also, at a given point in time, part of an economy's capital stock used to facilitate economic production, or serve as inputs to production (e.g. electricity, roads, and ports). This helps to produce items that are consumed by households (e.g. water, sanitation and electricity).

Social infrastructure, on the other hand, encompasses services such as health, education and recreation. It has both a direct and indirect impact on the quality of life. Directly, it enhances the level of productivity in economic activities, indirectly, it streamlines activities and outcomes such as recreation, education, health and safety. The indirect benefit of improved primary health care, for example, is improved productivity, which in turn leads to higher economic growth and real incomes. Social infrastructure also facilitates investment in human

capital that ensures better utilization by some of the economy's physical capital stock and thereby raises the productivity of the workforce.

According to the World Bank (2000), "poverty is pronounced deprivation in wellbeing", where well-being can be measured by an individual's possession of income, health, nutrition, education, assets, housing, and certain rights in a society, such as freedom of speech. Poverty is also viewed as a lack of opportunities, powerlessness, and vulnerability. This broadens the definition of poverty to include hunger, lack of shelter, being sick and not being able to see a doctor, not being able to go to school and not knowing how to read, not having job, fear for the future, living one day at a time and losing a child to illness brought by unclean water. Poverty further entails lack of representation and freedom. Indeed, the poor themselves see powerlessness and voicelessness as key aspects of their poverty (Narayan et al., 2000).

2.5.1 Impact of Infrastructure on Economic Development at Community Level

A recent body of research confirms the importance of infrastructure service provision to sustainable development. The World Bank's (1994) *World Development Report* landmark study on infrastructure highlighted the critical role of infrastructure in the development process. The evidence in the World Bank report on the vital role of infrastructure services in growth has been reinforced by subsequent research, especially that focusing on Africa's economic performance (Ndulu, 2006). Not only does the development of infrastructure services contribute to growth, but growth also contributes to infrastructure development, in a virtuous circle. Moreover, investments in human capital and in infrastructure interact, each increasing the returns to the other.

DFID (2002) identified the various channels through which investment in infrastructure can contribute to sustainable growth, as follows:

- Reducing transaction costs and facilitating trade flows within and across borders.
- Enabling economic actors − individuals, firms, governments − to respond to new types of demand in different places;
- Lowering the costs of inputs for entrepreneurs, or making existing businesses more profitable;
- Creating employment, including in public works (both as social protection and as a counter-cyclical policy in times of recession);
- Enhancing human capital, for example by improving access to schools and health centres;
- Improving environmental conditions, which link to improved livelihoods, better health and reduced vulnerability of the poor.

2.6 Remote Sensing and GIS in Slum Mapping/ Analysis

From a methodological point of view, the challenge lies in having appropriate methods to detect and monitor the spatial behavior of informal settlements reliably (Lemma, 2006; Muli, 2012). Regarding available data sources, remotely sensed imagery from satellites therefore offers a well suited data source and with the use of an adequate method for analyzes, a great deal of information is put forward. In an ideal case, these methods can be applied without the need of expert knowledge and human interaction. In practice easiness of use and the degree of automation for information extraction from imagery depends on the data used and the phenomena to be extracted from the image. In this context, informal settlements show a relatively high inner-structural heterogeneity which leads to particularly hard describable patterns in the image. This hampers the generation of an automated detection process which is easy to use. High-resolution satellite imagery has become more readily available over the past few years. This category of satellite commonly includes IKONOS (1999), EROS (2000), QuickBird (2001), SPOT-5 (2002), ALOS (2006) and GeoEye-1 (2008). Urban geographers

have recognized the potential of this information for various applications, including updating of maps, extraction of urban features such as road networks and other engineering and social infrastructure, generation of urban models, land-use mapping, and a wide range of other possible applications (Voipe and Rossi). It has been noted that GIS packages are utilized as an instrument for applying demographic and related statistics for the analysis and planning of socio-economic development.

Despite its potential application Herald et al. (2006), noted that remote sensing remained an underutilized data source in urban studies. The use of high-resolution remote-sensed satellite data in developing countries is sparser, although examples are available as discussed below;

2.6.1 Methodological Approaches on Slum Identification, Mapping and Socioeconomic Analysis

There have been a number of studies discussing identification and mapping of slum settlements. Satellite imagery has the advantage of providing the physical coverage of urban land. However, choosing the appropriate method to collect up-to-date and reliable spatial information about slums settlements is challenging. Several approaches are used in urban areas to extract spatial information from spatial data. For example, Hurskainen and Pellikka, (2004) integrate RS and GIS methods for change detection of informal settlements using multi-temporal aerial photographs in Voi, SE-Kenya. Stasolla and Gamba (2007) introduced a semi-automatic procedure to detect informal settlements in arid environments exploiting spatial patterns. Abbott (2003) developed GIS based spatial data management framework for informal settlement upgrading in South Africa. Similarly, Sartori *et al*. (2002) used GIS to monitor the evolution of informal settlements and population estimation from aerial photography and satellite image in Nairobi, Kenya.

The census-based approach uses data collected through census surveys as a schedule of deprivations/poverty mapping. Census data contain information on the inhabitants residing in a country aggregated to little areas to safeguard specific privacy.

The participatory approaches require mapping the details of everyday settlements at individual or household stage with the cooperation of slum-dwellers (Joshi *et al.,* 2002). Hasan (2006) used this approach to study and map infrastructure details of everyday settlements in Karachi. Karanja (2010) presented a full enumeration of homes and slums in Kisumu, Kenya. Participatory approaches can help to create spatial and non-spatial information in the shape of thematic GIS layers that offer a supplement to socio-economic surveys and feed into slum-related policy growth and planning.

Advance Remote Sensing based approach uses image processing practices to map slums from satellite imagery. Remote Sensing provides spatially disaggregated information with high temporal uniformity that may help quick monitoring and successful intervention of slums by local authorities. Jain *et al.* (2005; 2007) proposed the image processing for digital classification and also described the change in slum patterns over time and space.

They include data on social, financial and habitat/infrastructural aspects at the particular level of an enumeration device (Baud *et al.,* 2008; Kohli *et al.,* 2011).

Choosing one method over another is not easy and depends on data availability and purpose of the study. Also, urban space, by its very heterogeneous and dynamic nature, becomes more complex to study by the presence of many objects different by their shape, direction, size, roof material depending on the type of habitat (Busgeeth, *et al*., 2008). The combination of semantic information certainly improve the quality of image classification and will make easier the identification of the slums among other objects with similarities and which can lead to confusion in interpretation. Recently, OBIA approach has been employed for detecting and

mapping slum settlements through the integration semantic information (Benz *et al*., 2004; Hofmann, 2001; Nobrega *et al*., 2006) hence its adoption for this study. This approach will be explained further in the following section.

2.6.2 Object Based Image Analysis

Although pixel based classifiers are simple and economical, they are not capable of exploiting semantic information like shape, pattern, texture, neighborhood context, etc. particularly in urban system context where many features have similar spectral reflectance. In addition, important information for image understanding is not represented in single pixels but in meaningful images objects and their mutual relations (Blaschke, 2003). OBIA instead does utilize spectral and contextual information in an integrative way (Blaschke, 2010). By looking at VHR images it is possible to see several features that can be described based on their characteristics. For example, although river and lake have similar spectral values they can be identified based on their form and shape; informal settlements have irregular patterns that could distinguish them from formal settlements without much effort. One way to make use of this semantic information is segmenting the image into objects that represent regions of similar pixel prior to the classification (Campbell, 2002). The effect of salt-and-paper (reduction of noise) can be also overcome by segmentation followed by classification. Accordingly, the work step process of the same classification tasks could be automated to a certain extent, for working on similar image. In addition, the achieved classification results can be exported to GIS in the form of vector layers for further analysis and visualization (Shackelford & Davis, 2003). Generally, OBIA can give the benefit of classification scheme or hierarchical network that can be exported and reused on more than one data set having similar context (Niebergall, *et al.*, 2008). Similarly, OBIA has advantage of improving the quality of classification which

CHAPTER THREE

STUDY AREA AND METHODOLOGY

3.1 Introduction

This chapter comprises the method adopted, the analysis, study area, geology and relief, soil and vegetation, demography etc.

3.2 The Study Area

3.2.1 Location

The study area is located between Latitude10^0 25′N -10^0 37′ N and Longitude $7^0$25′E-$7^0$30′ E (NGA, 2013) Kaduna South has an area of 59km^2 and is bordered by Kaduna North and Chikun LGAs respectively (See Figure 3.0)

The two selected slum settlements are Down Quarters ($10^0$28′ to $10^0$29′N and longitude $7^0$24’ to $7^0$25’E) and Gangare (10^0 27′ to 10^0 30′N and 7^0 24’ to 7^0 24′E) respectively. Down Quarters is bordered in the east and south by Kakuri Industrial area, it is separated from Kinkino Settlement by a tributary of river Kaduna to the West and bordered by uninhabited vegetative area to the north (see figure 4.1) while Gangare is bordered by Tudun Nupawa and Tudun Wada central area (See Figure 4.2).

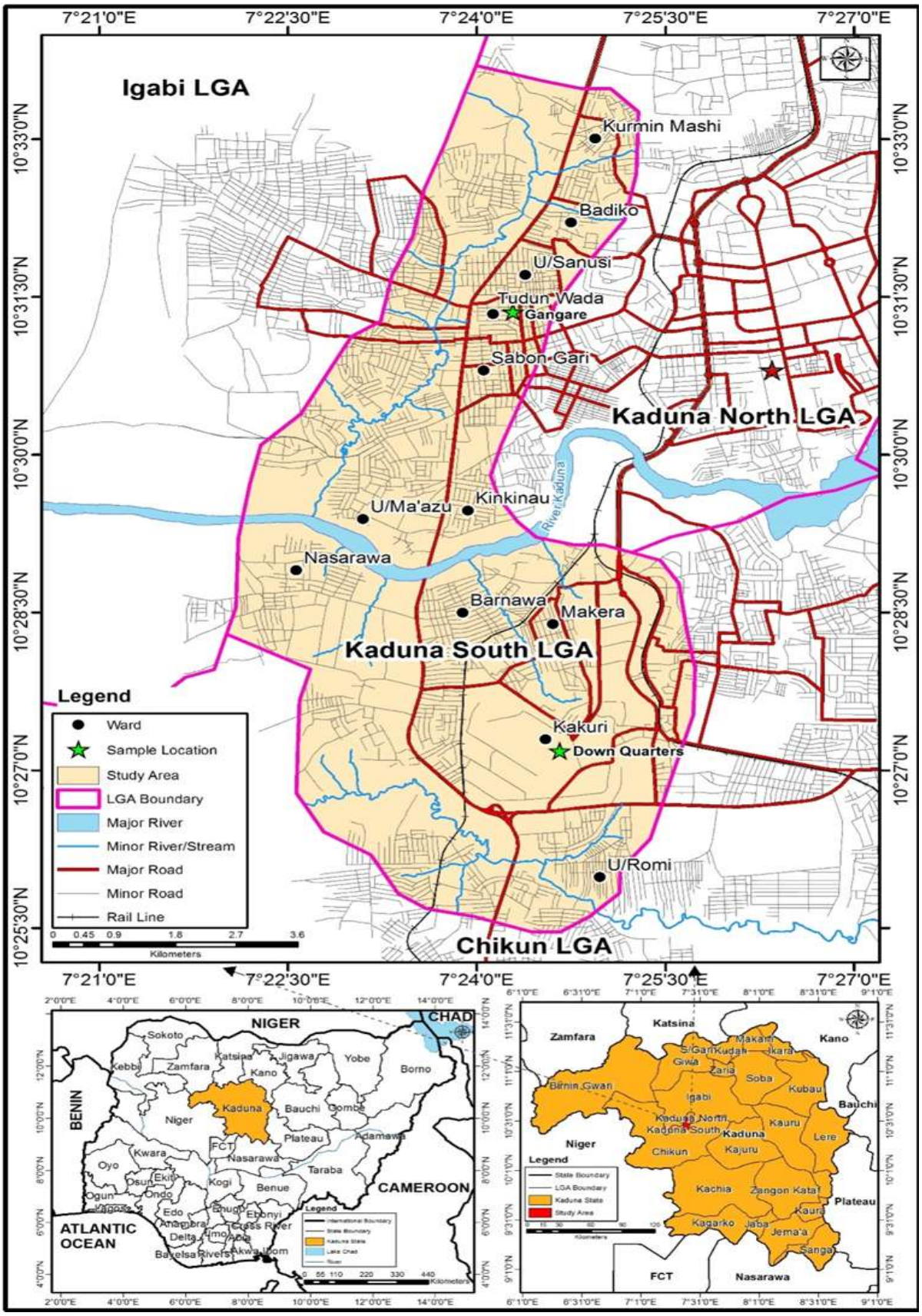

Figure 3.1: Map of Kaduna South LGA (The Study Area)
Source: Modified from Kaduna State Administrative

3.2.2 Geology and Relief

Kaduna south LGA lies on gently undulating plain with a land ranging from 450 to 650meters ASL (KADSEEDS, 2014). In some parts of the city there are outcrops of resistant granitic rocks which are as the result of weathering of previously existing Precambrian rocks that have been exposed to agents of erosion. These erosive activities resulted in outcrops of rocks forming inselbergs and huge rocky land. Kaduna state is endowed with mineral deposits of clay, amethyst, tin ore, graphite, gemstones etc (KADSEEDS, 2014).

3.2.3 Drainage

Based on the geology of Kaduna, attempt has been made to classify Kaduna into three (3) geomorphic areas namely: inter mountains and moderate relief areas. The major drainage in the state is the river Kaduna. Though the river is perennial, it is subject to great seasonal fluctuation in volume. There are rapids and cataracts that make water transportation in the river dangerous. The tributaries that feed the river include streams such as Kigami and other smaller rivers like Kubanni in Zaria. The river encourages fishing activities – though on a small scale- and enhances cultivation during the dry season (KADSEEDS, 2014)

3.2.4 Climate

The climate of the area is tropical continental characterized by a well-defined wet and dry season. The dry season is influenced by north- easterly trade wind (dry and cold harmattan wind) from the Sahara and the south – easterly trade wind influences the wet season.

The area is characterized by relatively wide and rapid changes in temperature and humidity with an exception of the harmattan period. The dry season extends from the month of November until April with the harmattan at its peak in the months of December and January. The month of April is usually the hottest. The rains begin in May and last until October. The

rains fall heavy with high intensity and short duration. Rainfall amount ranges between 1200-1500mm (KADSEEDS, 2014)

3.2.5 Vegetation

The area is located in the guinea savannah zone which comprises of shrubs, woodland and patch land. The grasses are short and the trees are of medium height. The vegetation is a remnant of the original vegetation which has been distorted by man. Pockets of "orchard bush" occur close to the banks of the river Kaduna representing the remnants of the exploitation of the original woodland. Around the settlements exotic species of trees are found. These trees are as a result of the planting activities of residents over the years. Examples of such trees are mango, paw-paw, guava and a variety of flowers (KADSEEDS, 2014)

3.2.6 Soils

The soils in the area are generally similar to those found in the "northern plains" and are lateritic in origin. Some of the soils found here are however formed from draft deposit. The covering material may be 4.3 meters deep or more. The soils are said to be particularly good for growing cotton.

The soils are mainly ferruginous in origin derived from the basement complex rocks. These soils develop on well drained sites. Hydromorphic and alluvial soils are also common. The hydromorphic soils are of special importance too; they are fairly rich in nutrients and have enough water supplies which persist in the dry season. Many parts of the Fadama are therefore used for high moisture demanding crops like rice, cocoa yam, cassava, sugar cane and vegetables (KADSEEDS, 2014)

3.2.7 People, Population and Culture

The population of Kaduna South LGA consists of people from different parts of Nigeria and other parts of the world. Ethnic groups like Koro, Jaba, Kataf, Bajju, Yoruba, Hausa, Igbo, Tiv, Nupe and several others predominate the area. Christianity and Islam are the major religions in the area with a few adherents of traditional religions which have been greatly depopulated due to invasion of Islam and Christianity (KADSEEDS, 2014).

Majority of the residents in Down Quarters slum engage in subsistence farming as their main occupation apart from which they engage in other secondary activities that are mostly informal in nature. Informal jobs found in the area include street trading (selling food, drinks, and provision), food processing, services (shoe-cleaning, unskilled labour in industries) and local crafts. Most of the people are underemployed and live at a substance level (Field Work, 2014).

Gangare has most of her inhabitants to be labourers. Others are basically cobblers, hunters, barbers, nail cutters, blacksmiths, farmers and very few as civil servants (Field Work, 2014).

3.3.2 Background History of Slum Areas

Down Quarters: This settlement was initially an unplanned area under the ownership of the Railway Corporation. Later on decision was made to use it in temporarily providing accommodation for the laborers of the Railway industry particularly bitters, slippers repairers and other laborers. Few storey building was raised under the supervision of the estate department to give out to these staff free of charge with the primary objective of maximizing their proximity to the industry to facilitate service.

When the Railway Property Management Company Limited (RPMCL), came into existence and took over the responsibility of all property belonging to the railway corporation, it started taxing the staff for apartments in form of rent, subsequently non-railway workers started

raising their structures in the area. The RPMCL took no action about the development, but rather imposed same tax on such people just as the other staff of the Railway Corporation.

Soon, there was massive invasion of the area by outsiders who continually build substandard houses haphazardly to reside. A resultant fitly and disorderly settlement was produced with absence of drainages and good roads. The settlement finally became overcrowded by the poor who sees such as an opportunity to build shelter over their heads thereby constructing extremely substandard houses mostly without fence, toilets and kitchen, and buildings made of local materials.

The unfortunate development later became very disturbing and a proposal was made by RPMCL for demolition of the uninvited buildings. A protest by the affected inhabitant rendered the decision dormant. Today, this settlement is believed to be one of the epicenters of criminals and also very popular for local sex trading in the state (Moshood, 2009).

Gangare: This settlement lies on an unplanned and abandoned land within Tudun Wada area. The creation of Tudun Wada was a deliberate exercise carried out by the colonialist in order to separate Africans from the white interims and their social amenities (Salau, 1992). The settlement was developed at the out skirts of the township as a camp for labours. By the end of 1920, this small town had over a hundred labourers which later expanded to include people of other occupation, such as barbers, nail cutters, cobblers, hunters, blacksmiths etc. In the 1960s, the development of new settlements started within the area of which Gangare is one. (Salau, 1992)

3.5 Methodology

The methodology of this study will include; reconnaissance survey, types and sources of data, data processing and data analysis.

3.5.1 Reconnaissance Survey

A reconnaissance survey was carried out in the study area. This was aimed at getting the researcher acquainted with the general knowledge of the study area. This knowledge is very useful for the selection of training area before and after classification.

3.5.2 Types and Sources of Data

3.5.2.1 The Primary Sources of Data

- Questionnaire: The questionnaire will be divided into three (3) sections viz: social attributes, economic attributes, and settlement characteristics. Each section will elucidate information on the subject heading. Direct observation will also be used to validate claims and responses on physical, environmental and housing conditions of the study area.

3.5.2.2 Secondary Sources of data

i. Quickbird (high resolution satellite imagery, 2010): 4-band (Red, Green, Blue & Near Infra-Red).

ii. Topographical map of Kaduna metropolis at a scale of 1:50,000 will be acquired from the Ministry of Lands and Survey, Kaduna State.

iii. Street guide map of Kaduna metropolis 2010 will be acquired from the department of Topographic Science Kaduna polytechnic, Kaduna State.

iv. Global Land Cover Facility (GLCF)

3.5.2.3 Materials for Literature

The secondary literature to be used includes:

Published materials from journals, textbooks, government publications and gazettes, theses, reports and web references.

3.5.2.4 Hardware and Software

Hardware: high speed memory Samsung laptop, A hand held Germini 20 GPS, Coloured printer, CD – ROM, A3 Scanner, and a Mouse would be used.

Software: ArcGIS 10.1 would be used for data processing/analysis and Microsoft Excel, SPSS and for analysis.

3.6 Sampling Design and Technique

A total of 9 slums are chosen on the basis of their informal nature (absence of legal right to existence) in respect to the Kaduna State Master Plan, was available from Max Lock Consultancy. This list is used as sampling frame to choose the study areas (see table 3.1).

Table 3.1: Kaduna South Local Government Area's basic statistics for informal settlements (slums)

S/N	Area Name (Formal)	Land use type	Area Ha.	%	Plots per Ha.	Mean POP.
1	K/ Mashi	HD informal	113.7	85	31	28,460
2	TW W ext. SE	MD informal	173.2	20	16	5,265
3	TW W ext. S	HD informal	234.9	95	16	33,920
4	G/Rimi	HD informal	155.8	95	19	26,715
5	TWE S O	HD informal	334.2	40	20	25,400
6	Railway Quarters	HD informal	25.6	100	25	6,080
7	Barnawa E	HD informal	239.1	100	17	38,615
8	Abuja Rd W ext.	MD informal	309.2	40	12	14,100
9	Abuja Rd W	MD informal	157.3	60	14	12,555

Source: Max Lock Consultancy, 2008)

3.6.1 Sampling Technique

In order to take representative sample slums, stratified random sampling technique was used to arrange the wards with slum areas in alphabetical order. The list of informal settlements in Kaduna south LGA revealed that slum units varied from High Definition (HD) informal to Medium Definition (MD) informal. For the study, those with HD informal type of land use were picked (see table 3.2).

Table 3.2: Selected Wards for the Study

S/N	Name of ward	Name slum	Land use type
1	Badiko	Rimi	HD informal
2	Barnawa	Barnawa E	HD informal
3	K/mashi	Kurmi	HD informal
4	Kakuri	Railway Quarters	HD informal
5	Tudun wada	TW W ext. S	HD informal
6	T/W South	TWE S.O	HD informal

It is assumed that the socio-economic characteristics of the inhabitants are affected by the following factors:

- Ethnic composition of the area (homogenous/heterogeneous)
- Basic facilities and services available within the area

Thus, the slums were split into two groups representing the nature of ethnic composition of the area andthe systematic sampling method will be employed by drawing a list of the subject wards when arranged in alphabetical order (see table 3.2).

To get the sample slums, every second (2^{nd}) numbered ward will be selected (See Table 3.3) Systematic random sampling technique will be used hence; every 5^{th}house will be selected for questionnaire administration.

Table 3.3: Selected Slums (Study areas)

S/N	**Slum name**	**Nature**
1	Gangare	Homogenous
2	Down Quarters	Heterogeneous

The selected slum areas were assigned a number of 172 questionnaires proportionate to the projected population to 2014 using the 2008 population data (equation 2) by the Max Lock

survey for the review of Kaduna State master plan (Max Lock, 2008) as presented in table 3.4. The projected area population is derived from the formula in equation 1:

The projected area population for the study is derived from the formula: Pr = Po (1 + r/100) n

Equation 1: Pr = Po (1 + r/100) n

Where P_r = required population (X)

P_o = initial population (31,480)

r = population growth rate (3.2%)

n = time interval (2014-2008=6 yrs.)

Table 3.4: Selected slums and Proportions of respondents

S/N	Selected areas	Population of area in 2008	Projected population 2014	Number of Questionnaires
1	Dan Quarters	6,080	6,469	33
2	Gangare	25,400	27,025	139
	Total	31,480	33,494	172

Using the Sample Size Formula by Krejcie and Morgan:

Equation 2: s = X 2NP (1− P) ÷ d 2 (N −1) + X 2P (1− P).

s = required sample size.

X2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size (33,494).

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

The sample size for the study therefore is 379

The random sampling method is used for the purpose of questionnaire administration at each of the sample area. Both household heads and youths is picked to answer questionnaires.

3.6 Method of Data Analysis

Objective 1: Slum Geo-database generation: Geo-database was in ArcGIS 10.1 having the 5-slum indicators as features of the database. The entities (features) are: dumpsites, drainages, boreholes, wells, schools, health care centers, road networks, power lines, building units etc. Boreholes will have the following: condition, depth, date of construction, etc. Schools will have the following attributes (fields): picture, physical condition, number of students, etc. Health care center will have the following: time of service provision, number of health workers etc. drainages will have the following: picture, condition, type etc. Same will apply to all other features of the database. The coordinates of each entity was collected using field-based GPS survey. Coordinates was typed into and excel sheet and imported to ArcGIS. High resolution satellite imagery of Spot 8 will serve as a base map. At the end of the database creation, the picture of each feature could be queried and viewed using the hyperlink tool.

Objective 2: To examine the socio-economic characteristics of the residents in the selected area: General observation and empirical data was used to assess social and economic features on the basis of four variables: Income; employment; education; and awareness. Data on each of the variables were derived from the answered questionnaires. Content analysis and the Statistical Package for Social Scientists (SPSS) were used to analyze variables. The frequency distribution was used to show results of the assessments for the socio-economic characteristics of the respondents.Tables and figures will also be used to display information.

Objective 3: To determine the correlation between settlement characteristics and socioeconomics. The Pearson correlation analysis was used to show significant relationship between settlement characteristics and socioeconomics.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The aim of this study forms the basis for all the analysis carried out in this chapter. The results from the analysis is presented and discussed in this chapter.

These results will come in four (4) subthemes: the thematic maps of slum areas generated from high resolution satellite imagery (SPOT-8); the geo-database of slums; the settlement and socio-economic characteristics of slum areas, and the testing of hypothesis. Results are presented using maps, screen-shots, chats, tables and figures.

The absent of a base map from for the study areas made it necessary develop thematic maps for the study. Quickbird (High Resolution Imagery, 2010) was used alongside a topographic map and a street guide map of the metropolis. Using ArcGIS 10.1 software, the imagery was geo-referenced and the important entities such as buildings, roads, hospitals, schools, dump sites, railway line etc were digitized and represented on the legend. The maps generated for each study area was used for the survey and to help guide questionnaire administration.

4.1 Thematic Maps of Study Areas Generated From Satellite Imageries

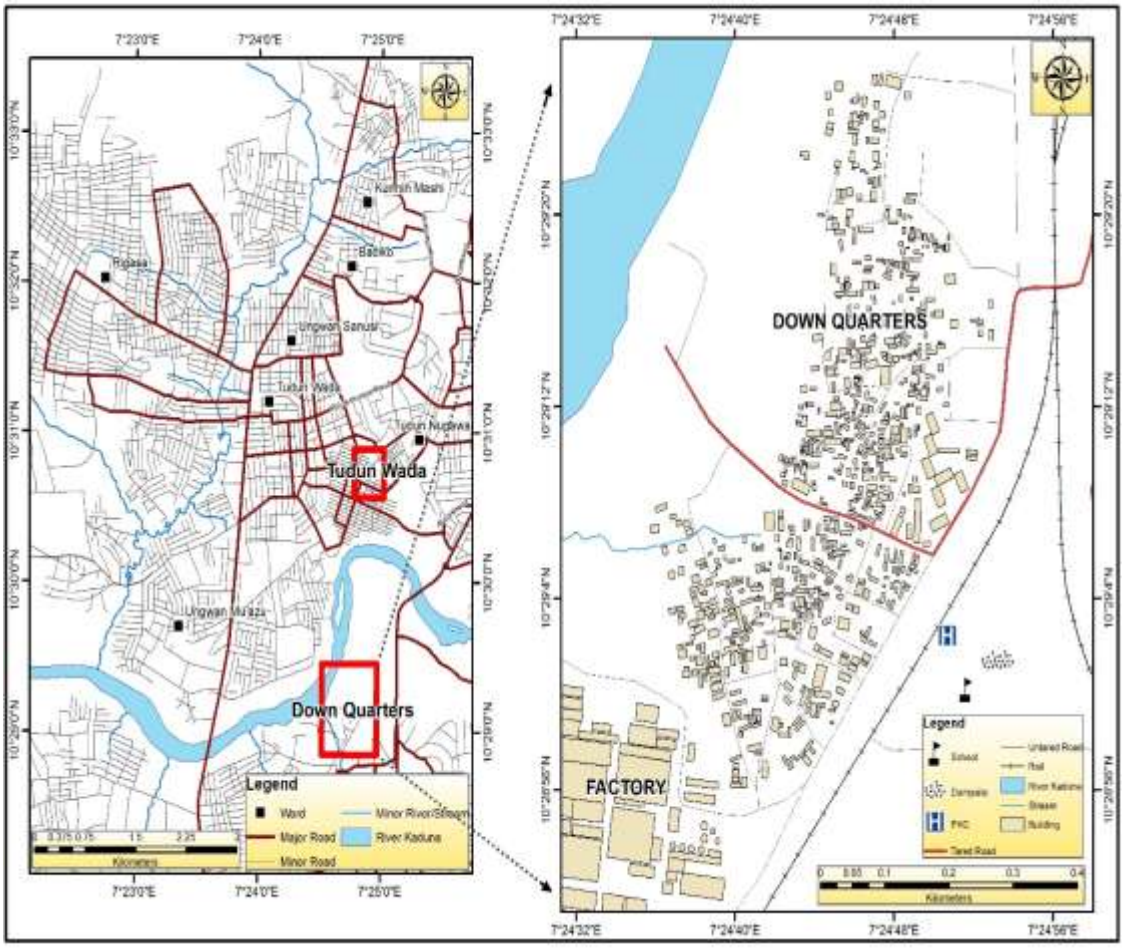

Figure 4.1: Map of Down Quarters

Source: Field work, 2014

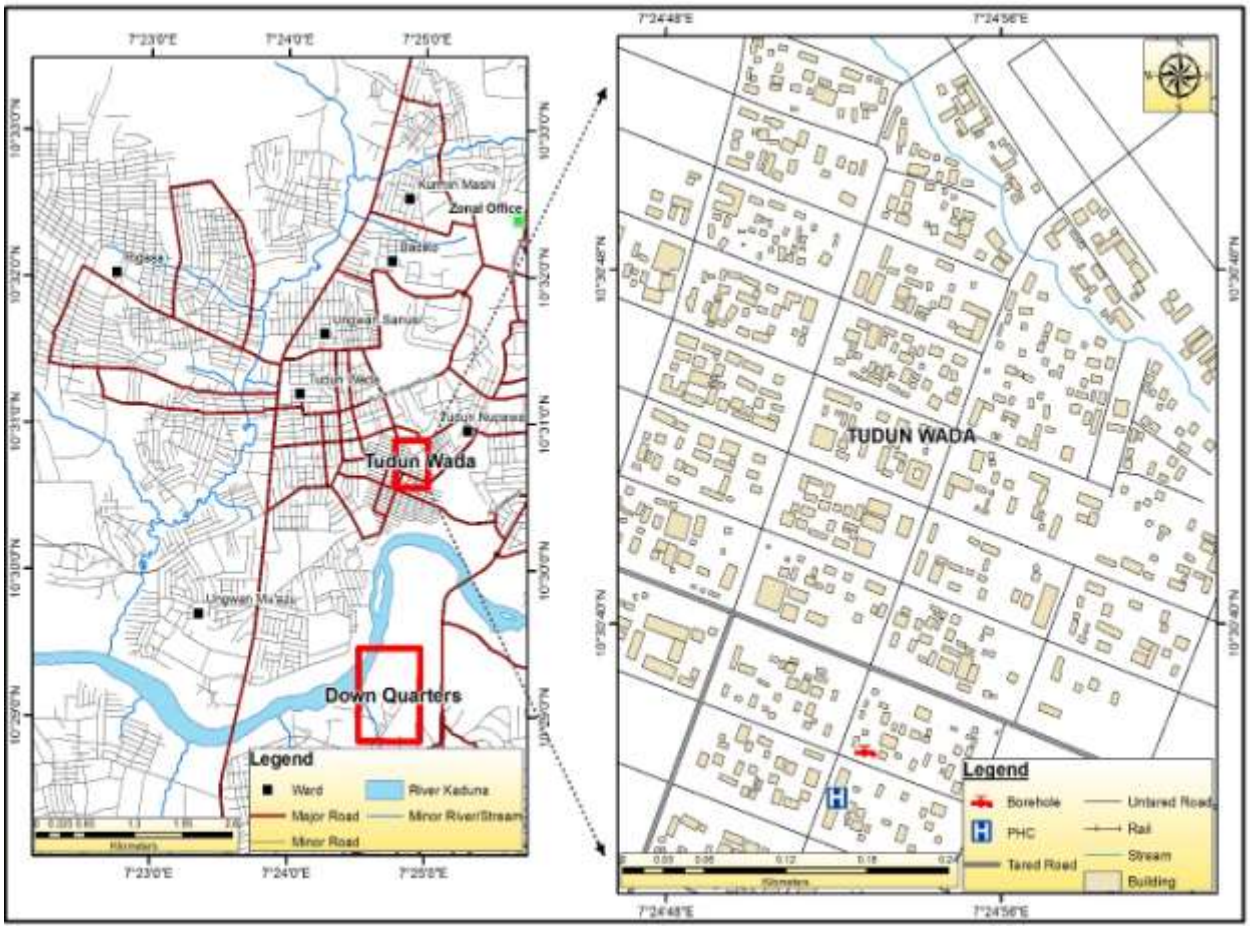

Figure 4.2: Map of Gangare
Source: Field work, 2014

4.2 Development of Geo-Database of Slums

The characteristic of a sample building in Down Quaters slum. The attribute table gives the following information on the sample building: material for construction, number of people in the house, occupancy ratio, general assessment of housing facilities, nature of usage and size of building. The general condition of housing in the settlement from the assessment of the samled ones is considered very poor as a result of absence of housing facilities such as toilet, bathroom, kitchen, drainage, and the poor condition of the few available ones.

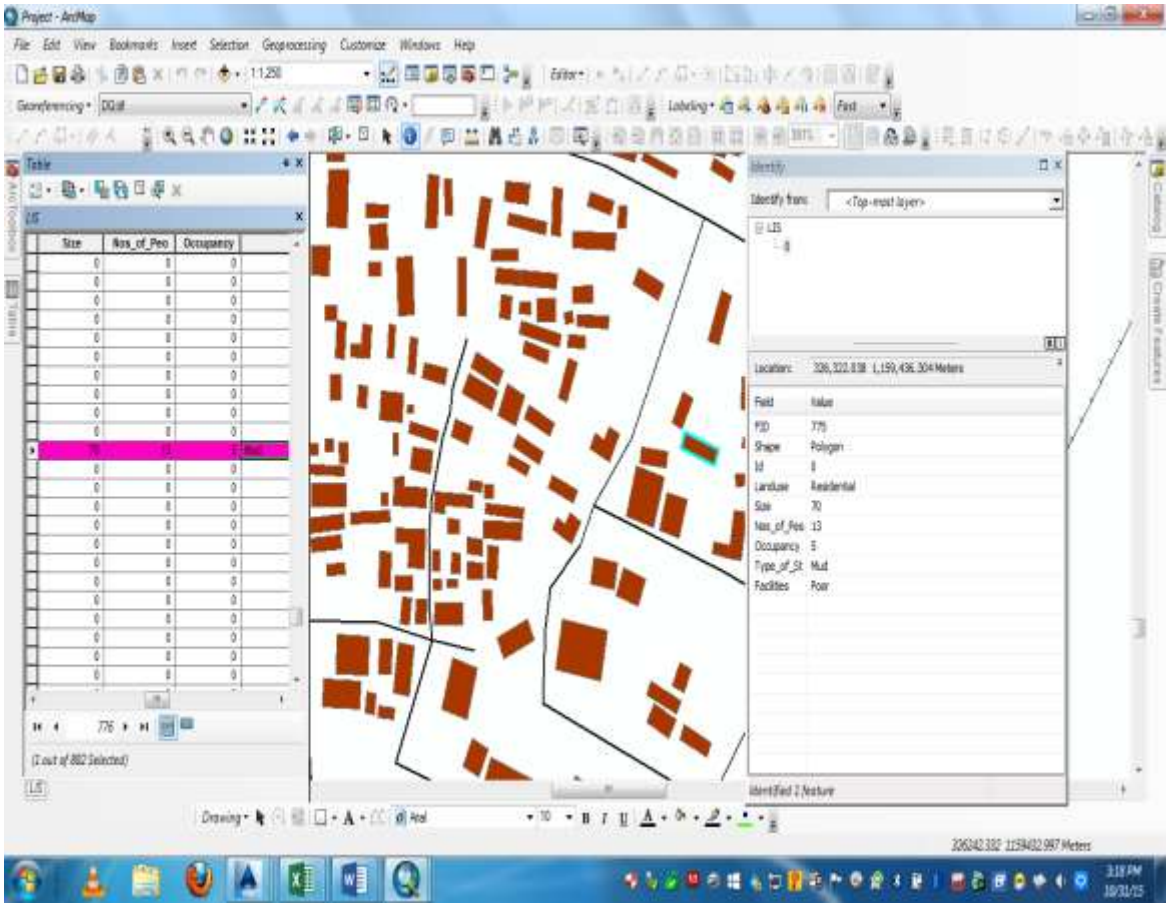

Plate 4.1: Geo-database Showing Sample Building and Attribute Table (Down Quarters)

Source: Field Work, 2014

Table 4.1: Attribute Table for Samle Building in Down Quaters

Building	Charactersistics
Landuse	Residential
Size	Small
Density per square meter	Very High
Room density	High
Type of structure	Mud
Facilities	Poor

Source: Field Work, 2014

The nature of waste disosal in the settlement is very disturbing as pockets of dump sites are found all over the area. This sample dump site lies along a major road in the area thereby causing hinderance to movement of people and vehicles. The quantity of waste is another disturbing factor as it causes a lot of environmental pollution which in turn affects the health of the inhabitants.

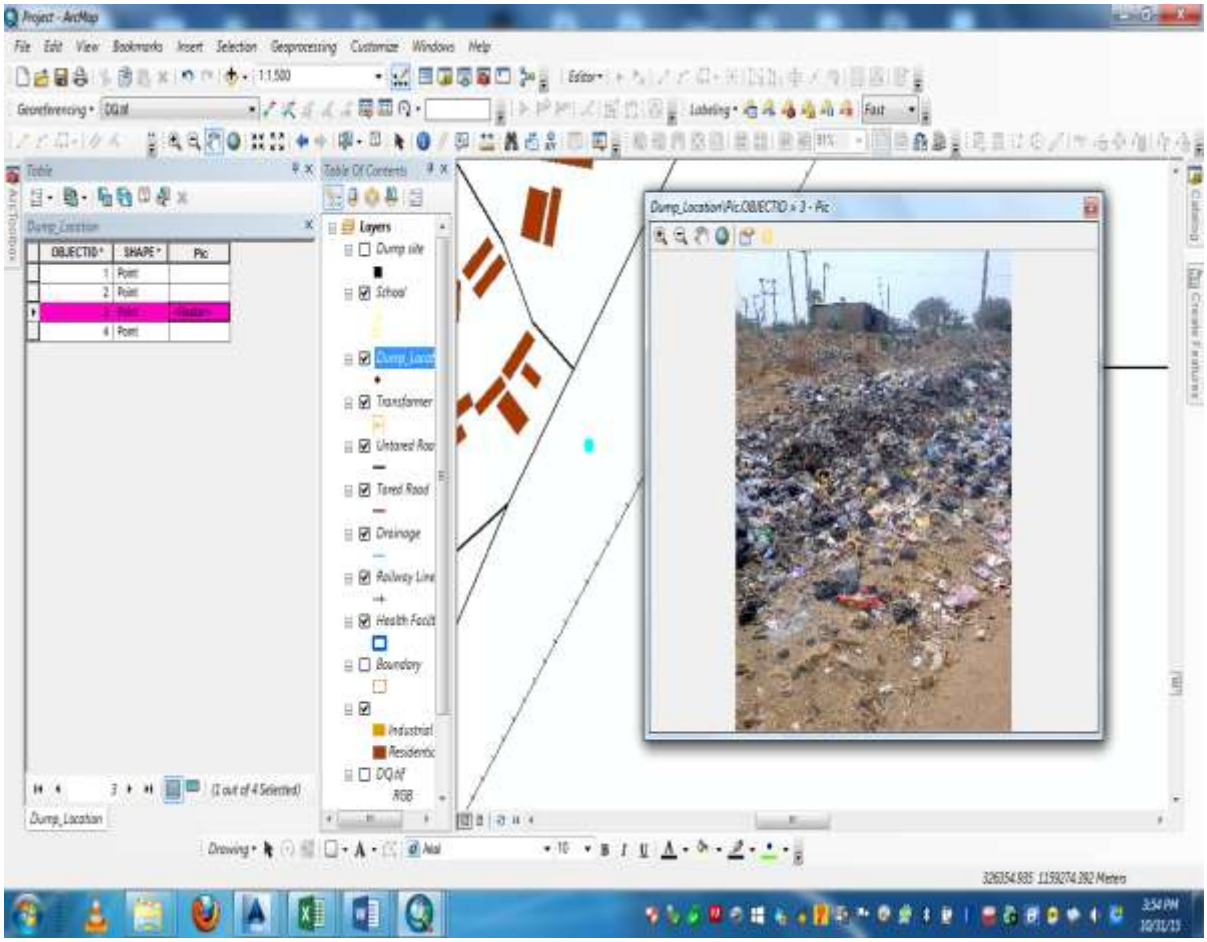

Plate 4.2: A Sample Waste Disposal Site in Down Quarters Slum
Source: Field work, 2014

Table 4.2: Attribute Table

Dump site	Charactersistics
Location	Along main road
Size	Large
Condition	Very Poor

Source: Field Work, 2014

The Characteristics of a health facility at Down Quarters as the attribute table gives the following information on the sample primary health care center: number of doctors, number of nurses, general assessment of facilities, general assessment of health service.The sample hospital is the only public health care facility in the area and has only a doctor to 2 nurses at a time according to the resondents. The condition of facilities in the hosital is very poor as they are short of drugs and other necessary equiments and the available ones are in bad shape.

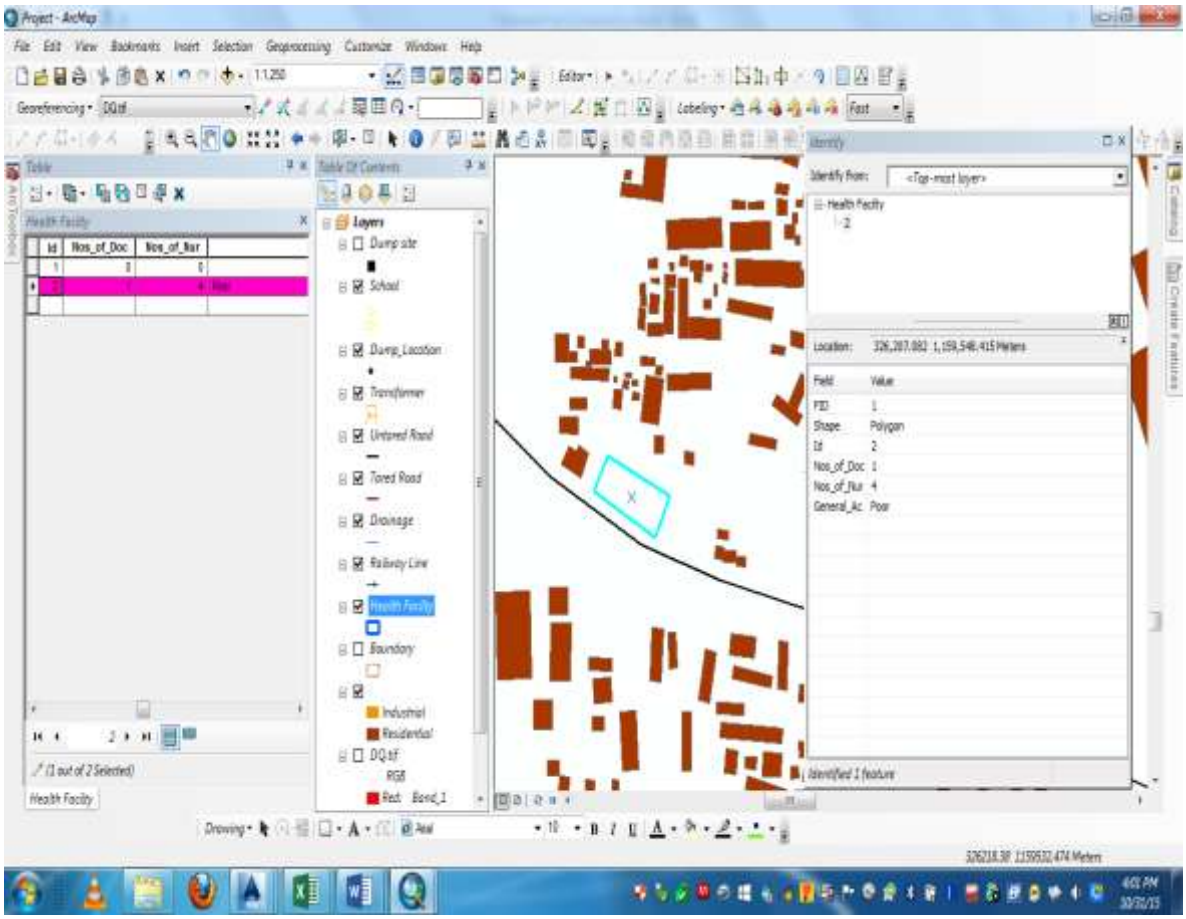

Plate 4.3: A Health Facility at Down Quarters
Source: Field work, 2014

Table 4.3: Attribute Table for Health Facility in Down Quarters

Health facility	Features
Availability of doctors	Poor
Availability of nurses	Poor
Facilities	Poor
Health services	Poor

Source: Field Work, 2014

The characteristic of a sample building in Gangare slum and the attribute table gives the following information on the sample building: material for construction, number of people in the house, occupancy ratio, general assessment of housing facilities, nature of usage and size of building. The general assessment of housing condition in Gangare is equally poor but is at the same time relatively better than that of Down Quarters. This is because the proportion of good houses to bad ones can be termed 1:3 therefore one quarter of them are good. Another factor is housing facilities are much more available in this settlement and are as well in better condition to those in Down Quarters. The density of people per room (overcrowding) is however worse in Gangare due to high population concentration.

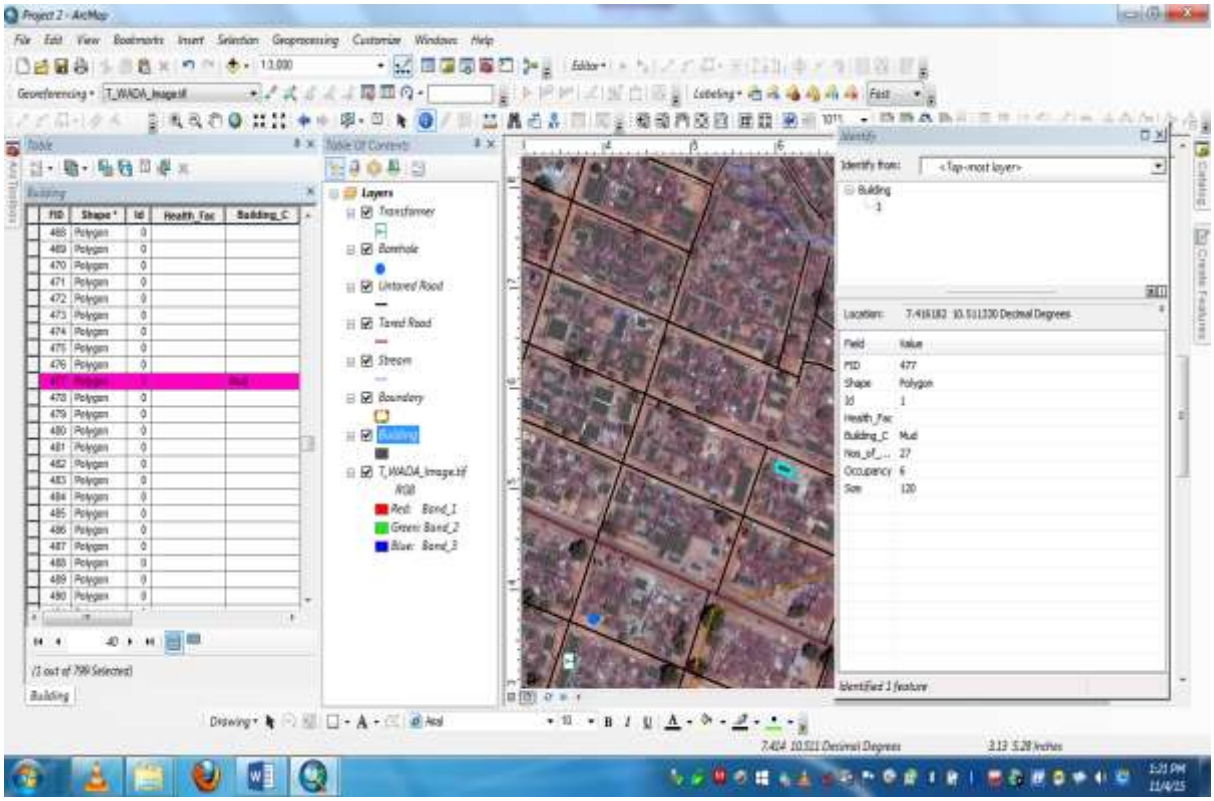

Plate 4.4: A Sample Building in Gangare
Source: Field work, 2014

Table 4.3: Attribute Table for Building in Gangare Slum

Building	Features
Material for construction	Mud
Density per square meter	Very High
Room density	Very High
Housing facilities	Fair
Nature of usage	Residential/Commercial

Source: Field Work, 2014

The characteristic of a sample waste disposal site in Gangare slum and the attribute table gives the following information on the dump site: nature and location of dump site. This sample dump site lies along a major drainage system in the area thereby preventing free flow of liquid waste. This esecially in the rainyseasons leads to floods.

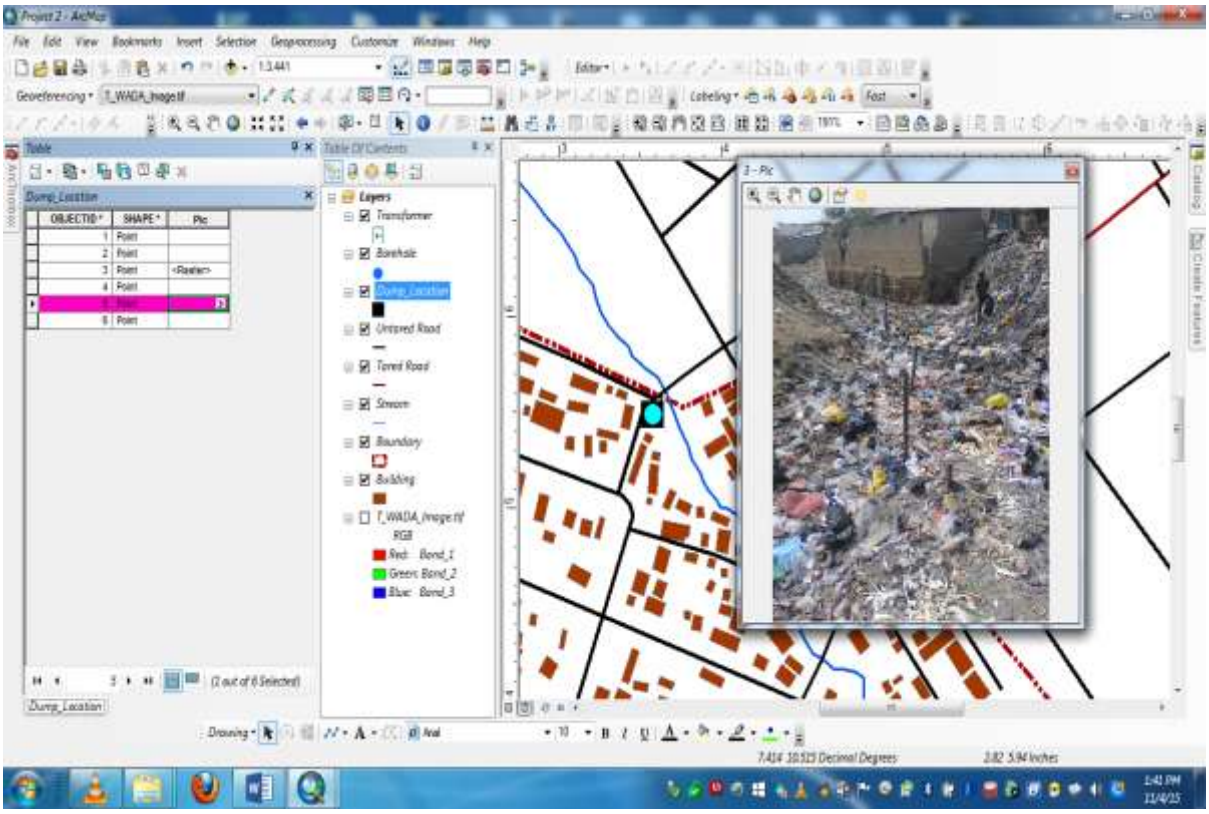

Plate 4.5: A Sample Waste Disposal Site in Gangare
Source: Field work, 2014

Table 4.4: Attribute Table

Dump site	Charactersistics
Location	Along main drainage
Size	Very large
Condition	Very Poor

Source: Field Work, 2014

The results in geo-database of Down Quarters and Gangare slums show similarities in pattern with other places around the world. For instance the results in both slums show substandard

housing structures that are overcrowded, presence of unofficial dump sites, absence or insufficiencies of basic facilities/ services (health care facilities, schools) among others. However, Gangare slum shows higher population and higher occupancy ratio while Down Quarters has worse housing structures. In a slum in Pune, India a study by Sen et al (2003) using census data they assembled information into a GIS framework that linked digitized maps to a database of slum characteristics. Results show poor shelter with bad conditions of drainage, waste disposal sites, toilets that are linked to poor health statuses of inhabitants. Many other studies used census and field survey as the basis for studying about slums and formed the database for GIS-based mapping (Joshi, Sen, and Hobson, 1998; Sliuzas and Kuffer, 2006).

4.3 Settlement and Socio-Economic Characteristics of Respondents

A settlement is considered a slum if it lacks one or more of the following characteristics or facilities: structural quality/ durability of dwellings, access to safe drinking water, access to sanitation facilities and especially security of tenure. In assessing any settlement for the purpose of establishing if it's a slum or not, it is very important to look at the availability and conditions of her facilities. The socio-economic characteristics of respondents on the other hand is based on the amalgamation of their educational attainment, economic activity, income and awareness. Some studies have agreed that the condition of a slum greatly affects the socio-economic statuses of her residents. This chapter discusses the settlement and socioeconomics of respondents which is used to find for possible relationship between the two variables. The characteristics include building standard (availability of housing facilities, materials for construction of housing facilities, age of building, nature of use of building), access to water, access to sanitation facilities, availability and condition of infrastructures and

security of tenure (ownership of accommodation) as well as income, awareness, economic activities and educational statuses of respondents.

4.3.1 Age and Sex of Respondents

The questionnaire administration was concentrated mainly on adults within age bracket of 20 years and above in both settlements. Table 4.5 shows the distribution of respondents by age. The age group 30-40 years has the highest proportion of 46.8%, followed by age group of 40-50 years with 23.7%, and those above 60 years have the lowest distribution of 2.9% in Gangare. Same age group of 30-40 has the highest proportion of 48.5% in Down Quarters, those within age group of 20-30 and 40-50 years have the same distribution of 15.1% each.

Table 4.5: Distribution of Respondents by Age

Age in years	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
20-30	26	18.7	05	15.1	31	16.9
30-40	65	46.8	16	48.5	81	47.7
40-50	33	23.7	05	15.1	38	19.4
50-60	11	7.9	04	12.1	15	10.0
Above 60	04	2.9	03	9.1	07	06.0
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field Work, 2014

The pattern of age distribution is so because the study is more interested in household heads who tend to fall within the age group 30-40 years. The age group 30-40 years therefore accounted for 47.7% of the total respondents in both settlements.

Figure 4.3 shows the fair distribution between the two genders of 54.1% male to 45.9% female in both areas.

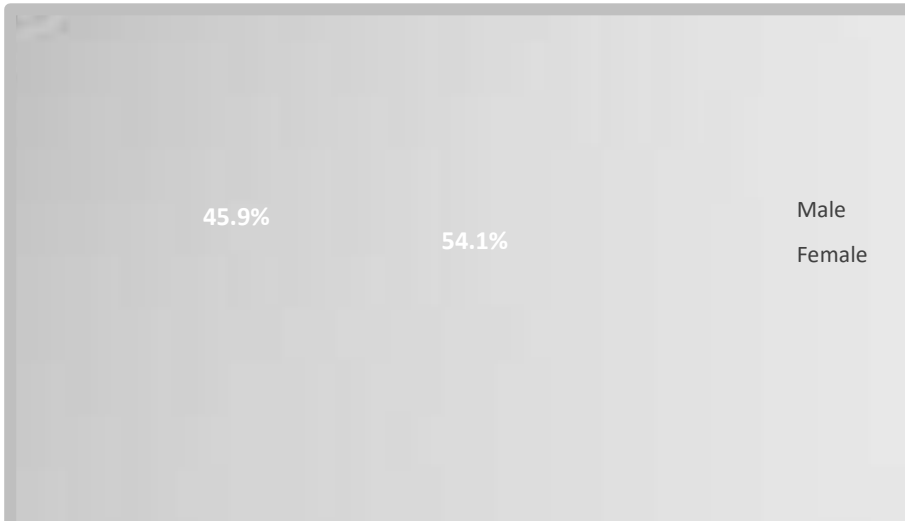

Figure 4.3: Percentage Distribution of Respondents by Sex
Source: Field Work, 2014

Table 4.6 shows that out of total number of respondents in Gangare, 52.3% are married and 18% is single. The incidence of divorce in this area is high (29.3%) which suggests a poor stability of the marriage institution. In Down Quarter, 43.6% are married, 28.2% are single, and 19.8% are widowed while 8.4% are separated. The incidence of divorce is low in this area (6.3%).

Table 4.6: Distributions of Respondents by Marital Status

Marital Status	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
Married	52	37.6	14	43.6	66	40.6
Single	25	18.0	9	28.2	34	23.1
Separated	6	4.4	7	19.8	13	12.1
Divorced	30	21.1	2	6.3	32	13.7
Widowed	26	18.9	1	2.1	27	10.5
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field Work, 2014

Figure 4.4 indicates that polygamy is the dominant marital union in Gangare with 63.3% of respondent being of polygamous family and only 36.7% are of monogamy. The reverse is the case in Down Quarters where monogamy dominates with 78% and 22% of polygamy only.

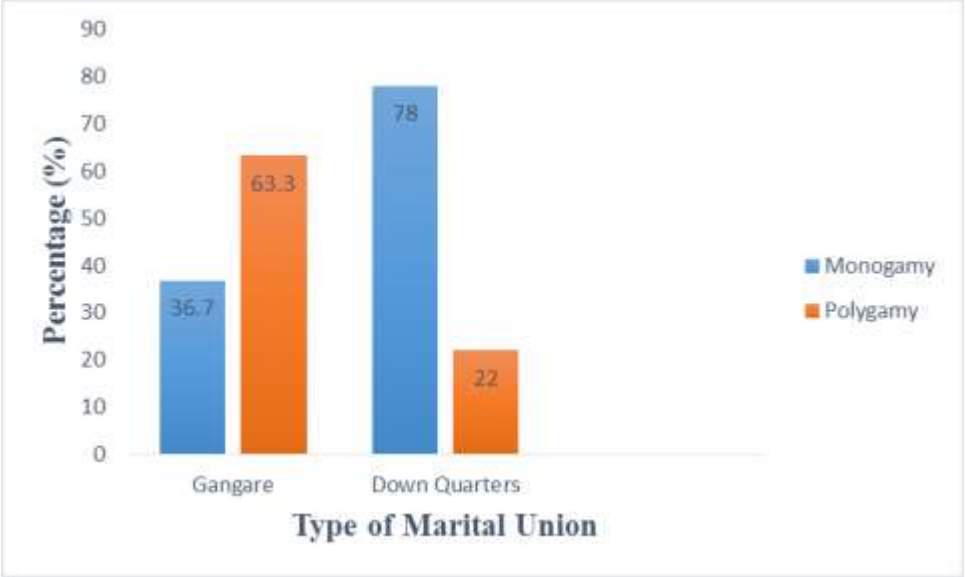

Figure 4.4: Percentage Distribution of Respondents by Type of Marital Union
Source: Field Work, 2014

The high percentage of polygamous unions in Gangare can be attributed to the religious and ethnic composition of the area as the Hausa/Fulani are the single largest cultural group dominating the area and are predominantly Muslims. Down Quarters is a heterogeneous settlement with a fair representation of people from different ethnic background ranging from Hausa, Gbagi, Igbo, Kataf etc.

Table 4.7 reveals that out of the 42.7% of respondents in polygamous settings (Figure 4.4) in both settlements, 43.1% of the men are married to two wives in Gangare and only them 9.7% are married to four wives. Down Quarters has only 4.9% of the men married to four wives as 21.9% are married to two.

Table 4.7: Percentage Distribution of Respondents by Number of Wives

No. of wives	**Gangare**		**Down Quarters**			
(Polygamy)	Frequency	Percent	Frequency	Percent	Total	Percent
2	49	43.1	7	0.6	56	21.9
3	28	24.6	1	0.1	29	12.4
4	11	09.7	0	0.0	11	4.9
Total	**88**	**77.4**	**8**	**0.7**	**96**	**39.2**

Source: Field Work, 2014

Table 4.8 shows that Gangare has a total of only 20.8% of the households with population size of 10 people and below. The distribution of respondents in the area with household size of above 20 people has the highest proportion of 28.8% while a total of 41.8% of the respondents have household size of between 10-20 people. Down Quarters has a relatively less household size as the highest percentage of her respondents 39.4% have a household size of 5-10 people and only 6.1% of the respondents are with over 20 people.

Table 4.8: Distribution of Respondents by Number of People in the House

Household size	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
0 – 5	18	12.9	3	9.1	21	11.0
5 – 10	11	7.9	13	39.4	42	30.2
10 – 15	29	20.9	12	36.4	41	28.6
15 – 20	29	20.9	2	6.1	13	7.0
Above 20	40	28.8	2	6.1	42	17.40
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field Work, 2014

The wide difference in household size between the two settlements (Table 4.8) is influenced by both the nature of marital union and the number of wives (Figure 4.4, Table 4.7) that exists in each of the areas.

Table 4.9 shows that Gangare has the highest proportion of houses with high concentration of people in a room 28.8% (10 or more people per room) Down Quarters has only 6.1% of her houses with such high room density where the highest proportion of houses 39.4% have occupancy ratio of 2 – 4 people per room. In all, only 41.2% of respondents in both settlements live within the standard occupancy ratio of 2 to 4 people per room while majority of the houses 53. 1% are overcrowded.

Table 4.9: Distribution of Respondents by Number of People per Room (Room Density)

Room Density	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
One	18	12.9	3	9.1	21	11.0
2-4	29	20.9	13	39.4	42	30.2
5-7	29	20.9	12	36.4	41	28.6
8-10	11	7.9	2	6.1	13	7.0
10-Above	40	28.8	2	6.1	42	17.40
Unanswered	12	8.6	1	3.0	13	5.8
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

Overcrowding is one major problem that slums face which is in so many ways directly related to the level of spread in diseases among inhabitants. The United Nations Habitat Report (1989) affirmed that one of the two basic environmental problems faced by slums is overcrowding and cramped living condition. The result of this finding corresponds to that of Sufaira (2013) in Kerala, India who came out with the finding that most of the households have only one room which is overcrowded with seven persons or more to a room.

Table 4.10 indicates that only 25.8% of the Households in Gangare have legitimate documents of ownership which gives them a secure tenure while 64% are having totally insecure tenure as they don't have any documentary proof claiming they own the apartment. On the other hand, all the residents in Down Quarters (100%) have no legal ownership. Houses in Down Quarters are in two forms; those owned by the Railway Corporation (official) and those built by the locals illegally. These people however pay rent to the corporation monthly or annually.

Table 4.10: Distribution of Respondents by Ownership of Accommodation (Land tenure)

Ownership of Accommodation	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Yes	36	25.8	0	0	36	12.9
No	89	64	29	87.9	118	75.9
Others	14	10.1	4	12.1	18	11.1
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field Work, 2014

The percentage of households with other options include those squatted by relatives or are staying temporarily. In general, the state of housing ownership in both slums is disturbing and could stand a chance of eviction or demolition at any point in time.

The quality of housing in the study area is very low due to the low quality materials used for construction and the inadequate technology as well as poor planning standards of handling the building components. 67% of the buildings in Gangare have spent over 40 years. Only approximately 6% of the total housing stocks in the area are buildings of recent construction, which are below 20 years. Down Quarters on the other hand is a younger slum as 63.6% of the buildings are below 30 years.

Table 4.11: Distribution of Respondents by Duration of Stay in the Building.

Duration	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Below 10 Years	02	1.4	3	9.1	05	5.3
10-19 Years	06	4.3	7	21.2	13	12.8
20-29 Years	06	4.3	21	63.6	27	34.0
30-39 Years	24	17.3	1	3.0	25	10.2
Above 40 Years	93	67.0	0	0.0	93	33.5
Unanswered	8	5.8	1	3.0	09	04.4
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

The work of Fadamiro (2001) become relevant here in which he argued that there is a correlation between relative habitability of the housing and their ages. According to him, buildings erected in more recent times tend to be more habitable than buildings built much

earlier. Hence, a large number of the housing stocks in the areas of study have relatively low habitability, which has direct effects on the state of health, socio-economic well-being and emotional stability of the residents.

Table 4.12: Distribution of Respondents by Nature of Stay in the Accommodation

	Gangare		Down Quarters			
Nature	Frequency	Percent	Frequency	Percent	Total	Percent
Self-owned	49	35.3	4	12.1	53	23.6
Rented	74	53.3	18	54.6	92	54
Official	4	2.9	9	27.3	13	15.1
Unanswered	12	8.6	2	6.1	14	7.3
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

Figures 4.3.3 and 4.3.4 reveals that 60.6% of houses in Down Quarters do not have provision to toilet facility at all. Such buildings only make use of mobile latrine, bushes, dunghill and drainage channels or squatting in the neighbouring houses. Without any doubt, this condition contributes to the deplorable condition of the area making it area look ugly, stinking and unattractive. 39.4% of houses in the area have toilets. In Gangare however, higher percentage of houses 79.9% are with toilets and a few 20.1% are without toilets. Unavailability of toilets has made most houses in Down Quarters extremely substandard

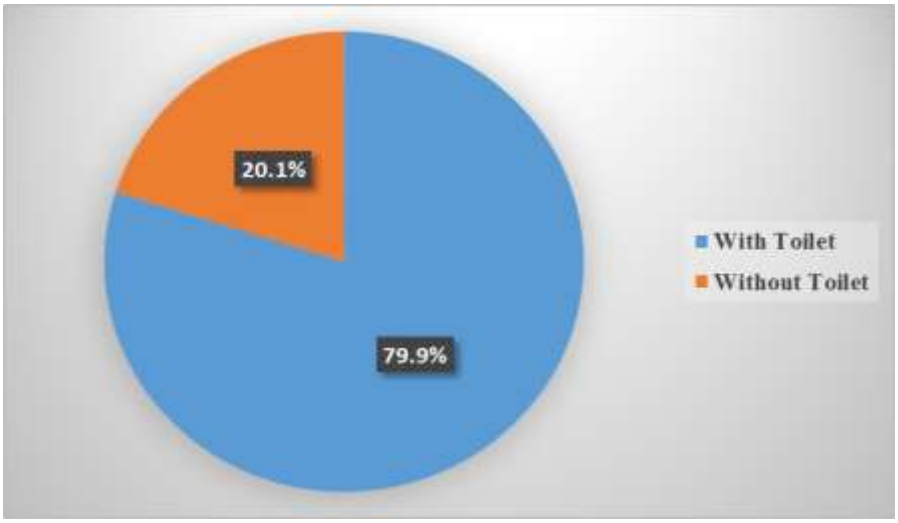

Figure 4.5: Percentage Distribution of Houses by Availability of Toilet Facility in Gangare
Source: Field Work, 2014

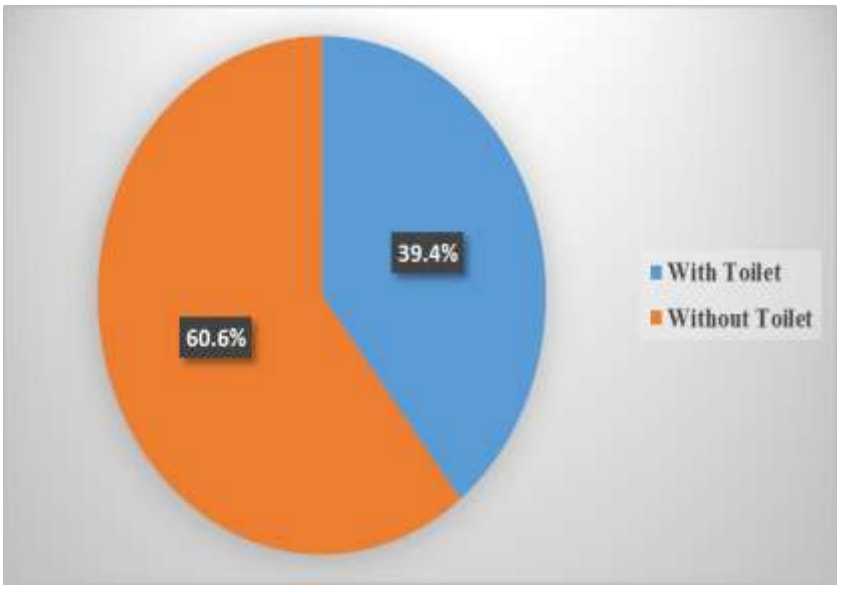

Figure 4.6: Percentage Distribution of Houses by Availability of Toilet Facility in Down Quaters
Source: Field Work, 2014

Findings made from the study also reveal that Earth dug and pit latrines are rampant in the areas, which accounts for about 45.6% in both slums. Only a total of 4.1% houses used modern day water closet.

Table 4.13: Distribution of Houses by Type of Toilet Facility

Type of Toilet	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
Earth dug	60	54.1	09	69.2	69	61.7
Pit Latrine	31	27.9	04	30.8	35	29.4
Water Closet	18	16.2	00	00	18	08.1
Others	2	1.8	00	00	02	01.0
Total	**111**	**100.0**	**13**	**100.0**	**124**	**100.0**

Source: Field Work, 2014

From Table 4.14, a large proportion of the buildings examined have their toilet facilities made of non-durable materials like mud (13.5%), rusted iron sheets (8.5%), or other items such as planks, bamboo, scrap items etc. A large proportion of the buildings with this facility are substandard and inconveniently located.

Table 4.14: Distribution of Houses by Type of Materials Used for the Construction of Toilets

Type	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Concrete	38	27.3	3	9.1	41	18.2
Iron sheet	1	0.7	11	33.3	12	17.0
Mud blocks	33	23.7	10	30.3	43	27.0
Others	67	48.2	9	27.3	76	37.8
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

The result for percentage distribution of houses with availability of toilet facilities is same with that of bathroom, 79.9% with bathrrom and 20.1% without the facility at all in Gangare while Down Quarters has just 39.4% houses with bathroom. Observation made is that most if not all the houses in both areas have a single structure serving for both facilities (toilet and bathroom) thus having same statuses in both cases (See Table 4.15)

Table 4.15: Distribution of Respondents by Type of Materials Used for the Construction of Bathroom

Type	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Concrete	38	27.3	3	57.6	41	18.2
Iron sheet	1	0.7	11	9.1	12	17.0
Mud blocks	33	23.7	10	9.1	43	27.0
Others	67	48.2	9	24.2	76	37.8
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

Figures 4.7 and 4.8 reveals that 45.3% and 72.7% of houses have no kitchen in Gangare and Down Quaters respectively. In Gangare, 39.5% of such houses cook in their room, 28.9% cook in an open space within the compound and 22.4% cook in their shops mostly a part of the building. Down Quaters has 37.5% of such houses cooking in the room, 37.5% in an open space and 12.5% in shops or outside the house. This condition makes such respondents very vulnerable to fire disaster or other fire related accidents.

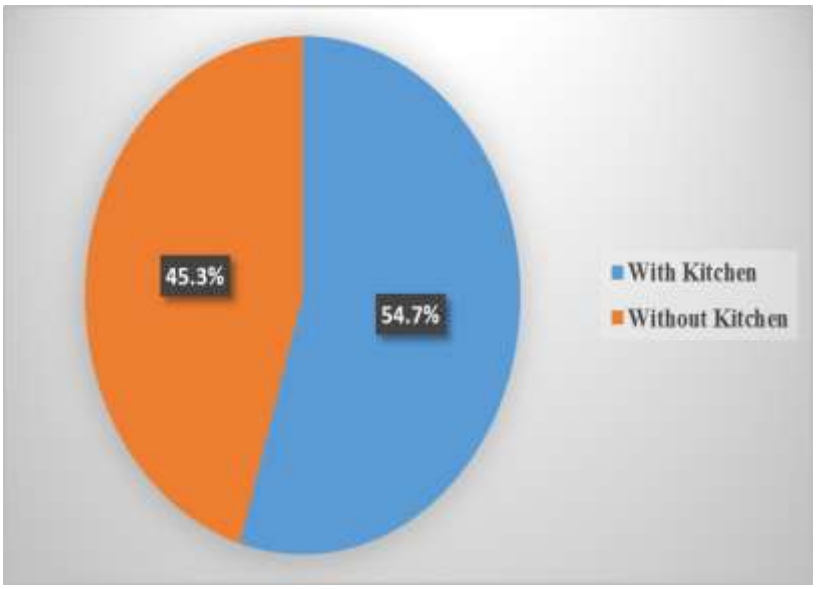

Figure 4.7: Percentage Distribution of Houses by Availability of Kitchen in Gangare
Source: Field Work, 2014

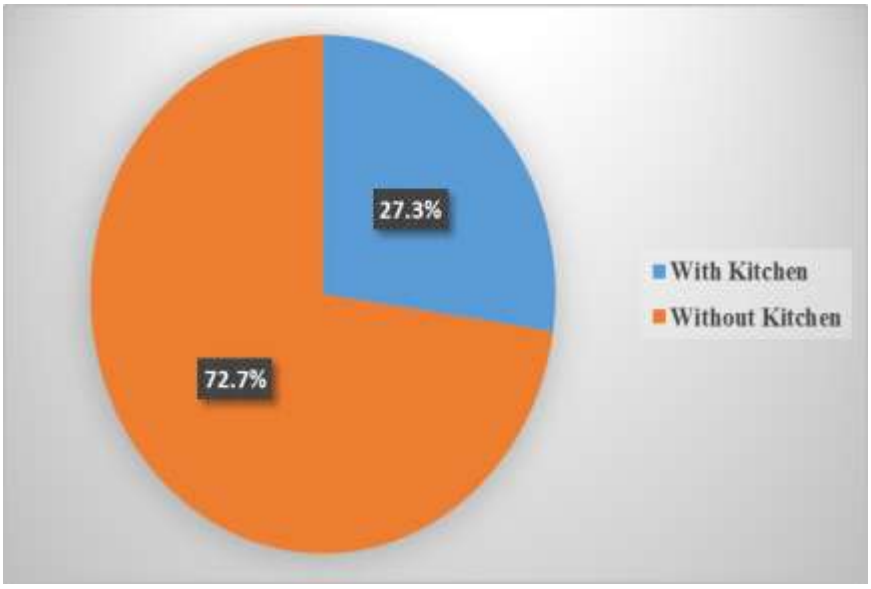

Figure 4.8: Percentage Distribution of Houses by Availability of Kitchen in Down Quaters
Source: Field Work, 2014

Table 4.16: Distribution of Houses by Nature of Kitchen

Nature of kitchen	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
In the room	30	39.5	9	37.5	39	38.5
In an open space	22	28.9	9	37.5	31	33.2
In the shop	17	22.4	3	12.5	20	17.5
Others	7	9.2	3	12.5	10	10.9
Total	**76**	**100.0**	**24**	**100.0**	**100**	**100.0**

Source: Field Work, 2014

Table 4.17 shows how substandard most of the kitchens are as only 23.7% are built of concrete in Gangare whereas the others are either built of plank (4.3%), Iron sheet (2.9%), mud (9.4%) or other items such as scraps, bamboo etc. Down Quarters has only 6.1% of the kitchen made of concrete. In general, only a total of 14.9% of the kitchens are built to standard.

Table 4.17: Distribution of Houses by the Type of Materials Used for the Construction of Kitchen

Type	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Concrete	33	23.7	2	6.1	35	14.9
Plank	6	4.3	18	54.5	24	29.4
Iron sheet	4	2.9	20	60.6	24	31.8
Mud block	13	9.4	13	39.4	26	24.4
Others	83	59.7	0	0	83	29.9
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

The survey reveals in Figures 4.9 and 4.10 that there is the absence of this drainage facility in most of the houses in both areas as only a total of 16.6% houses are with drainages while the available ones are being misused where they are provided through incessant dumping of refuse and human defecation without regular removal.

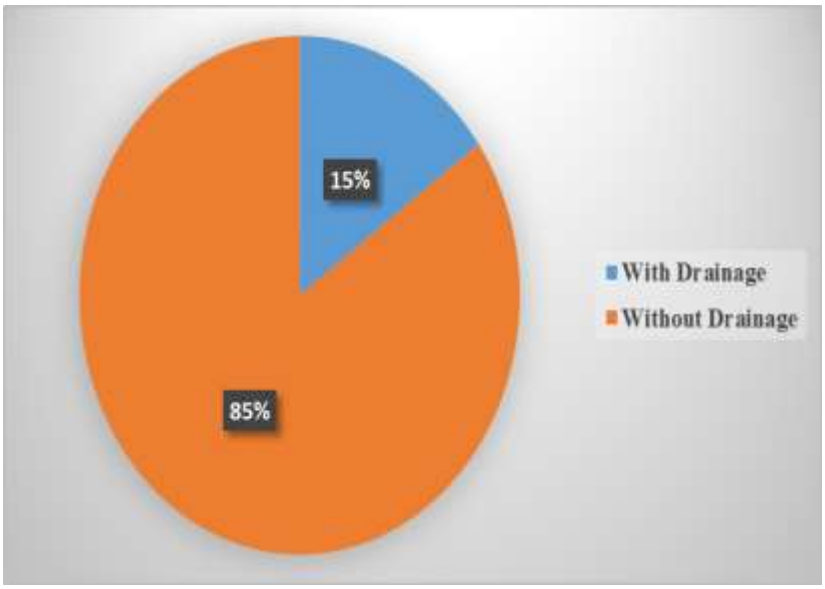

Figure 4.9: Percentage Distribution of Houses by Availability of Drainage System in Gangare
Source: Field Work, 2014

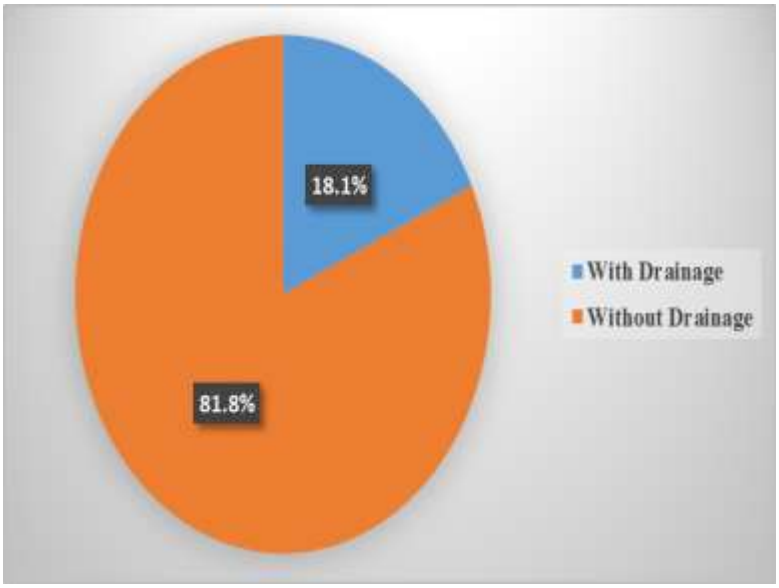

Figure 4.10: Percentage Distribution of Houses by Availability of Drainage System in Down Quaters
Source: Field Work, 2014

In Down Quarters, the largest percentage of houses (63.6%) are mud houses and only 30.3% percent houses are cement houses. In Gangare, most of the houses are relatively better with 54.7% percent of houses being cemented and 42.4% percent are mud. The option others

consists of those with a combination of different building materials for different parts of the house (Table 4.18).

Table 4.18: Distribution of Houses by Type of Materials Used for the Construction of Main Building

Type of Material for Main Building	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Mud block	59	42.4	21	63.6	80	53.0
Cement block	76	54.7	10	30.3	86	42.5
Others	4	2.9	2	6.1	6	04.5
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

Some of the observations made during the survey includes the roofing materials of the buildings in the area are mostly of zinc coated corrugated iron sheets types with only a few made of asbestos materials. This shows that the level of technology of building construction in the area is yet to catch up with modern age. It still remains crude and traditional, so is the level of maintenance. Majority of the buildings in both areas need either minor or major repairs, a large percentage of them are completely old and dilapidated only a few exhibit evidence of physical soundness

Table 4.19 shows that the respondents in the areas constitute 42.9% of those living in one/two rooms' type of accommodation which are mostly inherited by the occupants, followed by 29.5% living in flat apartments. It is however noted that virtually all the flats in Down Quarters are official in nature thus occupied by staff only. As few as 6% live in duplex.

Table 4.19: Distribution of Respondents by the Type of Accommodation

Type of Accommodation	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
One/two rooms	101	40.3	15	45.5	71	42.9
Flat	23	16.5	14	42.4	37	29.5
Duplex	12	2.9	4	9.1	7	6.0
Unanswered	3	1.4	0	0.0	2	0.7
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

4.4 The Availability of Infrastructural Facilities in Down Quarters Slum.

From the survey, 16.7% of the respondents indicate that their dwellings are accessible only by footpaths and a whopping 44.8% accessible only by bicycles or tricycles. Less than one percent of the houses (0.4% to be precise) are accessible by all modes of transport out of which 30.7% are accessible by car (Table 4.20)

Table 4.20: Distribution of Houses by Nature of Accessibility

Transportation Type	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
Foot only	9	6.5	9	27.3	18	16.9
Bicycles/tricycle	36	25.9	21	63.6	57	44.8
Car	81	58.3	1	3.0	82	30.7
All modes	1	0.7	0	0.0	1	0.4
Unanswered	12	8.6	2	6.1	14	7.4
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014.

Access roads are another important facility in the area that needs serious attention. Based on observation, most of the roads used by vehicles in the areas are either untarred or needs serious repairs.

Table 4.21 shows that only a small fraction of the houses make use of electricity and gas (3.0% and 3.3%) as a source of energy for cooking. This can be attributed to the economic condition of the residents as well as the nature of power supply especially in Down Quarters. A greater percentage of them depend solely on firewood (28.1%), charcoal (39.0%) and kerosene (23.5%) for their cooking.

Table 4.21: Respondents' Sources of Cooking Energy

Source of Cooking Energy	Gangare		Down Quarter			
	Frequency	Percent	Frequency	Percent	Total	Percent
Firewood	57	41.0	5	15.2	62	28.1
Charcoal	3	2.2	25	75.8	28	39.0
Kerosene	61	43.9	1	3.0	62	23.5
Electricity	4	2.9	1	3.0	5	3.0
Gas	9	6.5	0	0.0	9	3.3
Unanswered	5	3.6	1	3.0	6	3.3
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

The main source of electricity supply to the areas is through the Power Holding Company of Nigeria (PHCN), which accounts for almost 80% of the sampled buildings in both areas. About 3.4%% use generating plant as supplements while 15.4% and 10.2% others depends solely on local lamps and rechargeable lanterns for light (See Table 4.22)

Table 4.22: Respondents' Source of Light

Source of Light	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Local lamp	9	6.5	8	24.2	17	15.4
Rechargeable Lantern	3	2.2	6	18.2	9	10.2
Generator	1	0.7	2	6.1	3	3.4
PHCN	120	86.3	16	48.5	136	67.5
Unanswered	6	4.3	1	3.0	7	3.7
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

The condition of power supply in Gangare is quite impressive as 63% of houses attest to regular electricity supply but Down Quarters experiences the opposite as almost the entire area (93.9%) experiences rather an erratic nature of power supply by the PHCN. In most cases in Down Quarters, there is total darkness for weeks or sometimes months (Figure 4.11, 4.12)

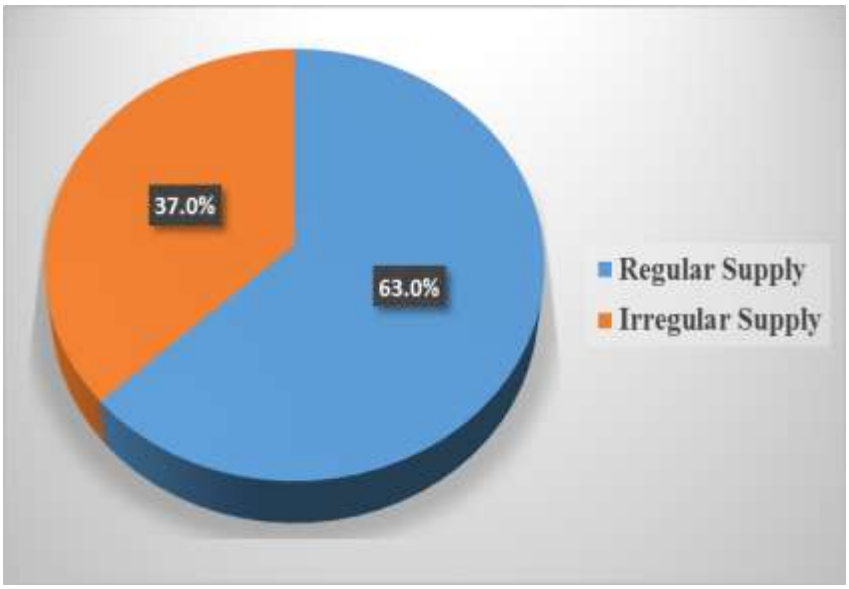

Figure 4.11: Percentage Distribution of Houses by Condition of Power Supply in Gangare
Source: Field Work, 2014

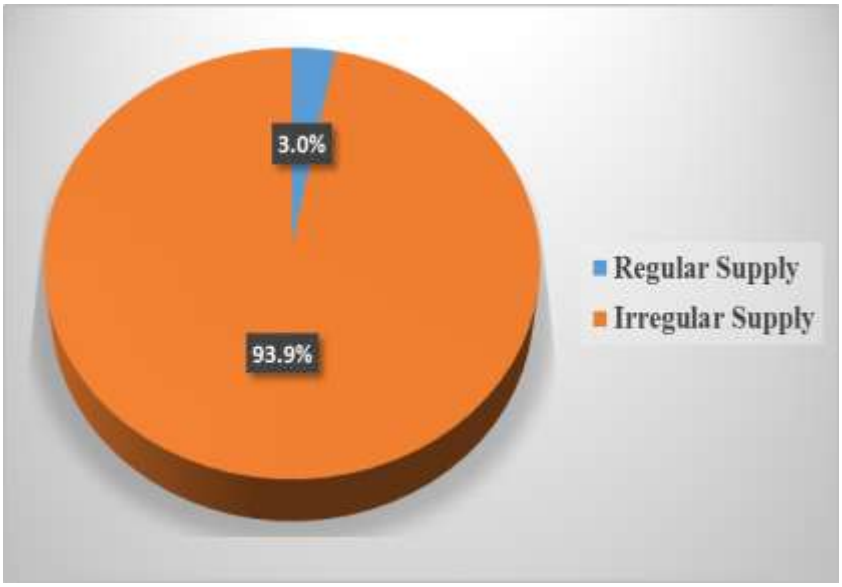

Figure 4.12: Percentage Distribution of Houses by Condition of Power Supply in Down Quaters
Source: Field Work, 2014

4.4.1 Health Facility

The state of health facilities is far below satisfaction. A large number of the respondents are having the facilities either farther away from their dwellings or completely absent within their

neighbourhoods (Gangare). Most respondents suffer non-availability of health workers or even drugs most of the time thereby forcing them into making use of ordinary chemist store or mini health centre within their neighbourhood instead. Improper access to health facilities exposes the residents to higher risk of mortality from illnesses especially those related to unhygienic environment.

4.4.2 Education Facility

Education levels in both slums are low, because of no access to schools. The only school available in Down Quarters is a staff school enjoyed mostly by the formal workers in the area. Gangare has mostly private schools available in neighboring areas which are unaffordable. Other factors affecting learning in such areas included distance, insecurity, family fanaticism, cultural lag and family illiteracy. Most of the girls drop out of school unwillingly. Most of the children under the age of 15 years are facing this problem of having to play a role in contributing to the family's income thereby often work as domestic helpers, street vendors and beggars to supplement their family incomes during school hours.

4.4.3 Access to Sanitation Facility

Greater percentage of houses in both slums dispose of their waste in unofficial dump sites (64.0%) within the area. Others either dispose by burning (15.0%) or dumping into drainages or along road networks in the area (6.1%). In DQ, no collection vehicle to evacuate refuses most probably due to poor road network (See Table 4.23)

Table 4.23: Distribution of Houses by Waste Disposal

Method of solid Waste Disposal	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
Dump sites	72	52.0	31	76	103	64.0
Burning	24	17.0	1	13	25	15.0
Waste collection vehicle	40	29.0	0	0.0	40	14.5
Others	3	2.2	1	10.0	4	6.1
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field Work, 2014

General observation made during the course of survey as well as results reveals that the non-challant attitude and lack of positive action of residents constitute major causes of environmental hygiene and sanitation problems in the area. From random dumping of refuse around dwelling places as well as drainages to unscrupulous characteristic way of life of the residents. These make the environment much unhealthier and generate hazards that threaten the lives of the people in the areas.

Table 4.24 reveals that access to safe drinking water is one major problem of the study area especially Down Quarters with no supply of pipe borne water at all. The main source of water supply is largely through underground well water (44.5%), some of which have shallow depth. This poses some problems because the water is not treated before use. Only few, about 19.1% enjoy tap water, which is strictly for those in Gangare. From this situation, the existing water supply does not guarantee quality water supply in the area (especially in the case of Down Quarters), hence the people are at greater risk of contacting acute water borne diseases.

Table 4.24: Distribution of Respondents by Source of Safe Drinking Water

Sources	**Gangare**		**Down Quarters**			
	Frequency	Percent	Frequency	Percent	Total	Percent
Local vendors	12	8.6	3	9.1	15	8.9
Well	48	34.5	18	54.5	66	44.5
Tap	53	38.1	0	0.0	53	19.1
Borehole	14	10.1	11	33.3	25	21.7
Stream	7	5.0	1	3.0	8	4.0
Unanswered	5	3.6	0	0.0	5	1.8
Total	**139**	**100.0**	**33**	**100**	**172**	**100.0**

Source: Field Work, 2014

The inadequacy or lack of basic facilities in the area of study has its numerous attendant problems on the general environment, socio-economic lifestyle, and the health of residents. The larger parts of the housing environment has been rendered unattractive for lack of essential services like water, access roads, regular supply of light, school, and health

facilities. The findings reconfirm the works of Olanrewaju and Akinbamijo (2002) in which they reported that environment has great and obvious effects on the health of the inhabitants.

4.4.5 Socio-economic status

Socio-economic status is an economic and sociological combined total measure of a person's work experience and economic and social position of a family in relation to others, based on income, education, employment (occupation) and awareness. This analysis of the socio economic status of this study areas will be discussed through the following headings.

Information gathered on educational background reveal that only an average of 9.6% of the inhabitants in both areas are illiterates who do not enjoy the benefits of formal education. Out of the literate ones, 11.4% have only primary school leaving certificate, while 49.6% attempted secondary school and only 20.0% have tertiary education. The implication of the low level of education of the people in the area undermined the importance of healthy environment therefore live below the minimum environmental standards stipulated in the planning code of the country (See Table 4.25)

Table 4.25: Distribution of Respondents by Educational Qualification

Level of educational	Gangare		Down Quaters			
Attainment	Frequency	Percent	Frequency	Percent	Total	Percent
None	14	10.1	3	9.1	17	9.6
Primary	19	13.7	3	9.1	22	11.4
Secondary	62	44.6	18	54.5	80	49.6
Tertiary	22	15.8	8	24.2	30	20.0
Qur'anic	22	15.8	1	3.0	23	9.4
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field Work, 2014

The occupational and income distributions are closely related. The nature of occupation determines their level of income. Table 4.26 indicates that only an average of 16.4% of the respondents in the settlements are within the formal employment sector (civil servants) while others engage in farming (8.2%), trading activities (26.7%), apprentice (14.1%) or in

different craftworks like weaving, tailoring, vulcanizing, mechanics, etc (22.8%). The remaining 11.8% are unemployed.

Table 4.26: Distribution of Respondents by Type of Occupation (Employment)

Type of Occupation	Gangare		Down Quarters			
	Frequency	Percent	Frequency	Percent	Total	Percent
Farming	10	7.2	3	9.1	13	8.2
Craftsmanship	34	24.5	7	21.2	41	22.8
Trading	49	35.3	6	18.2	55	26.7
Civil service	16	11.5	7	21.2	23	16.4
Unemployed	16	11.5	4	12.1	20	11.8
Apprentice	14	10.1	6	18.2	20	14.1
Total	**139**	**100.0**	**33**	**100.0**	**172**	**100.0**

Source: Field work, 2014

The residents of Down Quarters are of the advantage of their proximity to the industries in Kakuri thereby working as labourers in such factories while the younger ones hawk by the road side and along the railway station. The women are mostly involved in miscellaneous trading within their houses or in markets close to the area whereas most of the older men engage in subsistence farming or of daily wage services. It has however been noted that a huge number of the youths in this settlement are without any work thus forming gang groups within the area and surrounding neighbourhoods. Hawking before or after school hours is much more pronounced among children in Gangare whereas most of the youths engaged in self-employed jobs such as public transport drivers and conductors, tailoring, mechanic, craftsmanship and apprentices. In general, the occupational (employment) status of people in Gangare is better and even though the area is popularly known for gangs and thugs, their youth are hardly found idle and most of them live with their parents or relatives as against the youths in Down Quarters that are mostly living independently or squatted by friends in the area.

Figure 4.13 shows that about 51.3% of the respondents receive daily income below N200 out of which most have no stable source of income. Those who earn less than N200 (1 US dollar) per day are considered under acute poverty level and those who earn below N500 are termed

poor. The finding here revealed that the general income for most of the respondents is below the national minimum wage of N18,000 per month and some even below the state average income level. With this low income distribution, to afford good quality housing, proper maintenance of existing ones and adequate feeding might be very difficult, if not impossible. The monthly family income is divided into three family income groups, respectively .The groups are based on the lower, the middle lower, and the upper lower quartile values of monthly family income. The categories were as follows:

Gangare:

Family income group I: (22%) of inhabitants' income is less than N200

Family income group II: (39%) of inhabitants' income is N200

Family income group III: (39%) of inhabitants' income is above N200

Down Quaters:

Family income group I: (61%) of inhabitants' income is less than N200

Family income group II: (13%) of inhabitants' income is N200

Family income group III: (14%) of inhabitants' income is above N200

This implies that an average of 41.5% of the residents in both areas live below the poverty line (BPL) and 26% others live on poverty line (OPL). Recent evidence has emerged that low income has an effect on children's outcomes after controlling for key aspects of family background and child ability (Gregg and Machin, 2000, and Hobcraft, 1998).

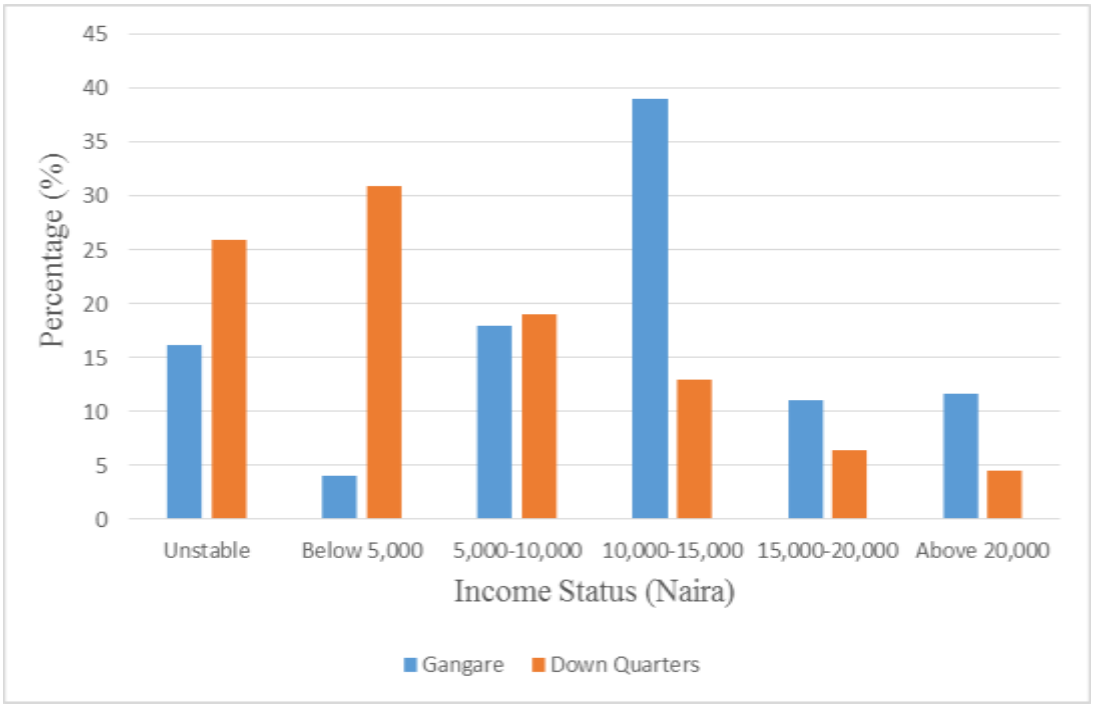

Figure 4.13: Percentage Distribution of Resondents by Income Status
Source: Field Work, 2014

The result in awareness in both slums shows poor level of access to information. However, 40% of the people in Gangare slum obtain information from the radio while 37% of those in Down Quarters obtain theirs from other sources such as social networks, rumors, etc.

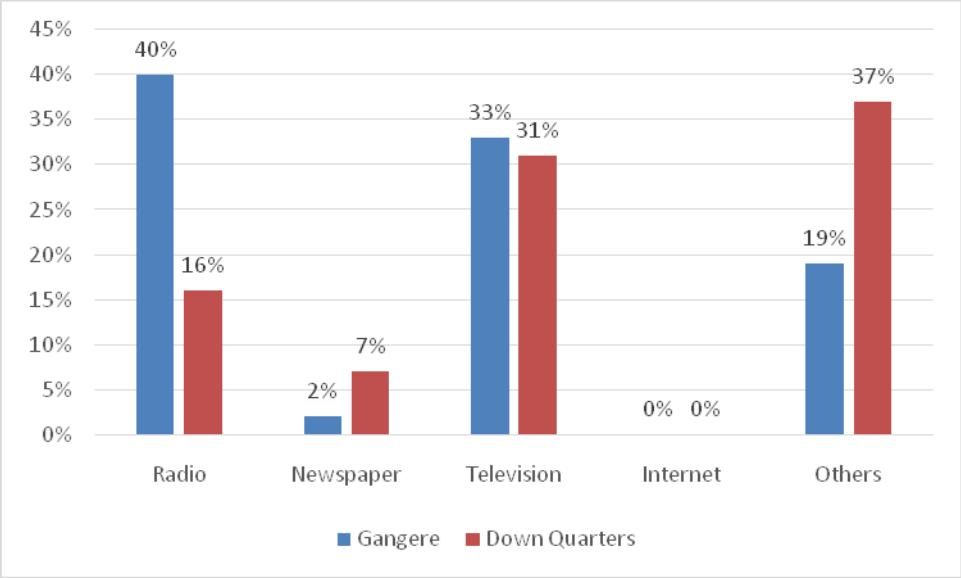

Figure 4.14: Percentage Distribution of Respondents by Level of Awareness
Source: Field work, 2014

The results of the settlement characteristics as well as socioeconomic condition of slum dwellers in the slum areas is in line with theories of slums which shows that it is the changes in urban land-use pattern and lack of housing, which lead to overcrowding and improper maintenance. According to one theory derived from a study of Gulbarga City," the slums in the city are characterized by poverty, unemployment, and minimum level of organization. The study has so much in common with the results of other researchers as thus:

Asker, Aslam and Akthar (1992) points out that that living condition of the slum dwellers were poor. The facilities for proper disposal of garbage were limited. The study revealed that about 46% of rural migrants were unskilled and 18% were unskilled workers. Lack of lavatories forced the slum dwellers to use the open space around. This tended to create a serious problem of sanitation. The study empirically proved that socio economic factors affecting living conditions of rural migrants.

Ali and Toran (2003) analysed inter and intra migration and also the socio economic strata of the slum dwellers of Gandhi agar Slum. On the basis of income and expenditure, socio economic conditions of the people were not good so are houses, basic amenities, drainage, water supply, and street lighting

Geetha and Swaminathan (1996) in a field study in the slum area of Mumbai revealed that absence of basic civic amenities such as safe and adequate water supply, sewerage and sanitation, toilets are the root causes of many diseases leading to high mortality in slum areas.

Karn, Shigeo and Harada (2003**)** examined the relationship between living environment and Health Status of Urban communities in Mumbai. The study showed that education level and location of residence have influence on the employment type.

Housing conditions differ considerably from pavement dwellers to squatters and slums, overall 33% houses were flimsy, 39% semi-permanent type and 28% cemented buildings. In slums, none of the household use any kind of scientific devices for pathogen killing or germs filtration. Polluted drinking water, insanitary living conditions, poor personal hygiene and food cleanliness are contributed to water related diseases. The impact of poverty and environmental factors highly pronounced between slums and pavement Dwellers. The study revealed that income, literacy, sanitation and personal hygiene have had impact on the morbidity of the people. The study empirically proved the effect of socio-economic and the environmental factors affecting health status of urban poor.

Objective 3: Relationship between Slum Characteristics and Socio-Economic Status of the People

4.5 Testing The Hypotheses

Are Settlement Characteristics Related to Socio-economic condition?

Settlement characteristics data at Household level was gotten from the field survey of both slum settlements and analysed based on the UN Habitat slum indicator and their respective working definition. For this purpose, each housing characteristic was computed in SPSS statistical software based on the following operational techniques.

If the Household does not have improved drinking-water sources, then slum1 (S1) = 1 (else 0);

If the Household does not have improved sanitation facilities, slum2 (S2) = 1 (else 0);

If the housing unit does not have basic facilities, slum3 (S3) = 1 (else 0);

If the housing unit is not made of poor structure, slum4 (S4) = 1 (else 0);

If the resident of housing unit is tenant, slum5 (S5) = 1 (else 0);

Then the data housing units by each of these defined characteristics with their respective spatially referenced housing unit was uploaded into ArcGIS environment.

Having calculated the above defined indicators for each housing units, their combination was calculated as the sum value for each housing units to relate with the result of the physical development process of slum settlements. That means each housing unit in the settlements have the value of the summation of the above five key indicators.

$$SHH = S1 + S2 + S3 + S4 + S5$$

Based on the above defined indicators the most possible minimum and maximum value of SHH is 0 and 5 respectively. For example, if housing unit has 0 value of SHH, this indicates that the housing unit does not show slum characteristics. This can be expected because not all people living in slum settlements are poor.

If the housing unit has around 3 values of SHH, the housing unit show some slum characteristics. In this case there might be high frequency of lack of improved sanitation facilities among others since only a certain percent of the residents of both settlements use improved sanitation facilities such as VIP latrine and pour-flush latrine connected to sewer and septic tanks as shown in key socio-economic analysis. Similarly, if the housing unit has maximum value 5, this shows that the housing unit does not have the above defined improved basic services. This housing unit exhibit severe slum characteristics.

H01: Slum characteristics of the area have no relationship with the socioeconomic activities of the inhabitants/respondents. This hypothesis was tested with the aid of Pearson correlation in order to determine whether there is significant relationship between slum characteristics of the area and socioeconomic condition of the inhabitants/respondents. The result is presented in Table 1, 2, 3 and 4 respectively.

The result in Table 4.11 showed that availability to basic facilities/services (S3) has a positive significant relationship with the awareness of the inhabitants/respondents at $P<0.001$ level.

On the other hand, the availability to improved water (S1) and sanitation (S2) of the respondents have positive significant relationship with the awareness at P<0.05. However, housing quality (S4) and tenures (S5) have no significant relationship with the awareness.

Table 4.27: Pearson correlation test of the relationship between settlement characteristics of respondents and their level of awareness.

	Awareness	S1	S2	S3	S4	S5
Awareness	1	.372*	.359*	.904**	.006	.111
		.238	.000	.000	.000	.043
	30	30	30	30	30	30
S1	.372*	1	.539**	.449**	.359*	.132
	.238		.001	.009	.040	.465
	30	33	33	33	33	33
S2	.359*	.539*	1	.833**	.667**	.245
	.000	.001		.000	.000	.170
	30	33	33	33	33	33
S3	.904**	.449**	.833**	1	.800**	.294
	.000	.009	.000		.000	.097
	30	33	33	33	33	33
S4	.006	.359	.667**	.800**	1	.367*
	.000	.040	.000	.000		.036
	30	33	33	33	33	33
S5	.111	.132	.245	.294	.103	1
	.043	.465	.170	.097	.036	
	30	33	33	33	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Key: S1 = access to improved water; S2 = access to improved sanitation; S3= availably to basic facilities; S4 = housing quality; S5 = housing unit s tenant

The result in Table 4.12 showed that all the settlement characteristics have a positive relationship with the income of the inhabitants. However, availability of improved water (S1), basic facilities/services (S3), housing quality (S4) and tenure (S5) have a positive significant relationship with the income of the inhabitants/respondents at P<0.001 level. Whereas, the availability to sanitation (S2) of the respondents has a positive significant relationship with the income at P<0.05.

Table 4.28: Pearson correlation test of the relationship between settlement characteristics of respondents and their level of income.

	Income	S1	S2	S3	S4	S5
Income	1	.372*	.359*	.904**	.006	.111
		.238	.000	.000	.000	.043
	30	30	30	30	30	30
S1	.372*	1	.539**	.449**	.359*	.132
	.238		.001	.009	.040	.465
	30	33	33	33	33	33
S2	.359*	.539*	1	.833**	.667**	.245
	.000	.001		.000	.000	.170
	30	33	33	33	33	33
S3	.904**	.449**	.833**	1	.800**	.294
	.000	.009	.000		.000	.097
	30	33	33	33	33	33
S4	.006	.359	.667**	.800**	1	.367*
	.000	.040	.000	.000		.036
	30	33	33	33	33	33
S5	.111	.132	.245	.294	.103	1
	.043	.465	.170	.097	.036	
	30	33	33	33	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Key: S1 = access to improved water; S2 = access to improved sanitation; S3= availably to basic facilities; S4 = housing quality; S5 = housing unit s tenant

The result in Table 4.13 showed that availability of basic facilities/services (S3) has a positive relationship with education of the inhabitants/respondents at $P<0.001$ level. Availability of improved water (S1) and sanitation (S2) equally have a positive relationship with education at $P<0.05$. On the other hand, housing quality (S4) and tenures (S5) have no significant relationship with the awareness.

Table 4.29: Pearson correlation test of the relationship between settlement characteristics of respondents and their level of education.

	Education	S1	S2	S3	S4	S5
Education	1	.372*	.359*	.904**	.006	.111
		.238	.000	.000	.000	.043
	30	30	30	30	30	30
S1	.372*	1	.539**	.449**	.359*	.132
	.238		.001	.009	.040	.465
	30	33	33	33	33	33
S2	.359*	.539*	1	.833**	.667**	.245
	.000	.001		.000	.000	.170
	30	33	33	33	33	33
S3	.904**	.449**	.833**	1	.800**	.294
	.000	.009	.000		.000	.097
	30	33	33	33	33	33
S4	.006	.359	.667**	.800**	1	.367*
	.000	.040	.000	.000		.036
	30	33	33	33	33	33
S5	.111	.132	.245	.294	.103	1
	.043	.465	.170	.097	.036	
	30	33	33	33	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Key: S1 = access to improved water; S2 = access to improved sanitation; S3= availably to basic facilities; S4 = housing quality; S5 = housing unit s tenant

The result in Table 4.15 showed that availability of basic facilities/services (S3) has a positive relationship with employment of the inhabitants/respondents at $P<0.001$ level. Availability of improved water (S1) and sanitation (S2) equally have a positive relationship with employment at $P<0.05$. On the other hand, housing quality (S4) and tenures (S5) have no significant relationship with the awareness.

Table 4.30: Pearson correlation test of the relationship between settlement characteristics of respondents and their level of employment

	Employment	S1	S2	S3	S4	S5
Employment	1	.372*	.359*	.904**	.006	.111
		.238	.000	.000	.000	.043
	30	30	30	30	30	30
S1	.372*	1	.539**	.449**	.359*	.132
	.238		.001	.009	.040	.465
	30	33	33	33	33	33
S2	.359*	.539*	1	.833**	.667**	.245
	.000	.001		.000	.000	.170
	30	33	33	33	33	33
S3	.904**	.449**	.833**	1	.800**	.294
	.000	.009	.000		.000	.097
	30	33	33	33	33	33
S4	.006	.359	.667**	.800**	1	.367*
	.000	.040	.000	.000		.036
	30	33	33	33	33	33
S5	.111	.132	.245	.294	.103	1
	.043	.465	.170	.097	.036	
	30	33	33	33	33	33

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Key: S1 = access to improved water; S2 = access to improved sanitation; S3= availably to basic facilities; S4 = housing quality; S5 = housing unit s tenant

Income, education, employment and awareness all have positive significant relationship with the settlement characteristics of slum areas occupied by respondents at either $P<0.001$ level or $P<0.05$. We therefore, reject the null hypothesis (H 01).

Socio-Economic Analysis and Applicability of the Approach

The result of the correlation in this work is in line with the study of Sori (2012) who analysed key socio-economic characteristics of Manyatta settlement and correlate them with the five UN Habitat slum indicators except overcrowding for nine slum settlement units found in Manyatta. The result shows significant relationship between them except for housing quality.

The result is however not in line with the study of Toyobo *et al.* (2011) who studied for the relationship between socio-economic characteristics and housing quality in Ogbomosho Township. Oyo State, Nigeria where the hypothesis tested confirmed that there is significant difference between the socio-economic characteristic and housing quality in the study area and that this is responsible for different form of houses in the study area. The income and educational background of residents determine the quality of housing.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the summary of the key findings of this research work, the conclusion made by the finding and finally recommendations proposed for an effective environmental management to put a stop to birth of slums in the state. The phenomenon of slum is a complex issue and poses a major challenge in many cities in developing countries. This study focused on finding the relationship between slum condition and the socio-economic condition of the inhabitant in Down Quarters and Gangare slums in Kaduna South Local Government Area, Kaduna, Nigeria using a combination of GIS and survey data which has been demonstrated as an effective tool in slum mapping and monitoring.

5.2 Summary of Findings

The slums settlements were identified based on geospatial techniques as well as ground verification. This work developed site-specific geo-database for slum identification in two slums in Kaduna State. It also established that Gangare is clearly better off in terms of availability of infrastructures which plays an important role in the people's socioeconomic status.

Finally, it has been established that, significant relationship exist between the settlement characteristics and socioeconomics of the people in Gangare and Down Quarters, Kaduna South LGA.

5.3 Conclusion

In conclusion, the research has demonstrated the great potential of RS/GIS in the study and analysis of slum conditions. The result obtained from the study showed a positive significant relationship between slum characteristics and the socio-economic condition of the residents.

The study also revealed that slums re-evolve over time thereby upgrading the status of the slum itself (from slum of despair to slum of hope) as well as the standard of living of its residents. Information derived would be useful to the government, urban planners and policy makers in the management of the city.

5.4 Recommendations

Based on the major findings in the study, it is recommended that;

i. the residents of Down Quarters should be evicted from the area, reasons being that they illegally occupy the land and it is very hazardous for habitation. The settlement is too close to the railway line and also close to the industries in Kakuri. An alternative place should be provided for them to build their structures.

ii. basic infrastructures such as safe drinking water, hospitals, schools and waste disposal facilities should be provided in Gangare. The Government, private individuals and NGOs should see to this. Based on the result of the analysis, this in turn has the potential of enhancing the income of the people through petty jobs thereby making life better.

iii. the residents should work hand in hand with the Local Government Authorities to ensure proper disposal and collection of refuse in the area to enhance environmental hygiene.

iv. drainage system be provided through community development projects by the residents in collaboration with the Government to ensure free flow of water waste and prevent floods.

v. Trend Analysis of socioeconomic condition of the residents is highly recommended for further study.

vi. The effect of slum condition on the health of the people is also recommended.

REFERENCES

Abbott, J. (2003). The Use of GIS in Informal Settlement Upgrading: Its Role and Impact on the Community and on Local Government. Habitat International, 27(4), 575-593.

Akinbabijo, O.B. (2012): Urban Environmental Justice and the Missing Links: A Study of High Density Residential Districts of Kaduna, Nigeria. *The Built & Human Environment Review, Vol. 5:14-27.* Department of Urban and Regional Planning, School of Environmental Technology, Federal University of Technology, Akure, Nigeria

Alberti, M. & Waddell, P. (2000). An integrated urban development and ecological simulation Model. *Integrated Assessment*, 1(3), 215-227.

Angeles, G. *et al* (2009). The 2005 Census and Mapping of Slums in Bangladesh: design, select results and application. [Article]. *International Journal of Health Geographics*, 8, 19.

Arimah, B.C. (2011). What Drives Infrastructure Spending in Cities of Developing Countries? *Urban Studies*, 42, pp. 1345-1368.

Baharoglu, D. & Kessides C. (2004). *Urban Poverty Chapter of the PRSP Sourcebook, Chapter 16.* World Bank, Washington, D.C Bank, Washington, D.C., 15-17

Bahir, A.L. (2010). Human Induced Disaster and the Socio-economic Capital of Squatter Settler: the case study of the Kore community in Addis Ababa, Ethiopia. *Journal of sustainable Development in Africa*, 12(6) ISSN; 1520-5509. Clarion Univerity of pennylvania.

Baud, I., Sridharan, N. & Pfeffer, K. (2008). Mapping urban poverty for local governance in an Indian mega-city: The case of Delhi. *Urban Studies*, 45(7), 1385-1412.

Beall, J. & Fox, S. (2009). *Cities and Development.* London: Taylor & Francis Ltd.

Bello, A.A. (2002). An Appraisal of Socio-Economic Effects of Slum Environment on Urban Dwellers: A case study of Osogbo in Osun State. Unpublished B. Sc. Thesis, Obafemi Awolowo University, Ile-Ife, Nigeria.

Benz, U. C., Hofmann, P., Willhauck, G., Lingenfelder, I. & Heynen, M. (2004). Multi-resolution, Object- oriented Fuzzy Analysis of Remote Sensing Data for GIS-ready Information. *ISPRS Journal of Photogrammetry and Remote Sensing*, 58(3-4), 239-258.

Blaschke, T. (2003). Object-Based Contextual Image Classification Built on Image Based Approach. Paper presented at the Advances in Techniques for Analysis of Remotely Sensed Data, 2003 IEEE Workshop.

Blaschke, T. (2010). Object Based Image Analysis for Remote Sensing. *ISPRS Journal of Photogrammetry and Remote Sensing, 65(1), 2-16.*

.

Busgeeth, K., Brits, A., & Whisken, J. (2008) Potential Application of Remote Sensing in Monitoring Informal Settlements in Developing Countries Where Complimentary Data Does not exist. Geoinformatics 2008 and Joint Conference on GIS and Built Environment, Guangzhou, China, 28–29 June 2008.

Businge, S.M. & Immaculate N.M. (2011). Socioeconomic Status, Poverty, Gender and Environment. Pp 24-45.

Campbell, J. B. (2002). Introduction to Remote Sensing (3rd Ed.). New York, London.

Cities Alliance for Cities without Slums. (2000). About Slum Upgrading. 2011, from http://www.citiesalliance.org/ca/About-slum-upgrading

Chen, N., Valente, P. & Zlotnik, H. (1998). What Do We know About Recent Trends in Urbanization? Cities Alliance for Cities without Slums. (2000). About Slum Upgrading. 2011, from community and on local government. *Habitat International*, 27(4), 575-593.

Das S., Choudhury, M.R., Shobhana, B., Bhakhar, K., & Vaghela, B. (2014). Slum Redevelopment Strategy using GIS Based Multi-Criteria System: A case study of Rajkot, Gujarat, India. *World J. Civ. Engin. Constr. Technol*. 1(1):012-041.

Davis, M. (2004). *Planet of Slums: Urban involution and the informal proletariat*. New Left Review 26, pp 5-34 http://www.newleftreview.net/NLR26001.shtml

De Soto, H. (2003). *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (Vol. 1st edition). New York: Basic Books.

DFID (Department for International Development) (2000) *Sustainable Livelihoods Guidance Sheets.* London: DFID. From http://www.livelihoods.org

Ebong, M.O. (1983).The Perception of Residential Quality: A Case Study of Calabar, Nigeria. Third world Planning Review, 5(30: 273-284.

Funmilayo L. A., (2012) Housing Quality in Informal Settlements and Urban Upgrading in Ibadan, geographic information systems: case of kawangware, nairobi (1990-2010).

George, C.K., (1999). *Basic Principles and Methods of Urban and Regional Planning.* Lagos, Nigeria: Libra – Gen Limited. GIM International, 19(9). *GIM International*, 19(9).

Gregg, P. and Machin, S. (2000). Child development and success or failure in the youth labor market. In *Youth employment and joblessness in advanced countries* (pp. 247-288). University of Chicago Press.

Hasan, A. (2006). Orangi Pilot Project: The expansion of work beyond Orangi and the mapping In Arid Environments Using Optical Space Borne Data. International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 36 (3/W49A).

Hassan R., Atika H., Aziza B. & Mustapha, H. (2011). Detecting Slums from SPOT Data in Casablanca Morocco Using an Object Based Approach. *Journal of Geographic Information System, 2011, 3, 217-224.* Retrieved from (http://www.SciRP.org/journal/jgis)

Herald, M., Goldstein, N. C., & Clarke, K. C. (2006). The spatiotemporal Form of Urban Growth: measurement, analysis and modeling. *Remote Sensing of Environment*, 86(3), 286-302.

Hobcraft, J. (1998). Intergenerational and life-course transmission of social exclusion: Influences and childhood poverty, family disruption and contact with the police. *LSE STICERD Research Paper No. CASE015*.

Hofmann, P. (2001). Detecting Informal Settlements from Ikonos Image Data Using Methods of Object Oriented Image Analysis: An Example from Cape Town (South Africa). *Remote Sensing of Urban Areas*, 107–118.

Hofmann, P., Strobl, J., Blaschke, T. & Kux, H. (2008). Detecting informal settlements from Quickbird data in Rio de Janeiro using an object based approach. In T. Blaschke, S. Lang & G. J. Hay (Eds.), Object-Based Image Analysis (pp. 531-553): Springer Berlin Heidelberg.

Huchmeyer, M. & A. Karam (2006). Informal settlements: A perpetual challenge? UCT Press, Cape Town, South Africa. In Hofmann, P., (2001): Detecting Informal Settlements from IKONOS Image Data Using Methods of Object Oriented Image Analysis – An Example from Cape Town (South Africa).

Hurskainene, P. & P. Pellika, (2004). Change detection of informal settlements using multi-temporal aerial photographs – the case of Voi, SE-Kenya. Department of Geography, University of Helsinki (Accessed Jan 2013)

Indymedia, (2008). Politics in the Slum, New York, USA. Available at http://nyc.indymedia.org/en/ Accessed on 11/09/2012

Jain, S. (2007). Use of IKONOS satellite data to identify informal settlements in Dehradun, India. International Journal of Remote Sensing, 28(15), 3227 - 3233.

Jain, S., Sokhi, B. S. & Sur, U. (2005). Slum identification using high-resolution satellite data. *GIM International*, 19(9).

Joshi, P., Sen, S. & Hobson, J. (2002). Experiences with surveying and mapping Pune and Sangli Sangli slums on a geographical information system (GIS). *Environment and Urbanization*, 14(2), 225-240.

(KADSEEDS) Kaduna State Economic Empowerment and Development Strategy (2014) Kaduna State Government: State Development Plan 2014-2018. Ministry of Economic Planning

Karanja, I. (2010). An enumeration and mapping of informal settlements in Kisumu, Kenya, implemented by their inhabitants. *Environment and Urbanization*, 22(1), 217-239.

Kayode F.O. (2010). An Assessment of Housing Condition and Socio-Economic Life Styles of Slum Dwellers in Akure, Nigeria. *Contemporary Management Research*, 6(4), Pages 273-290.

Kohli, D., et al. (2011). An ontology of slums for image-based classification. Computers, Environment and Urban System.

Lemma, T., R. Sliuzas & M. Kuffer (2005) A participatory approach to monitoring slum conditions. (Accessed Jan 2013).

Lemma, T., Sliuzas, R. V. & Kuffer, M. (2006). A Participatory Approach to Monitoring Slum Conditions: an example from Ethiopia. In: Participatory learning and action (2006)54. Special issue on: Mapping for change: practice, technologies and communication: proceedings of the international conference on participatory spatial information management and communication PGIS '05 - KCCT, Nairobi, Kenya, 7-10 Sept 2005. / ed. by Giacomo Rambaldi; Jon Corbett; Mike McCall; ...[et al.] London: IEED, 2005. pp. 54-58.

Lugalla, J. (1995). *Crisis, Urbanization, and Urban Poverty in Tanzania: A Study of Urban Poverty and Survival Politics*. Lonham: University Press of America.

Mabogunje, A. (2001). Sustainable partnerships for city development: *A paper presentation by Professor Akin L. Mabogunje to the Public Policy Forum of the Cities Alliance held in Kolkata, India*, October 10th, 2001

Majale, M. (2002). Towards Pro-Poor Regulatory Guidelines for Urban Upgrading. *A review of papers presented at the International Workshop on Regulatory Guidelines for Urban Upgrading held at Bourton-on- Dunsmore*, May 17-18, 2001

Mallo, I.I.Y. & Obasanya, V.G. (2012). Socio-economic effects of Demolishing Squatter Settlements and illegal structures in Abuja Metropolis, Federal Capital Territory, Nigeria. *Con. J. Envtal Std*, 7:10 – 21

Mareng, C. (2010). Development of Women's Education in Kenya. I*nternational NGO Journal*, 5(3):68-73. http://www.academicjournals.org/ingoj/PDF/pdf2010/Mar/Mareng.pdf

Mason S. & Fraser, C. (1998). "Image Sources for Informal Settlement Management," The Photogrammetric Record, 16(92), 313-330

Mathenge, C. W. (2011). Application of object oriented image analysis in slum identification and Monitoring Informal Settlements in Developing Countries Where Complimentary Data Does Not Exist. Council for Scientific and Industrial Research (CSIR), Built Environment Unit, 314-328.

Max Lock Centre (2003) 'The background of Kaduna in the Nigerian federal context, Appendix D', Max Lock Centre, University of Westminster, London

Midat, J. (2012) Nigeria: Hell of Life in Kaduna Leper's Slum. *The leadership*

Moreno E., (2003) Slums of the World: The face of urban poverty in the new millennium?

Muli, E. M., (2012) Change Detection of informal settlements using remote sensing and Geographic Information Systems: Case of Kawangware, Nairobi (1990-2010)

Najam, A., Papa, M. & Taiyab, N. (2006). Global Environmental Governance: A Reform Agenda. International Institute for Sustainable Development, Winnipeg, Manitoba, Canada retrieved from http://www.iisd.org/pdf/2006/geg.pdf 12/6/2014

Napier, M. (2000) *Human Settlements and the Environment.* Report prepared for the Department of Environmental Affairs and Tourism, Pretoria, South Africa. Available on: http://www.environment.gov.za/soer/index.htm

Narayan, D., Chambers, R., Shah, M.K. and Petesch, P. (2000) Voices of the Poor: Crying Out Nations.

Ndulu, B. (2006) "Infrastructure, Regional Integration and Growth in Sub-Saharan Africa: Dealing with the Disadvantages of Geography and Sovereign Fragmentation" *Journal of African Economies, vol 15, AERC supplement 2, pp. 212-244*

Negera D.S. (2012). Identifying and Classifying Slum Development stages from Spatial Data. Thesis submitted to the faculty of Geo-Information Science and Earth Observation of the University of Twente, Netherlands.New York. http://hdr.undp.org/en/media/HDR_2010_EN_Complete_reprint.pdf) New York: Oxford University Press.

Niebergall, S., Loew, A. & Mauser, W. (2008). Integrative Assessment of Informal Settlements Using VHR Remote Sensing Data: The Delhi Case Study.

Nobrega, R. A. A., O'Hara, C. G., & Quintanilha, J. A. (2006). Detecting Roads in Informal Informal Settlements Surrounding Sao Paulo City by Using Object-Based Classification. OBAI'06 - 1st International Conference on Object-Based Image Analysis. Slazburg, Austria.

NPC (2006). National Population Commission, Official Gazette. Abuja, Nigeria.

Olanrewaju, D.O. & Fadamiro, G. (2004). Flooding as an Induced Environmental Problem. A case Study of Ala River in Akure, Nigeria. *Journal of the Nigerian Institute of Town Planners,* 6(1):85-95.

Olotuah, A.O. (2005). Urbanization, Urban Poverty, and Housing Inadequacy. *Proceedings of Africa Union of Architects Congress,* 23-28 May, Abuja, Nigeria, pg. 185-199.

Omole, K.F. (2010). An Assessment of Housing Condition and Socio-Economic Life Styles of Slum Dwellers in Akure, Nigeria. *Contemporary Management Research,* 6(4):272-290.

Onibokun, A. G. (1985) Public Housing Delivery System in Nigeria (1979-1983); a Critical Review. Housing in Nigeria, Onibokun, A. G. (Ed.) Nigerian Institute of Social and Economic Research, NISER, Ibadan, 429-446.

Onibokun, A.G. & Kumuyi, A.S. (1996). *Urban Poverty in Nigeria: Towards Sustainable Strategies for its Alleviation*. Nigeria: Centre for African Settlements Studies and Development (CAESDO).

Ooi, G.L. & Phua, K.H. (2007). Urbanization and Slum Formation. *Journal of Urban Health*, 84(0), 27-34.

Patel, R.B. & Burke, T.F., (2009) Urbanization - An Emerging Humanitarian Disaster. *New England Journal of Medicine* 361: 741–743.

Paudel, H.K. (2003). 14-3-3 Connects Glycogen Synthase Kinase 3ß to tau within a Brain Microtubule-associated tau Phosphorylation Complex, *J. Biol. Chem*. 278:12722-12728

Payne, G. & Majale, M. (2004). *The Urban Housing Manual Publisher*. Earthscan Publications Ltd, 168 pages.

Penrose. K. (2010). Informal Urban Settlements and Cholera Risk in Dar es Salaam, Tanzania. PLoS Negl Trop Dis 4(3): e631. doi:10.1371/journal.pntd.0000631

Rukhsana, K. & Sheraz, A.B. (2006). Quantification of Socio Economic Deprivations of Squatter Settlement's Inhabitants: A Case Study of Lahore. *6th Global Conference on Business and Economics, Gutman Conference Center, USA. ISBN*: 0-9742114-6-X

Salau, A. T. (1992) Urbanization, Housing and Social Services in Nigeria. The Background History of Tudun Wada, Kaduna State.

Sangli slums on a geographical information system (GIS). Environment and Urbanization, 14(2), 225-240.

Sartori, G., Nembrini, G. & Stauffer, F. (2002). Monitoring of Urban Growth of Informal Settlements (IS) and Population Estimation from Aerial Photography and Satellite Imaging. *Occasional paper- thirstycitiesinwar.com*. Nairobi.

Sen, S., Hobson, J., & Joshi, P. (2003). The Pune Slum Census: creating a socio-economic and spatial information base on a GIS for integrated and inclusive city development. [Proceedings Paper]. Habitat International, 27(4), 595-611.

Shackelford, A. K., & Davis, C. H. (2003). A Combined Fuzzy Pixel-Based and Object-Based Approach for Classification of High-Resolution Multispectral Data over Urban Areas. IEEE Transactions on Geoscience and Remote Sensing, VOL. 41, NO. 10, OCTOBER 2003.

Shekhar S., (2012). Detecting Slums from Quick Bird Data in Pune using an Object Oriented Approach. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XXXIX-B8, 2012. XXII ISPRS Congress, 25 August – 01 September 2012, Melbourne, Australia

Sliuzas, R. V., Ottens, H., & Kreibich, V. (2004). Managing Informal Settlements: A Study using Geo - information in Dar es Salaam, Tanzania. ITC, Enschede.

So, A.T.P & Leung, A.Y.T., (2004): Survey of Attitudes towards Buildings in Three Chinese Cities: Hong Kong, Shanghai and Taipei. *Facilities* 22(3/4): 100-108.

Sori, D. N. (2012). Identifying and Classifying Slum Development Stages from Spatial Data

Srivastava, A. and Singh, R. C. (1996) Slums and associated problems: A case study of Bhilai, an industrial city, India, *International Journal of Environmental Studies*, 50, pp: 51-60.

Stasolla, M., & Gamba, P. (2007). Exploiting Spatial Patterns for Informal Settlement Detection In Arid Environments Using Optical Space Borne Data. International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 36 (3/W49A).

Sumanta D. (2014). Slum redevelopment strategy using GIS based multi-criteria system: A case study of Rajkot, Gujarat, India. World *Journal of Civil Engineering and Construction Technology,* 1(2), pp. 012-041. www.premierpublishers.org ISSN: 1936-868X.

Taubenböck, H., Wegmann, M., Roth, A., Mehl, H., & Dech, S. (2009). Urbanization in India - Spatiotemporal analysis using remote sensing data. Computers, Environment and Urban Systems, 33(3), 179-188.

The World Bank (2001) Upgrading Urban Communities: A Resource Framework. Washington,

The World Bank and UNCHS (2001). Cities alliance for cities without slums. Action

Ujjwal S., Sadhana J. and Sokhi B.S. (2004). Identification and Mapping of Slum Environment using IKONOS Satellite Data: A Case Study of Dehradun, India, http://www.gisdevelopment.net/application/environment/pp/mi04011.htm

UN Habitat. (2005). Situation Analysis of Informal Settlements in Kisumu, Kenya: Slum Upgrading Programme and Cities Without Slums. Nairobi.

UN Habitat. (2007). *Kenya Slum Upgrading Programme* (KENSUP). Nairobi, Kenya.

UN Habitat. (2008). *State of the World's Cities 2008* - HARMONIOUS CITIES. Nairobi, Kenya.

UN Habitat. (2010a). *The State of African Cities 2010*: Governance, Inequality and Urban Land Markets. Nairobi, November 2010.

UN Habitat. (2010b). State of the World's Cities 2010/2011: Bridging the Urban Divide. GB: Earthscan.

UNCHS (1996). An Urbanizing World: Global Report on Human Settlements 1996, Oxford: Oxford University Press.

UNDP (2009) Human Development Report, New York: Oxford University Press.

UNDP (2010). Human Development Report. United Nations Development Programme (UNDP), New York. http://hdr.undp.org/en/media/HDR_2010_EN_Complete_reprint.pdf)

UNDP (United Nations Development Programme) (2000) *Human Development Report 2000*. New York: Oxford University Press.

UN-HABITAT (2003). The Challenge of Slums - Global Report on Human Settlements 2003

UN-HABITAT (2003). The challenge of slums: Global report on human settlements Geneva.

UN-HABITAT (2007). Enhancing Urban Safety and Security Addresses Three Major Threats to the Safety and Security of Cities: Crime and Violence; Insecurity of Tenure and Forced Evictions; 2007

UN–Habitat (2009) "For a Better Urban Future: The Participatory Slum Upgrading Programme (PSUP)". Narrative Report, 2009.

UN-Habitat (2010). "The State of African Cities 2010: Governance, Inequality and Urban Land Markets. Nairobi": UN-Habitat.

UN-HABITAT (2010). State of world's cities 2010/2011: United Nations Human Settlements Programme (UN-HABITAT).

UN-Habitat (2011) State of African cities: Governance, Inequalities and Urban Land Markets.

UN-Habitat. (2008). State of the world's cities 2008/2009 harmonious cities. London e Sterling,

UNHCS (1996). Indicators Programme, United Nations Centre for Human Settlements (Habitat) at http://www.unchs.org/ 20 December 2014

United Nations (2007). The millennium development goals report 2007. New York: United

United Nations Human Settlements Program (UN-HABITAT), (2003). The Challenge of Slums: Global Report on Human Settlements 2003. Nairobi: UN-HABITAT.

United Nations Human Settlements Program. (2009). UN-HABITAT annual report 2008. [Online]. Available: http://www.unhabitat.org/pmss/ Accessed 15.07.14

UNSTAT, 2005: http://unstats.un.org/unsd/environmentgl/gesform.asp?getitem= 665 Upgrading Programme and Cities Without Slums. . Nairobi. *Urban Studies*, 42, pp. 1345-1368.

Uwadiegwu, B.O., (2013). The Structural Profile of the Socio-economic and Housing Problems of the Slum Area in Enugu City, Nigeria; *An Insider's Perception. Int. J. Eng. Sci*. 2(3):8-14.

Wahab, B., (2001). Grassroots Participation in Sustainable Urban Development of Slum and Squatter Settlement. Paper Presented at the 32nd Annual Conference of the Nigerian Institute of Town Planners, Uyo, Akwa Ibom State.

WHO (1998). The World Health Report 1998: Life in the Twenty- First Century: A Vision for All.

WHO, (2008). "Report on Violence and Health in Africa"Geneva.

World Bank (1994). Infrastructure for development, World Development Report, New York:

World Bank (2000). Entering the 21st century: World Development Report 1999/2000. New York.

Zulu M., (2011) Overview of Migration, Poverty and Health Dynamics in Nairobi City's Slum Settlements. *Journal of Urban Health*

Appendix

DEPARTMENT OF GEOGRAPHY
AHMADU BELLO UNIVERSITY, ZARIA

QUESTIONNAIRE ON THE EFFECTS OF SETTLEMENT CHARACTERISTICS ON SOCIO-ECONOMICS OF SLUM RESIDENTS IN KADUNA SOUTH LGA, KADUNA STATE

Dear Respondent,

This questionnaire is designed as part of a M.Sc. research on "THE EFFECTS OF SETTLEMENT CHARACTERISTICS ON SOCIO-ECONOMICS OF SLUM RESIDENTS IN KADUNA SOUTH LGA, KADUNA STATE." This exercise is purely academic and so any information supplied would be used strictly for that purpose and thus treated strictly as confidential.

SOCIAL, DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF RESPONDENT

Area: Dan Quarters [ ] Gangare [ ]

1. Age (a) 20-30 (b) 30-40 (c)40-50 (d)50-60 (e) above 60
2. Sex (a) Male (b) Female
3. Marital Status (a) Single (b) Married (c) Separated (d) Divorced (e) Widowed
4. Type of marital union (a) Monogamy (b) Polygamy (c) others
5. If polygamy, number of wives (a) 2 (b) 3 (c) 4 (d) above 4
6. Number of children (a) 0-5 (b) 5-10 (c) 10-15 (d) 15-20 (e) above 20
7. Level of educational attainment (a) none (b) primary (c) Secondary (d) Tertiary (e) others(specify)_____
8. Occupational Pattern (a) Farming (b) Craftsmanship (c) Trading (d) Civil Service (e) Unemployed (f) Apprentices
9. If employed, how much do you earn in a month?
10. If unemployed, how much do you make in a day?
11. Number of people living in the house (a) 1-5 (b) 5-10 (c) 10-15 (d) 15-20 (e) above 20

SHELTER AND TENURE CHARACTERISTICS

12. Do you own your accommodation? (a) Yes (b) No
13. If no, what is the nature of your stay? (a) Free (b) Renting (c) Official (d) others(specify)_____
14. What type of house do you live in? (a) Rooming type (b) Flat (d) Duplex (e) others(specify)_____
15. How long have you been living in the house? (a) Below 10yrs (b) 10-19yrs (c) 20-29yrs (d) 30-39yrs (e) above 40 yrs.
16. Availability of facilities

Facility	Yes	No
Toilet		
Bathroom		
Kitchen		
Drainage		

17. If yes, what is the type of toilet? (a) Earth dug (b) Pit latrine (c) Water closet (d) others(specify)_____
18. If no, where do you cook? (a) In the room (b) In the open space (c) in the shop (d) Outside the house (e) Others(specify)_____
19. Material of building

facility	Material of building				
	Concrete	Planks	Iron sheets	Mud blocks	Others
Main building					
Toilet					
Bathroom					
Kitchen					

20. What is the nature of usage of the house? (a) For residential purpose only (b) Residential and commercial purposes (c) Others (specify) _____
21. What is the nature of accessibility to the house? (a) Accessible by foot only (b) Accessible by bicycles/tricycles (c) Accessible by car (d) Accessible by all modes of transport

BASIC INFRASTRUCTURAL FACILITIES/ SERVICES

22. Is there electricity supply in this area? (a) Yes (b) No

23. If yes, what is the nature of supply of electricity? (a) Very poor (b) Poor (c) Fair (d) Good (e) Excellent

24. Arrange the sources of light in the order of usage

S/No.	Sources of light	Arrange in hierarchy of usage
1	Local lamp	
2	Rechargeable lantern	
3	Generator	
4	Power supply	

25. Is there good road network in the area? (a) Yes (b) No
26. If yes, what is the condition of road network? (a) Very poor (b) Poor (c) Fair (d) Good
27. Is there drainage systems in the house? (a) Yes (b) No
28. If yes, what is the condition of drainages? (a) Very poor (b) Poor (c) Fair (d) Good
29. Is there any public school(s) in the area? (a) Yes (b) No
30. If yes, how many? (a) 1 (b) 2 (c) 3 (d) above 3
31. What is the condition of teaching service? (a) Very poor (b) Poor (c) Fair (d) Good
32. Is there any health care centre(s) in the area? (a) Yes (b) No
33. If yes, how many? (a) 1 (b) 2 (c) 3 (d) above 3
34. What kind of health care centre is in the area? (a) Primary Health Care Centre (b) Hospital (c) Maternity centre (d) Others (specify) _____
35. What is the condition of health service? (a) Very poor (b) Poor (c) Fair (d) Good
36. Is there pipe born water supply? (a) Yes (b) No
37. If yes, what is the condition of water supply? (a) Very poor (b) Poor (c) Fair (d) Good
38. What do you think of water quality? (a) Very poor (b) Poor (c) Fair (d) Good
39. If No, what are the sources of water? (a) Local vendors (b) Well (c) Borehole (d) Stream

40. Arrange sources of water supply in the order of hierarchy

S/No.	Source of water supply	Arrange in hierarchy
1	Local vendors	
2	Well	
3	Tap	
4	Bore hole	
5	Stream	

ENVIRONMENTAL SANITATION/HYGIENE

41. How do you dispose your solid waste? (a) In dump site (b) By burning (c) By waste collection vehicle (d) Others (specify) _____
42. If no drainage, how do you dispose sewage? (a) Open space (b) Backyard (c) Outside
43. If no toilet, what do you use? (a) Public toilet (b) Backyard (c) Others_____
44. What do you use in cooking? (a) Firewood (b) Charcoal (c) Kerosene (d) Electricity (e) Others (specify) _____