THE CHALLENGES OF INFRASTRUCTURE PLANNING IN URBAN SLUMS CASE STUDY OF KOSOVO, MATHARE 4B, AND GITATHURU SLUMS IN MATHARE VALLEY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university. No part of this thesis may be reproduced without the prior written permission of the author and/or the University of Nairobi.

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DEDICATION

I would like to dedicate this research to my family especially my dear wife Lucy Njeri, son Phinehas and my lovely daughter Bridget. I sincerely thank you for your support and encouragement during the research period. I will forever be indebted to you may God richly bless you.

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To my family members, I am very grateful for the constant love, care, encouragement, financial and moral support throughout my life and career development.

Finally I thank God for His Grace in undertaking this research; I can only affirm that "I can do everything through Christ who strengthens me".

ABSTRACT

The growth and expansion of slums is alarming and needs more attention. The inability of city authorities to plan effectively as well as enforce urban planning and land laws have given rise to haphazard development of settlements and proliferation of slums. Sustainable development being a major component of urban planning calls on planners to view slums as an aspect of urban development. Therefore the question of slum is not marginal to urban development but it is at its very heart. The purpose of this study is determine the challenges of infrastructure planning in urban slums and takes a case study of three slum settlements, Kosovo, Mathare 4B, and Gitathuru, in Mathare Valley. The study establishes the factors that have led people to settle in the slum settlements and go further to identify the nature and status of the existing infrastructure. Opportunities and challenges for infrastructure provision are established with and an aim of establishing a sustainable infrastructural planning framework that would enhance better living conditions and environmental quality in Mathare Valley.

The study adopted a mixed method approach targeting all the 5,897 households in the study area. The use of several research instruments which included; household questionnaires, interview schedule with key informants, observation schedule that was enhanced by the use of photography and a document analysis guide was employed. Spatial stratified sampling and systematic random sampling approach was adopted to identify the households. In total 85 households participated in this study. The data generated by questionnaires, interview and observation schedules were analyzed using SPSS 17. Spatial data generated by visual image interpretation, field observations and the checklist were supplemented by GPS measurements, and later processed in GIS environment. ARCGIS 9.3.1 was used to carry out spatial analysis and offered an interface between spatial and non spatial data and finally helped in the production of for this study. Analyzed data was then summarized into frequencies and percentages and presented in tables, bar charts and figures.

Findings of the study indicate that urban poverty and the close proximity of the slums to Nairobi Central Business District was the major cause that led people to settle in these slums. In addition to the infrastructural provision in the slums being inadequate the

existing infrastructure was not only inefficient but poorly maintained. Lack of security of tenure, location of slums, and space requirements for infrastructure emerged as the major challenges to infrastructural provision in the slums. In addition to these, existing conflict between the structure owners and tenants aggravated the situation of infrastructural provision. Community participation emerged as the best solution of enhancing infrastructural provision within the slums. The study recommends that measure be put in place to tackle urban poverty by providing economic opportunities for the poor and also recommends that an urban planning framework for slums be incorporated in urban planning. This should take into consideration the existing nature of the slums and provide for measures that are tailored for the slums. Finally, the study suggests that further study be undertaken to determine how issues surrounding struggles between tenants and structure owners in service provision can be alleviated.

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ABBREVIATIONS AND ACRONYMS

CBO	Community Based Organization
CCN	City Council of Nairobi
COHRE	Centre for Housing Research
COHRE	The Centre on Housing Rights and Evictions
CWS	Cities without Slums
EPFL	Swiss Federal Institute of Technology
FIG	International Federation of Surveyors
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GPS	Global Positioning System
KNBS	Kenya National Bureau of Statistics
KPC	Kenya Power Company
MDG	Millennium Development Goals
MuST	Muungano Support Trust
NGO	Non-Governmental Organization
NSDF	National Slum Dwellers Federation
NSWC	Nairobi Water and Sewerage Company
PT	Pamoja Trust
SOK	Survey of Kenya
SPSS	Statistical package for Social Science
UN	United Nations
UNDP	United Nations Development Programme

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the last five decades, rapid urbanization has been one of the greatest socio-economic changes to occur in the world. It has brought with it many challenges; the major one being that of urban sprawl occasioned by rural urban migration. This has resulted in flourishing of new kinds of slums and squatter settlements. It is envisaged that all future urban growth in developing countries will be absorbed by urban centres, which have a high average annual urban population growth rate of 2.3% compared to 0.4% in developed countries (UN-Habitat, 2003).

UN-Habitat (2003) estimated that over two billion people lived in urban areas in the developing countries. In Africa, Caribbean and pacific countries 70% of the urban populations live in slums or informal settlements. Rising trends of urbanization poses major challenges to both local and national governments of developing countries, The challenge of how to deal with slums in terms of provision of adequate basic services, infrastructure and economic empowerment through job creation and general environmental quality have been the serious issues that these authorities have had to contend with (Mitlin 2003)

Most of the urban poor in the developing countries live in informal settlements or slums. Slums tend to be associated with inadequate provision of infrastructure and services. The increasing trends of urban population associated with unmatched magnitude in urban infrastructure provision in the slums or informal settlements have remained a major challenge in dealing with the slum phenomena. Economic and financial strains of many developing countries have led to little intervention in infrastructure and basic needs provision for the urban population resulting in slums or informal settlement being neglected. (UN-Habitat, 2003).

In Kenya, especially in Nairobi slums poses precarious challenges in the way they form and the way they are managed. The structures within the slums are made of salvaged materials e.g. wood, iron sheets and are built without complying with legal building

procedures. Most of the settlements are located in contested lands in riparian and utility reserves while others encroach/squat on government or private lands. This has a bearing on the tenure as it becomes difficult to grant security of tenure in such areas, this notwithstanding many slum dwellers reside in habitable areas eg government lands still lack secure tenure. More often than not when slums sit on such areas many authorities tend to neglect them and often do not recognize them as a fundamental part of the city. Slums are physical and spatial manifestation of urban poverty, Slum dweller lack proper and adequate infrastructure services, such as water supply, sanitation, drainage, waste disposal and proper road access. Target 11 of The Millennium Development Goals (MDGs), the international community agreed to take action to improve the lives of slum dwellers. This target recognizes the importance of improving upon the quality of life of slum dwellers globally. It is envisaged that by 2020, a significant improvement in the lives of at least 100 millions slum dwellers would be achieved (UN Habitat, 2009).

Despite these efforts, lack of basic infrastructure and services in the slums and informal settlements has led the deplorable living conditions in the slums and informal settlement in cities of developing Countries. It is therefore necessary to investigate the challenge of infrastructure planning in three slums in Mathare Valley and based on its finding proposes recommendation on appropriate planning interventions that would facilitate integrated infrastructure provision that would enable, sustain and enhance better living conditions and environmental quality for the slum dwellers.

1.2 Statement of the Problem

In the past there have been growing global concern about slums as indicated in the United Nations Millennium Declaration and subsequent identification of new development priorities by the international community. As a result of increasing numbers of urban slum dwellers, governments adopted a specific target on slums highlighted as the Millennium Development Goal (MDG) 7, Target 11, whose aims was to significantly improve the lives of at least 100 million slum dwellers by the year 2020.

Many past responses to the problem of urban slums have been based on an erroneous belief that provision of improved housing and related services through slum upgrading

and physical eradication of slums would solve the slum problem. Solutions based on this premise have failed to address the main underlying causes of slums (UN-Habitat, 2003).

One of the major challenges in basic service provision in slum areas is related to poor planning for infrastructural services. Tshikotshi (2009) in a study on the challenges of eradicating informal settlements in South Africa noted that inappropriate planning was a major contributor to poor infrastructural provision in informal settlements. UN-Habitat (2003) emphasizes on the need of pro-poor planning and management so as to not only enhance the income-generation opportunities for the urban poor but also as a mechanism of infrastructural provision in urban slums.

The UN Habitat (2009) indicates that More than 34% of Kenya's total population lives in urban areas and of this, more than 71% is confined in informal settlements. It is estimated that 60 percent of the inhabitants of Nairobi City live in these informal settlements occupying less than 1% of Nairobi's area and less than 5% in residential area **(**Mittulla 2003). These informal settlements are mostly characterized by existential indigence, insufficient infrastructure and difficult living conditions. The main problems associated with urban slums are the lack of basic supply e.g. accessibility, drinking water, electricity or communication systems and inadequate hygienic conditions

In spite of the fact that Kenya is making frantic efforts to address the slum issue through various policy and programmes eg housing policy, land policy and KENSUP respectively the impacts of these interventions are yet to be realized. The growth and expansion of slums is alarming and needs more attention. The inability of city authorities to plan effectively as well as enforce urban planning and land laws have given rise to haphazard development of settlements and proliferation of slums

The researcher notes that, in infrastructural provision for urban slums in Nairobi County, there are no concerted efforts to incorporate the tenets of planning as a tool of infrastructural provision in Nairobi slums leaving the urban poor in these settlements to provide the services for themselves in their own ways. This study looks at the planning challenges that exist in infrastructural provision in urban slums by taking a case study of Kosovo, Mathare 4B and Gitathuru slums in Mathare Valley.

1.3 Research Objectives

1.3.1 General Objectives

The purpose of this study was to determine the challenges of infrastructure planning for urban slums by taking a case of Mathare Valley Slums in Nairobi County, Kenya.

1.3.2 Specific Objectives

The specific objectives of the study will be to:

1. Examine the factors leading to settlement in the study area.
2. Identify the nature and status of existing infrastructure in study area.
3. Establish the opportunities and challenges for infrastructure provision in the study area.
4. Determine a sustainable infrastructural planning framework that would enhance better living conditions and environmental quality in the study area.

1.4 Research Questions

1. What are the factors leading to slum settlement in the study area?
2. What is the nature and status of existing infrastructure in Mathare Valley Slums?
3. What are the main challenges and opportunities for infrastructure provision in the study area?
4. What planning interventions/approaches would be appropriate for sustainable infrastructural planning that would enhance better living conditions and environmental quality in the study area?

1.5 Scope of the Study

Geographically the study covers Mathare valley slums .Within Mathare valley there are eleven slums, the study however, specifically focuses on three slums namely; Kosovo, Mathare 4B and Gitathuru.

The settlements were chosen because of various reasons including previous interventions in infrastructure pilot projects, availability of trunk infrastructure, presence of many Civil Society Organization's (CSO's) dealing with aspects of slum data collection, community organizing and basic services delivery and finally because the settlements are on government land.

The subject of the study covers households' socio economic and spatial characteristics, basic services, housing conditions, status and nature of the existing infrastructure and challenges and opportunities for infrastructure provision.

1.6 Justification and Significance of the Study

The slum phenomena have been a challenge to cities of developing countries and consequently efforts to sort out challenges associated with these slums have been left to planners and the planning authorities. In the process of trying to address this challenge various approaches to slum upgrading has been tried with the primary goal of making better the living conditions of slum dwellers and most importantly preventing proliferation of slum settlements. These approaches have had their challenges and effects hence a clear indication that Government, local authorities, planners and professionals in the landed profession are yet to demonstrate an approach that effectively and sustainably address issues of slums in urban areas.

Mathare slums reflect this deficiency despite the fact that the slums significance advantage like, proximity to the city -5km from the city ,availability of trunk infrastructure-water and sewer within the settlement, connectivity to major transportation network, settlement being on a river front –Mathare and Gitathuru river etc. Mathare slums have over time attracted many organizations, public and private, in an attempt to improve living conditions of the slum dwellers through multiple slum projects. Despite these efforts there has been limited success towards this course.

The findings and recommendations will be beneficial to national government, county governments, civil society organizations, NGO's and international organizations concerned with improving the lives of slum dwellers.

It is envisioned that the research findings and recommendations will also provide planning benchmarks for provision of infrastructure in slums. The findings will also add to the body of knowledge and could be a source of future reference by other scholars who might need to dwell on similar or related issues.

1.7 Limitations of the Study

The major setbacks to this study were largely from data sources and data quality problems. For example there are many organizations within the study area dealing with different aspects of infrastructure services but they had inconsistent data on the same subject. A case in point is while MuST and PT local NGO's had comprehensive enumeration data at household level, similar data from KNBS especially on population was different. The researcher relied on the enumeration data as it was generated through a community process and the opinion leaders held the position that it was more accurate.

Lack of up to date spatial data in form of maps for the study area made it hard analyze physical planning issues, a lot of time was used by the researcher to collect the spatial data to update the base maps. Maps from sources like. NWSC, PT, MuST and SoK were inconsistent in terms of their coordinates systems and hence overlaying the water infrastructure map to the cadastral map hard considerable shifts and hence the researcher had difficulties carrying out spatial analyzed based on different thematic layers.

Again, Mathare valley has attracted many researchers, local and international alike. There has been a sense of research fatigue among opinion leaders and many resourceful persons significantly undermining the accuracy of information as some of them were too busy to attend discussion groups and would send their proxies' .Other respondents gave biased responses. Similarly institutional survey was a difficult task to undertake as the sampled officers from the various institutions were too busy to provide the information on time thus contributing to delay in this research.

1.8 Outline of the Research

The research has been structured into five chapters. Chapter one introduces the research, identifies the key problem under investigation, states the general and specific objectives and asks the relevant research questions. It further defines its scope, gives a justification for the topic and outlines the limitations of the research. This chapter is significant to the study as it puts the study into perspective and helps to check deviations.

Chapter two offers an overview of the study area laying focus on the emergence of slums in Nairobi and the eventual emergence of the Mathare Valley where the three settlements

of focus are situated. It gives the historical background of the evolution of the Mathare Valley Slums.

Chapter three presents a review of relevant literature on slum and urban development definition of related terms, review of growth of slums in the world, slum policies in Africa challenges and opportunities of infrastructure planning and provision through selected case studies .The chapter concludes by looking at the theory of slums and housing by tuner and based on this theory, a conceptual framework is constructed. In general this chapter provides the theoretical and historical information needed to carve a methodology for the research.

Chapter four focuses on the research design, the data requirement and the source of the data, the research instruments employed, instruments validity and reliability, target population, sample and sampling procedures, data collection procedures and data analysis procedures

Chapter five gives a brief background of Mathare Valley and the selected slums. This chapter provides the presentation, analysis and interpretation of the socio-economic and spatial data collected in the field. This chapter attempts to answer the research questions and forms the basis for the research recommendations

Chapter six constitutes the key findings, recommendations and a general conclusion for the study. The chapter provides recommendations on the subject of study and thus contributes to the body of knowledge and provides an opportunity for further research.

CHAPTER TWO

BACKGROUND ON THE AREA OF STUDY

2.1 Location

The area of study was in three settlements located in the Mathare Valley Slums namely: Kosovo, Gitathuru and Mathare 4B. Mathare valley is located on the northern part of Nairobi city and covers and estimated area of 157 hectares. The Valley stretches from Pangani slopes along the Mathare River to the intersection of Gitathuru and Mathare Rivers. To the West, the Valley borders Pangani, to the north it is enclosed by the Mathare Police Depot, Mathare Primary School and Mathare Mental Hospital while to the South it borders Juja Road which separates it from Eastleigh and to the east it borders Huruma Estate.

Mathare Valley is comprised of 13 villages: Mashimoni, Mabatini, Village No. 10, Village 2, Kosovo, 3A, 3B, 3C, 4A, 4B, Gitathuru, Kiamutisya, and Kwa Kariuki. The settlement sits within a valley of the Mathare and Gitathuru Rivers. Mathare is one of the oldest and largest informal settlements in Nairobi (MuST, 2012).

2.2 Demographic Information

According to MuST (2012) Mathare Valley is an informal settlement that is home to nearly 200,000 people and is confronted by several challenges. It is one of the largest slums in Nairobi a city is that is known to house over 180 different slums. Mathare is characterized by unsafe and overcrowded housing, elevated exposure to environmental hazards, high prevalence of communicable diseases, and a lack of access to essential services, such as sanitation, water and electricity. The residents of Mathare suffer from tenure insecurity and widespread poverty and violence which increase their vulnerabilities. Mathare Valley slums are characterized by lack of basic services such water, sanitation and electricity for a majority of its residents and infrastructure improvements ranks as a top priority for the area. Though there have been national focused planning policies, no comprehensive development plans currently exist that integrate physical and social planning for the Mathare Valley (MuST, 2012.)

2.2.1 Population Density

Table 2.1 Population Density

Settlement	Area (Ha)	Population	Population Density/Ha	Population Density/Acre
Kosovo	7.9159	8085	1021	414
Mathare 4B	4.2385	5681	1340	543
Gitathuru	4.7409	3737	788	319
Total	16.8953	17503		

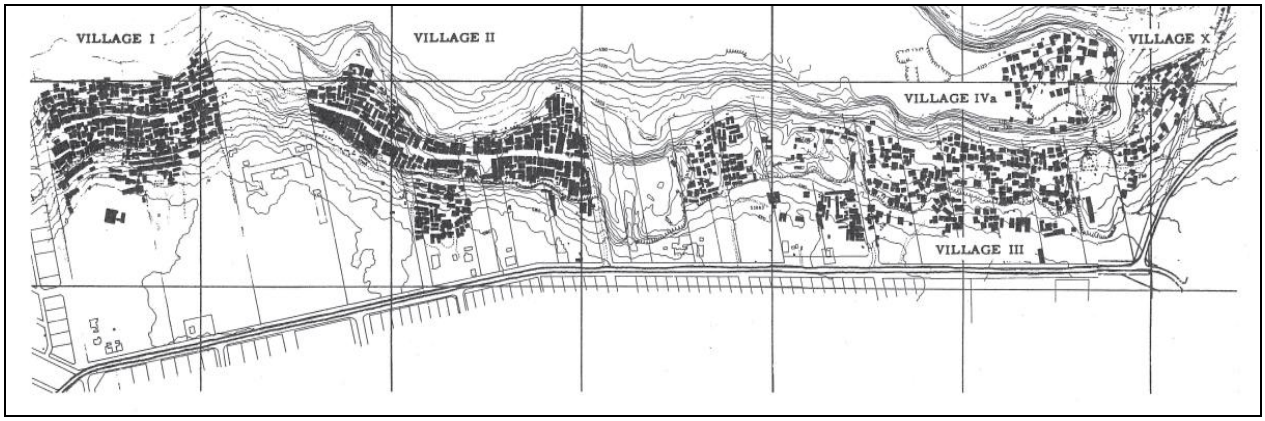
(Calculations done by Author using available Data on population (Census, 2009) and GIS mapping)

Table 2.1 indicates the population densities of the study area. Mathare 4B has the highest population density with 543 persons per acre while Kosovo has 414 persons per acre and Gitathuru has 319 persons per acre. Comparing these with low density areas of Muthaiga where one acre houses one two three households then the population density in the study area can be seen to be very high.

2.2 Slum Development in Nairobi

The growth of slums in Nairobi is directly related to the growth of the city. The city of Nairobi emerged with Railway line in 1901 and has since then grown as an administrative city. During the construction of the Railway line, Nairobi lay at the point where the railway entered the highlands regions of Kenya. Within this period Nairobi became the collecting centre and distribution point for the export produce of the highland communities. All export commodities were collected and graded in the city while all imports to the highlands passed through the city on the way to their destinations. In this way Nairobi emerged as an administrative town (van Zwanenberg, 1972).

Map 1: Map of Mathare Valley Structures in Different Villages in 1969.



Source: MuST (2012)

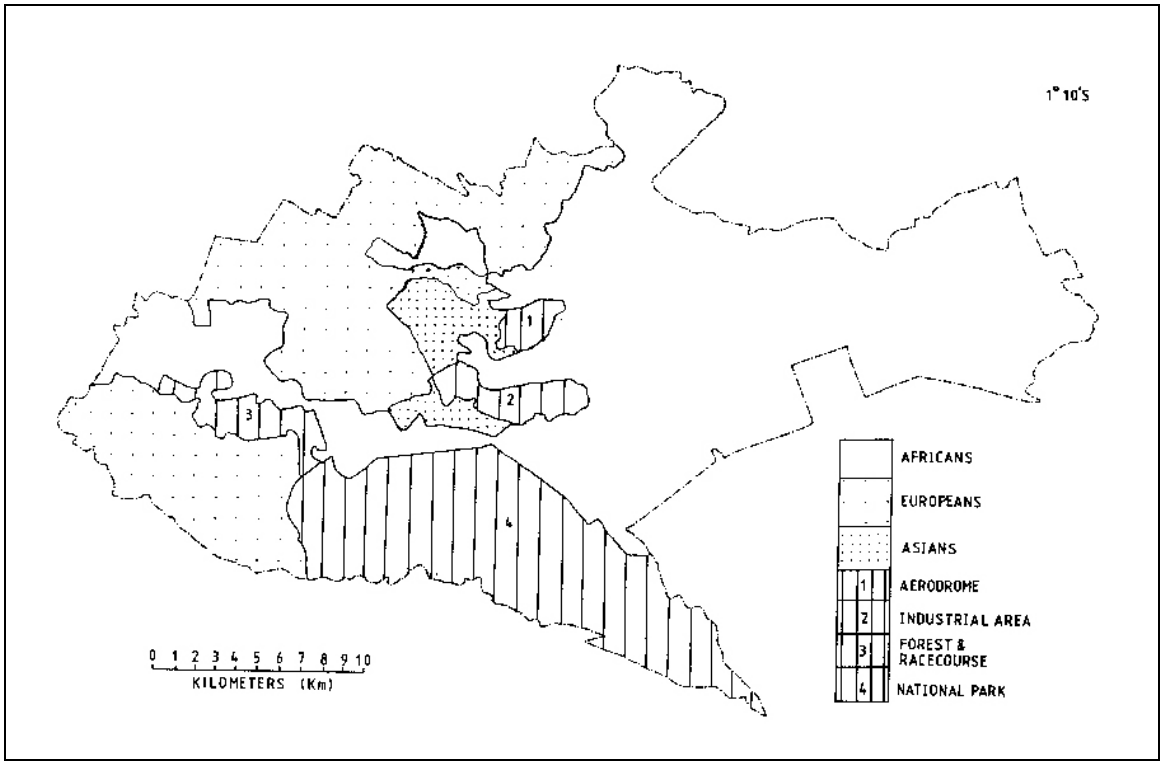
After Kenya attained independence in 1963 it experienced an increase in the speed of economic development and Nairobi continued to draw in foreign capital and investors in the city. Before independence Nairobi was characterized by the separation of various communities along racial lines. The colonial masters believed in their wealth and in the 'garden city' aspect of a city layout. This had seen Parklands becoming predominantly an Asian setting while mass of the mass of the population ended up being pushed to live in Eastleigh, Pumwani, Pangani and Mathare Valley.

The emergence and growth of slums in Nairobi has resulted from a variety of factors which are historical and contemporary in nature. According to Olima (2001) the forces that have contributed to urban spatial segregation in Nairobi are many and varied. Whereas some are of a legal nature others are cultural. Large scale government sanctioned racial segregation which was reinforced by planning laws as well as exclusionary zoning regulation saw the city being divided into four district sectors. North and East defined as the Asian Sector (Parklands, Pangani and Eastleigh); East and South East defined the African Sector (Pumwani, Kariokor, Donholm); South East to south marked another small Asian enclave before it was bounded by the Game Park (Nairobi South, Nairobi West). Finally, the line North and West marked the European area.

Majale (2004) as cited in Mitullah (2004) states that the emergence and development of slums in the colonial era was as result of; displacement of Africans to make room for European Settlers, colonial Government's policy of racial segregation, accompanied by a de facto policy of not allocating enough resources to cater for the housing needs of the

Africans, and clearance of "sub-standard" housing. Below is a map that shows spatial segregation in the colonial era.

Map 2: Map of Nairobi Showing Spatial Segregation



Source: MuST (2012)

After independence there was relaxation in policies and laws that prohibited movement of Africans to Nairobi resulting in an increased rural to urban to migration that saw the population of Nairobi rise. Despite the population increase there was no concomitant rise in housing provision. According to Shihembetsa (1989) the independence government allowed new immigrants to put up shacks within the city as long as they were not located near the Central Business District (CBD). This was accompanied by state action that protected some settlements while demolishing others.

2.3 History of Settlement Patterns in the Mathare Valley

Helen G.B (1980) indicates that before 1950s Mathare valley was predominantly owned by Asians who used to extract stones (brown) for building. It was later allocated to carrier corps who had earlier been settled in today's Kariokor market. Etherton (1970) estimates

that by 1963 50% of Nairobi's population lived in Eastleigh next to the current Mathare Valley slums.

Mathare valley was predominantly inhabited by the '*mau mau'* fighters in the late 1950's who used it the area as a hiding place for weapons and as an oathing area for new recruits. By this time there were only a few authorized houses in the area due to lack of proper sanitation and refuse disposal. After independence, there were many people who were left landless and without shelter and most of them came to Nairobi to look for employment. Unfortunately, there were no readily available jobs. This forced some to go back home while those who had no shelter and no land settled in Mathare valley that was government-unutilized land. They erected shanties that could be built at a minimal cost, to serve as shelters while still looking for employment. They also took casual work in industries and building construction sites. Some started brewing commercial *chang'aa* and *busaa* (illicit brews). Others started small food kiosks, green grocers and hawking. A case is highlighted where in 1968 huts were burnt around the Kaburini areas (currently Ziwani) and their occupiers had to take refuge in Mathare valley leading to further growth of the Mathare Valley Slums (Helen, 1980).

Other groups that inhabited the area after independence were youngsters who had migrated from rural areas in search of employment. Due to frustration as a result of lack of employment in the urban centre they could not afford the costly houses that were readily available in the city and thus to settle within the slums, Mathare Valley being one of them. Some of the group who never went back to rural areas started small businesses in slums, others engaged in illegal brewing and selling of illicit brews, bhang, others took up robbery with violence, while others took up prostitution.

2.4 Daily Life in Mathare Valley Today

Throughout their daily activities and tenacious efforts to earn a livelihood, Mathare residents may face difficult trade-offs and several demands on their time. Accessing healthcare may conflict with residents' livelihood strategies or involve heavy out-of-pocket expenditures. The available government health usually lack sufficient supplies of medication forcing residents to turn to private clinics or pharmacies. Transport costs are

not a major burden for Mathare patients, according to recent UoN and MuST surveys, but residents usually endure long waiting times.

Mathare residents frequently work extremely long hours, but many face various economic challenges such as low incomes, lack of childcare, and rising food prices.

CHAPTER THREE
LITERATURE REVIEW

3.1 Introduction

The literature review shall involve the systematic identification, location and analysis of documents containing information related to the research objectives as outlined by Mugenda and Mugenda (2003). In line with this, this chapter comprises the literature review of the study and takes a look at definition and characteristics of slums with an aim of understanding socio-economic and spatial structure of the slums in the study area. The chapter will also look at the various perspectives of infrastructure provision in the slums and give aspects of slums and urban development. The literature review will also entail discussions of the issue of slums from an international, regional and local perspective by taking cases of selected slums in the world. All this will be undertaken with an intention of establishing the challenges that face infrastructure provision in slums and thus help to propose a sustainable infrastructural planning framework that enhances better living conditions and environmental quality in slums.

3.2 Definition and Characteristic of Slums

The concept of slums and its definition vary from country to country and depend on the socio economic conditions of society the society in question. The term 'slum', since its first appearance in the 1820s, has widely been used to refer to areas that have poor quality housing, unsanitary conditions and act as refuge for criminals and drug abuse besides being a likely source for many of epidemics that ravage urban areas. The Merriam Webster Dictionary (1994) define slum as a heavily populated urban area characterized by substandard housing and squalor. Davis (2002) defines a slum as a residential area that has developed without legal claims to the land and/or permission from the concerned authorities to build; as a result of their illegal or semi-legal status, infrastructure and services are usually inadequate.

According to Cities Alliance Action Plan (1999), slums are neglected parts of urban towns where the state of the housing conditions and living conditions are appallingly poor. They are considered to range from high-density, squalid central city tenements to

spontaneous squatter settlements that do not have any legal recognition or rights and are seen to sprawl at the edge of urban centers.

This study adopts the proposed definition of slums by the UN-HABITAT Expert Group Meeting on slum indicators which states that:

> *"A slum is a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services. A slum is often not recognized and addressed by the public authorities as an integral or equal part of the city" (UN-HABITAT, 2002:21; 2003:10).*

In this definition, UN-Habitat (2003) encompasses a slum as having a wide variety of low-income settlements and poor human living conditions. This also includes the traditional meaning of slums of old residential areas that are seen to have been once respectable or even desirable, but over time, have deteriorated through neglect, as the original occupants opted to move out forcing the units to be subdivided or partitioned and rented out to poorer households. These classic slums include decaying inner-city housing and rundown tenements in cities of both developed and developing countries.

As can be seen from the various definitions of slums, lack of basic services is one of the most frequently mentioned characteristics of slums with lack of access to sanitation facilities and safe water sources being the most important features. Slums are coupled with a high absence of waste collection systems, lack of electricity supply, unsurfaced roads and footpaths, poor street lighting and poor drainage facilities. This lack of basic services manifests themselves in the form of open sewers, uncontrolled dumping of waste and polluted environments among others.

UN-Habitat (2003) associate slums with a high number of substandard housing structures, often built with non-permanent materials which are unsuitable for construction of houses e.g. earthen floors, mud-and-wattle walls or straw roofs. Slums are considered to be overcrowded with five and more persons living in a one-room unit that acts as the cooking, sleeping and living area. Apart from the housing structures being made of sub-standard materials, the layout of the slum settlement is at times hazardous because of a lack of access ways and high densities of dilapidated structures.

A number of definitions, one of them being by Davis (2002), consider lack of security of tenure as a central characteristic of slums and regard it as *prima facie* evidence of illegality and slum occupation. Informal or unplanned settlements are often regarded as synonymous with slums with dwellers being considered as among the most disadvantaged. Slum dwellers are considered to rate far lower on human development indicators than other urban residents and have more health problems, less access to education, social services and employment with most of them having very low incomes.

Slums are characterized by lack of key government institutions and other key private and commercial systems with most banks not having branches in the slum and most slum dwellers are not able to access regular sources of finance to develop their own businesses. The few banks that have branches within the slums are faced with the challenge of offering loans to slum dwellers that lack legally registered collateral thus excluding all but the most well-off slum dwellers from obtaining loans. Slum entrepreneurs are forced to draw on informal sources of finance at exorbitant rates and very short repayment periods. UN-Habitat (2003) considers the life chances of slum dwellers as being very low and one that is constrained by ability to obtain formal-sector jobs because of their lack of social capital, including lack of education, lack of patronage and contacts, and a general exclusion from 'regular society' that is mediated by signifiers of social class and a lack of empowerment.

In general, slums are considered as the epitomes of urban poverty and are the physical and spatial manifestation of urban poverty and intra-city inequalities" (UN-Habitat, 2003) Bolay (2006), states that regardless of the city or region of the world, poverty and precarious habitat (slums) are intimately connected. Bolay cites the definition and indicators of urban poverty by the French Institute of Statistics and Economics (INSEE, 2004) as a confirmation. In this definition and indicators of urban poverty, INSEE (2004) considers concentration of low-income households, over-population, lack of basic material comforts, territorial localisation, poor transport networks and access to urban services as indicators of urban poverty.

3.3 Slums and Urban Development

Bolay (2006) view the slum not only as a manifestation of mismanaged urban planning but also as a sign that the slum is a crucial element of contemporary urbanisation. Bolay (2006), argues that both public and private decision makers should seek appropriate solutions to the housing problem of a majority of urban dwellers in order to meet the challenges of sustainable development. Sustainable development being a major component of urban planning calls on planners to view slums as an aspect of urban development. Therefore the question of slum is not marginal to urban development but it is at its very heart.

The extension of slums in developing countries is a product of 20th and 21st century urban growth and represents the very essence of the Third World city. Attempts have been made to eliminate slums but they have almost universally failed because they do not question the urban model that generates the slum in the first place. Though the slum is characterized by the precarious nature of its habitat it can genuinely be seen as a 'hothouse' of cultural creativity, economic invention and social innovation. Classic urban planning principles are based on comprehensive planning regarding land allocation, infrastructural organization, and decisions on technical services and networks.

In the slums, however, this technocratic approach is undermined by the social practices of individuals, families and social groups, particularly the poorer ones. These actors resort to their own solutions to urban integration problems, and they do so at the very level where these problems are. This mainly results to households constructing on a plot of land which is occupied either illegally or by informal agreement, without being connected to the customary utilities. Although poor citizens recognize the importance of infrastructures and urban services for their wellbeing, they do not consider them a minimum requirement to move in. The immediate consequences of this situation are: substandard housing, poor infrastructure, environmental degradation and creates a challenge for planners to apply classical models of spatial organization (Bolay, 2006).

This discrepancy has been known to lead to two opposing tendencies with the first one being the denial of the 'social fact' by urban planners. The second tendency has been the

corresponding implementation of a repressive policy aiming to destroy whatever infrastructure or housing has been created outside official regulations and standards, and; the establishment of alternative policies aiming to reorganise and rehabilitate slum areas on the basis of what the resident communities have undertaken by themselves.

Ruffin (2003) states that, most slum-dwellers live in the urban agglomerations of developing countries and estimates that 6% cent of urban dwellers in the rich countries live under extremely precarious conditions. As a result it is feared that further shortages and even more precarious living conditions may arise. Thus it makes it clear that, regardless of the city or region, poverty and precarious habitat are intimately connected. Most poor citizens live in the cities as this is where the main economic activities are concentrated. This is due to the types of housing they have access to, and to the facilities provided by the proximity of public services. In France for example, approximately one million households are inadequately housed, or have no housing at all. The practices of social segregation and spatial fragmentation best explain these developments, and they are universally applicable. The truth is that the trend towards discriminatory and inequitable urbanisation is found everywhere, in both rich countries and poor ones (Ruffin (2003).

In other words, the 'urban question' is multi-faceted and multi-dimensional. For nearly 20 years the Swiss Federal Institute of Technology, Lausanne (EPFL) implemented various research projects and urban development in Latin America, Africa and Asia which make one receptive to the plural and association-based approach to urban planning at different levels. This levels are; intra-urban, urban-rural, regional-national-world. It is fundamental to acknowledge fully the contributions of specific players (public, private and community-based, both on an individual and institutional level) and take into account the opinions of a plethora of professional groups (architects, urban planners, technicians, administrators, economists, finance specialists and social scientists). A scientific cooperation project between Vietnamese and Swiss social scientists, engineers and architects that lasted almost eight years deepened our understanding of the interactions between precarious habitats, poverty, social exclusion and spatial planning (Bolay and Thai Thi Ngoc Du, 1999; Bolay et al., 1997). The Vietnam project established a link

between the natural and the man-made environment, highlighting two dimensions which provide a better understanding of urban slums. This type of research activity aiming at providing innovative policies

3.4 Growth of Slums in the World

In the recent past rapid population growth and its concentration in cities around the world has constituted a crucial element that is affecting the long-term outlook of humanity. Besides causing the burgeoning of new kinds of slums, urbanization has led to the growth of squatter and informal housing all around the rapidly expanding cities of the developing world. According to UH-HABITAT (2003) urban populations have increased explosively in the past 50 years and it is estimated that this increase will continue for the next 30 years. This shall be as result of population increase within the cities and which shall be brought about by an increase in the number of people born in the cities and due to increased rural to urban migrations. It is envisaged that the increased growth in population (the urban labour force) will not be met with a similar rate of creation of formal sector urban jobs and therefore majority of these new residents will eke out an informal living thus ending up in the slums (UN-HABITAT, 2003).

During the first United Nations Conference on Human Settlements in 1976, the world population was estimated to be just over 3.5 billion people. Two decades latter at the second United Nations Conference on Human Settlements the world population stood at 6 billion. The world's urban population had doubled in only two decades. UN-HABITAT (2003) noted that developing world which was been predominantly rural was rapidly turning urban. In 1950 only 18 % of people in developing countries lived in cities while in 2000 the proportion was 40 %, and by 2030 the developing world is predicted to be 56% urban. It is envisaged that future urban growth in developing countries will be absorbed by urban centres, which have a high average annual urban population growth rate of 2.3 per cent, in contrast to the developed world's rate of 0.4 per cent.

Davis (2004) estimated that there were more 250,000 slums in the world. In the developed world they are noted to have been in existence since the industrial revolution and currently over 6% of the population in this countries live in slums while China and

India together house 37% of the world's slums. According to Davis (2004) the five great metropolises of South Asia (Karachi, Mumbai, Delhi, Kolkata and Dhaka) are considered to be home to over 15,000 distinct slum communities with a total population of more than 20 million. UN-HABITAT (2003) reveal that over 90 per cent of slum dwellers are in the developing world with sub-Saharan Africa, where urbanization was seen to be virtually synonymous with slum growth, has 72% of its urban population living in slums.

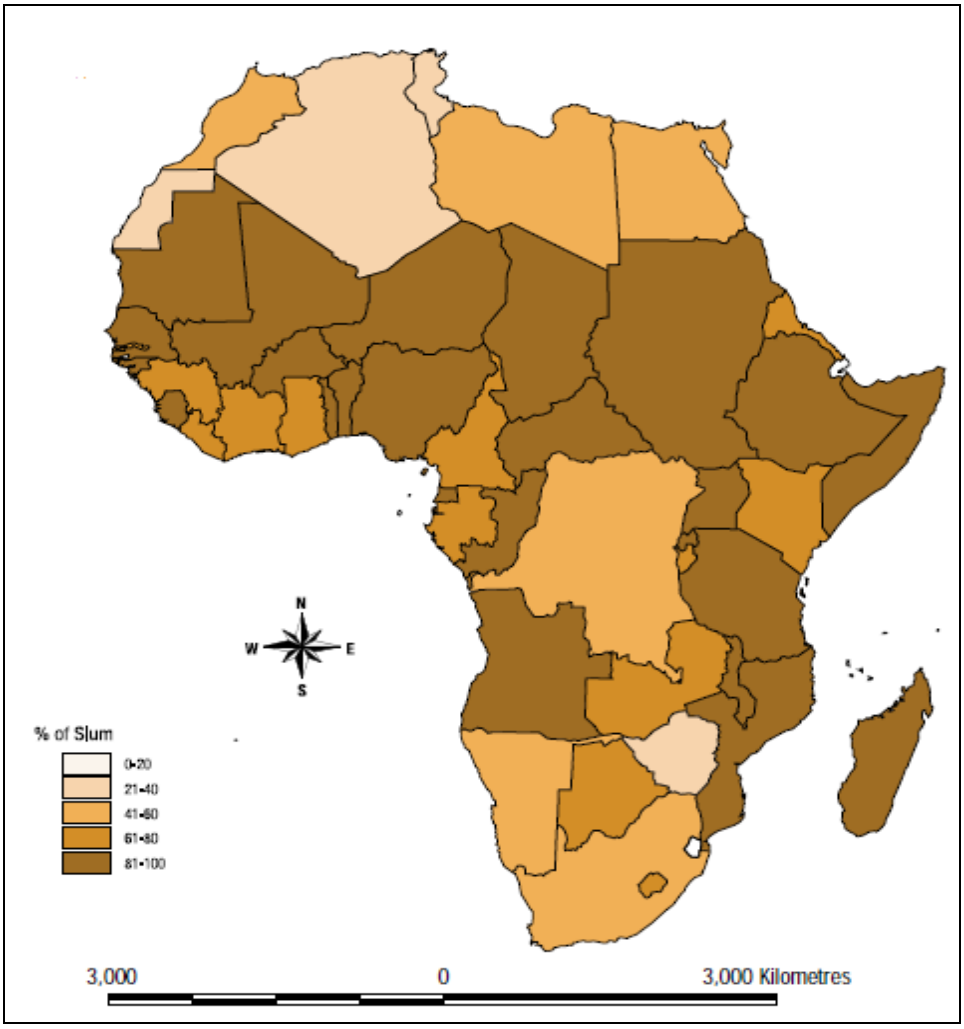
In 2003 in a working paper dubbed Slums of the World: The face of urban poverty in the new millennium, the UN-Habitat stated that the world's highest percentages of slum-dwellers are in Ethiopia with an astonishing 99.4 per cent of the urban population living in the slums with a similar percentage for Chad, Afghanistan (98.5 percent) and Nepal (92 per cent). The poorest urban populations were noted to be Maputo and Kinshasa where two-thirds of residents earned less than the cost of their minimum required for daily nutrition.

Prodipto and Shangon (1995) highlights the situation in Delhi where planners complained about 'slums within slums' as squatters took over the small open spaces of the peripheral resettlement colonies into which the old urban poor were brutally removed in the mid-1970s while in Cairo and Phnom Penh urban dwellers were squatting or renting space on rooftops thus creating slums in the air.

3.4.2 Slums in Africa

In Africa today, most of the cities are characterized by rising urban poverty, unsustainable environmental practices and social exclusion that have aggravated the slum situation. It is estimated that by the year 2001, 61% of urban residents in Africa were living in slums with 54% being in the Sub-Saharan Africa and 7% in Northern Africa. The slum incidence for Egypt at the time was considered to be 39.9% of the total urban population while that for Libya was 35.2% and 32.7% for Morocco. In Chad and Ethiopia virtually all the population living in cities and towns is considered to be a slum household in statistical terms meaning that all individuals living in the same roof lacked one or more of the five indicators that characterize slums. Figure 1.1 shows the prevalence of slums in Africa (UN-Habitat, 2003b).

Figure 3.1 Prevalence of Slums in Africa



Source: UN-Habitat (2003b)

3.4.2.1 Slum Policies in Africa

According to Pugh, (1997), Slums are often conceived and portrayed as institutional failures in housing policy, housing finance, public utilities, local governance and secure tenure and thus measures /strategies to address the slum phenomena was conceived around this thinking particularly in the 1950's and 1960's. Sietchiping, (2005) classifies the strategies into three main approaches centralized control of housing, neo-liberal approach and the emerging preventative approach. The approaches are derived from the following five major chronological categories: laissez -faire attitudes in the 1950s and 1960s; site and service programs in the 1970s, slum upgrading in the 1980s, enabling strategies of 1990s, and Cities Without Slums action plan in the 2000s.

a) Negligence: 1950s-1960s

This approach was characterized by many authorities of the developing countries turning a 'blind eye' to slums while focusing on public housing (Sietchiping 2005).The approach was based on two major assumptions; that slums are illegal and slums are an unavoidable but temporary phenomenon that can be overcome by economic development in both rural and urban areas .Government planning institutions never placed emphasis on slums to an extent that planning documents such as land use maps didn't include slum or urban informal settlements but shown them as blank spots denoting undeveloped land (UN Habitat 2003).

The approach was modeled around subsidized low cost housing programmes for low income groups that, in the context of high and steady economic growth, brought improvement of housing conditions and resulted in elimination of urban slums. The major challenges associated with this approach in developing countries was that in the face of unstable economic growth, provision of formal low cost housing never benefited the intended beneficiaries-low income groups but rather the civil servants and middle class and political clienteles (Sietchiping 2005)..The high cost of this approach coupled with corruption was the main reason that the housing needs of the poor have not been met (UN Habitat 2003).

b) Site and Service Scheme: 1970s and 1980's

The site and service schemes were World Bank's instigated programmes that opted for direct and centralized state interventions on slums. This scheme advocated for clearance of centrally located slums and their relocation to newly serviced plots often outside the existing urbanized areas, Sietchiping 2005. According to Pugh, the site and services schemes enabled shared responsibilities between the slum dwellers and the government through participation and financial contribution of the slum dwellers in the resettlement process. The implementation of site and service scheme was heavily criticized especially its demolition and eviction components.

This approach did not solve the problems of slums; instead it shifted them to the periphery of cities, the continuous spatial growth of cities brought about an endless cycle

of new evictions and creation of new slums at the periphery of the cities, outside of municipal boundaries or it accelerated the overcrowding of the dilapidated buildings within the cities (UN Habitat 2003).

c) Upgrading strategies; 1980's

This approach was conceived upon recognizing that slums as a durable structural phenomenon that required appropriate responses .The upgrading strategies focused on three main areas, provision of basic urban services, provision of secure tenure for slum dwellers and innovative access to credit to slum dwellers (UN Habitat 2003).

Upgrading projects were to be implemented with lesser intervention of government than in site and service schemes. Local upgrading strategy was appealing because it avoided (unnecessary) demolition, was cheaper per unit than site and service approach, and preserved social and economic networks. Despite these specific successes, upgrading programs also had many shortcomings and overall, failed to meet their expectations. Generally, they were criticized at four main levels: failed financial commitment, negative socio-economic impacts, insecurity of tenure and the non - replicability of 'best practices'

d) Enabling Policies; 1990's

This approach emphasizes on the need to involve slum dwellers not only in the construction processes of slum improvement, but also in the decision making and design process that establish priorities for action and support for implementation. Enabling policies are based on the principles of subsidiarity and they recognize that to be efficient, decisions concerning the investment of a resource in domestic economic, social and physical development have to be taken to the lowest effective level (UN Habitat 2003)

e) Cities without Slums Action Plan Post 2000

In 1999, the World Bank and the UN-Habitat initiated the Cities Without Slums (CWS) action plan, which constitutes a part of the United Nations Millennium Declaration Goals and Targets. The action plan aims at improving the living condition of at least 100 million slum dwellers by the year 2020 (UN-Habitat, 2003). The main innovation in

this policy is to move from the physical eradication or upgrading of slums adopted by past policies, to start to address one of the fundamental reasons why slums exist in the first place: poverty. The action plan recognizes that slums are largely a physical manifestation of urban poverty, and to deal with them effectively, future actions and policies should also associate urban and slum stakeholders in the poverty reduction or eradication campaign (Sietchiping 2005).

3.5 Infrastructural Planning for Slums

At the core of efforts to improve the living conditions and environmental habitability of slums and enhance economically productive activities there is need to invest in infrastructure. Of importance is the provision of water and sanitation, electricity, access roads, footpaths and waste management. Low-income housing and slum-upgrading policies need to pay attention to the financing of citywide infrastructure development. This therefore calls for policy makers to focus on poverty reduction and the up-grading of slum communities.

UN-habitat (2003a) considers the upgrading of existing slums as being more effective than resettling slum dwellers and advocates for this measure as an interventions measure for slum initiatives. This is because eradication of slums and resettlement of slum dwellers can create more problems than solutions. It is envisaged that eradication and relocation unnecessarily destroy a large stock of housing affordable to the urban poor and the new housing provided frequently turn out to be unaffordable resulting into some of the relocated households moving back into the slums.

Majale (2002) is of the view that that globalisation in its present form has not always worked in favour of the urban poor but has exacerbated their social and economic exclusion in some countries. Community participation is a necessity in the improvement of the effectiveness of slum policies. According to UN-Habitat (2003a) the improvement of the effectiveness of slum policies can be achieved by fully involving the urban poor and those traditionally responsible for providing slum housing. To achieve this, there must be more urban policies on the part of the public sector which must be made more accountable for the supply of urban public goods and services to all.

The Cities Alliance (2013) consider political will from the government and strong buy-in on the part of communities as two of the most important factors that are needed for any slum intervention measure to be successful. High sense of partnership among all parties is also necessary and the initiative must meet a real need and the people must want it and understand why it is important. It is also beneficial if upgrading activities are city-wide and involve partners beyond the slums themselves, which is especially important in implementation. There must be incentives for agencies to work with the poor; good communication and coordination among stakeholders; and clearly defined roles for the various agencies involved.

Slum upgrading or infrastructural provision is most effective when linked with other initiatives or goals e.g. poverty alleviation, health and education, preservation of historic city centers, environmental and sanitation improvement and city-wide infrastructure and transportation expansion

Land ownership is an issue that bedevils the urban poor. For the United Nations, secure land tenure is a key element for the integration of the urban poor, as is their recognition by the public authorities (UNCHS, 1999). It can also encourage families to invest into upgrading their plots and diversify their use. This has can give them protection against possible evictions and provides them with an asset that may serve as a guarantee in certain markets (e.g. for the purpose of acquiring bank loans.

3.5.1 Challenges Hindering Successful Provision of Infrastructural Services in Slums

According to Mejia (1994) the challenges of slum improvements can be overwhelming. The primary challenges in provision of improved infrastructural services in slums is achieving some kind of coherence in the community and finding solutions to a wide range of needs. Since slums are not homogeneous there exist many diverse vested interests. Apart from the urban poor who live in the slums just because it is a form of cheap there could be criminal elements who take advantage of the informal settlements to perpetuate there criminal activities. There are also landlords who make their money from renting out shacks to the slum dwellers. Lack of order on the hand has given rise to

groups of people who thrive in the slums by providing basic social amenities like water, sanitation and health services. These groups of people in most cases have been known to frustrate improvement of infrastructural provision in the slums as they consider them a threat to their very survival. In some cases, for example, slum upgrading projects have failed because there are people in the community who believe they won't qualify for an upgrading programme because they are not citizens or residents of the country (The Cities Alliance, 2013).

On the other hand Werlin (1999) indicates that though provision and improvement of infrastructural services in slums through the slum upgrading efforts can achieve remarkable success, the high cost of implementation of these projects prove a major challenge. In Manila, Calcutta and Jakarta for example where the World Bank put in concerted efforts in slum upgrading the costs of these projects ran into millions of US dollars.

The location of slums is another challenge to improved infrastructural provision. Slums are often located in precarious areas (ravines, hills, beaches or floodplains), making them difficult or expensive to upgrade. An example is in Rio de Janeiro where two thirds of the slums are located at the steep slopes surrounding the city and are subject to flooding and landslides (Bartone, Bernstein and Eigen, 1994). Houses appear to sit on top of one another and often actually do while the population density is extremely high. Slums have been known to lack rhyme or reason to their layout. This leads to virtually every bit of space in the slums being in use by someone, somehow thus the laying of pipes, even underground, most always intrudes on someone's sense of ownership and adjudicating disputes from the outside is next to impossible (Werlin, 1999).

Land ownership tend to be very complex in the slums. This is because seldom do slum dwellers own both their houses and the land on which they live. Amaral (1994) notes that while many residents may simply be casual squatters, illegally occupying vacant land, they are sometimes part of highly planned invasions or informal arrangements worked out with landowners. In any case, they may own dwellings or rooms and manage various sub-letting arrangements which have been negotiated with or even facilitated by

landowners without the approval of local authorities. This at times has led to extensive violence between groups of squatters for control over this land and the right to profit from the sale or rent of it (Amaral, 1994). Viloria, Williams and Didier (1998) associate violence in slums in Brazilian cities with efforts to control illegal drug-trafficking and other gangster activities. On the other hand the trio indicates that in Manila, problems arose when the police failed to prevent squatters from invading land that had been temporarily vacated for upgrading purposes by designated beneficiaries.

Maintenance of infrastructural services is factor that contributes to lack of improved infrastructural facilities in slums. Development agencies are known to propose low standards of infrastructure in slums so as to keep slum upgrading costs down. Contractors therefore tend to de-emphasise quality of construction, particularly when contractual arrangements are corrupt and supervision is inadequate. This leads to the rapid deterioration of the facilities. While there are many reasons for lack of maintenance in slum upgrading projects, the problems of how to pay for it seem most daunting. Almost everywhere, politicians are more eager to promise cheap or free public services than to emphasise adequate cost recovery (Werlin, 1999).

Lack of community participation in activities or projects geared towards improving facilities in slums has also been a contributing factor to many interventions in the slums. Often, there are deep-rooted social and economic divisions that prevent effective community participation. This is complicated by lack of education among slum-dwellers and this coupled with divisions and political unrest and economic hardship intensify them. Many politicians are known to prefer to exploit or ignore slum conditions rather than to ameliorate the social tension preventing community participation. UN-Habitat (2003) note that there has been apathy and lack political will in the improvement or rehabilitation of slums leading to neglect and lack of government interventions in infrastructural provision.

3.6 Infrastructure Provision Case Studies

3.6.1 Infrastructure Provision for Slums in Asia – Case of Orangi Pilot Project in Karachi Pakistan

The Orangi Pilot Project (OPP) in Karachi Pakistan has been identified as one of the most successful interventions in the provision of sanitation in slums. The objectives of the project were to understand the problems of Orangi and their causes and through action research develop solutions that people can manage finance and build. Thereafter it was to provide people with technical guidance and managerial support to implement the solutions in the process overcome constraints that governments face in upgrading informal settlements. The project was an initiative of Orangi Pilot Project Research and Training Institute (OPP-RTI). The project was a community-owned, community-managed infrastructure upgrading program with the intention of improving sanitation for the residence of Orangi whose main form of sewage disposal was bucket latrines or soakpits and open sewers (World Bank, 2001).

The project was started in 1980 and has directly and indirectly assisted about one million people in Orangi (Karachi) to improve their sanitation. The project was developed through research into household resources and aspirations in Orangi. It has utilized minimal external support in order to assist households to achieve their objectives for local development. The Project has also been able to incorporate the people of Orangi and the surrounding area in the provision of a number of additional services which include housing, health and education facilities.

Infrastructure provision by OPP-RTI has been made possible by adopting; a low-cost sanitation programme that enables low-income households to construct and maintain modern toilets with their own funds and under their own management, a low-cost housing programme which upgrades the slum structures by introducing stronger machine-made concrete blocks, and battens and tile roofing which is cheaper than reinforced concrete. The programme relies heavily on capacity building among the slum dwellers where it upgrades the skills of local masons by introducing proper construction techniques and through educating house-owners on planning, orientation and low-cost technology. Health and family planning programme for segregated and illiterate or semiliterate low-

income women is attained by teaching them on the causes and methods of preventing common diseases. OPP-RTI has also been able to incorporate a schools programme that assist in the upgrading of physical and academic standards in private schools (OPP-RTI, 1995).

The success of the project demonstrates the strength of alternative models of development which depend on the scale of people's initiative and activity. The project has strengthened the position of women in the communities by encouraging participation in community affairs. Also, by lowering the portion of family income spent on medical bills, it has allowed more money to be spent on other needs such as food, education, and housing. These goes to show that if local residents and communities in slums join hands with little expectation that the government will respond or come to their aid then infrastructure provision in slums can be an attainable goal.

3.6.2 Infrastructural Provision for Slums in Sub-Sahara Africa – Case of Nylon zone in Douala, Cameroon

The first major urban upgrading project in Cameroon and in sub-Sahara Africa was a multi-sectoral project started in 1984 in the Nylon zone in Douala, Cameroon. In this area, only 6 percent of the houses were built with permanent materials with an estimated 65 percent of residents not connected to pipe-borne water, and 80 percent not connected to sanitation facilities. Leakage and overflow from pit latrines and septic tanks polluted the water table resulting in the water pollution in wells and streams. This zone is vulnerable to flooding and occupied by a population living in precarious houses without formal property deeds. During the project design phase and the first years of its implementation, Cameroon was enjoying a period of considerable prosperity.

The project which was funded by the World Bank was not just complex but also a long-term undertaking, designed and initiated at a time of powerful economic growth, continued during the recession, and completed at a time of economic, social, and political crises. It demonstrated the difficulty involved in adopting a broad policy approach with ambitious policy and institutional objectives and a large scope of project activities.

Though it was originally designed as a modest effort to provide basic water and sanitation to be sustained through local financing, the project became a major urban intervention that involved the construction of primary infrastructure (a central market stall and primary transit roads) and required ongoing external funding. Infrastructural upgrading led to the resettlement of more than 30 percent of the population, mostly lower-income families. The project succeeded in proper implementation of community facilities and the proper integration of schools and health centers into the respective sectorial ministries while secondary effects helped to integrate the neighborhood and created a dynamic for progress. Partial success of this project was in promoting contractors and small companies which had been severely jeopardized by the economic downturn (World Bank, 2002).

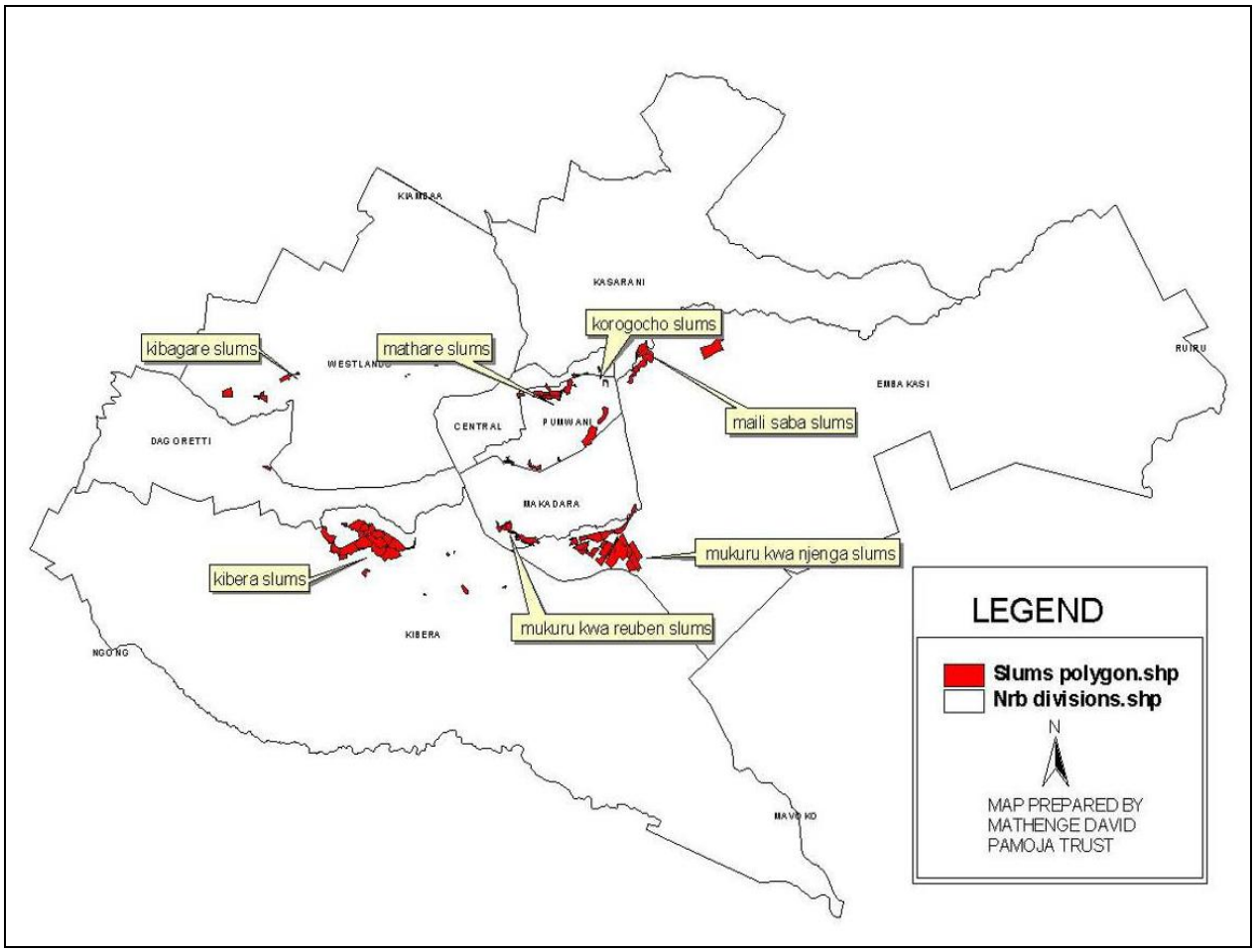
Despite its successes the project failed in construction of infrastructures; mistaken standards, roads never connected to the rest of the network and not maintained; resettlement and housing improvement, almost all completely abandoned for lack of resources after 1988. The project also suffered immensely from lack of institutional structures to safeguard it as the organization responsible for implementing the project had almost no contacts with Douala's legally appointed authorities. At the same time regularization of land failed because land titles were not given to the population. At the end of it the WB considered the project largely unsatisfactory and cancelled funding. (World Bank, 2002).

3.6.3 Slums in Kenya

Kenya like other African countries is facing an increasing development and growth of informal settlements in her urban centers. Several factors can be attributed to this including high rates of urbanization, landlessness, poverty among others. According to the UN-Habitat (2009) more than 34% of Kenya’s total population lives in urban areas and of this, more than 71% is confined in informal settlements. The UNDP report, 2007, notes that Kenya has the highest annual informal settlement growth rate of 5% in the worlds and predicts that the number can double in 30years if no intervention measures are taken

The unprecedented rates of urbanization can be linked to massive migratory movements as well as to natural growth, challenging urban planning and thereby causing environmental problems with far reaching effects. While the low quality of housing and the general lack of basic infrastructure especially sanitation, drainage, access to energy and clean water supply result in poor social and environmental conditions, high levels of unemployment and low income give rise to conflicts (Beatley, 2000; Smith and Hanson, 2003; Pamoja Trust, 2009). The situation is not helped by lack of supporting policies for effective urban planning and improvement**.** History of informal settlements in Nairobi dates back from colonial period, where most Africans were barred from the city's designated residential areas since they were a preserve for Europeans and Asians. This meant that Kenyans who came to the city in search of work had to create informal residential settlements outside the central business district and the planned residential areas which were largely ignored by the colonial government (Amnesty International, 2009)**.** Mitullah (2003) argues out that the city's first development plans did not include early settlements; hence essential infrastructure services to these areas were never provided. Over the past two decade there has been lack of political will to address slum issues in Kenya in way of clear policies and strategies by the government, this has not only led to growth of slums in the city but also to deteriorating living conditions in slum settlements. Major slums in Nairobi includes, Kibera, Mukuru, and mathare, these slums are characterized by lack of security of tenure, a fact that has been used to explain the reluctance to improve housing and related infrastructure services, the slums in Nairobi presents the face of poverty with majority of residents not being able to meet their financial obligations to meet costs of food, education, access to quality health care etc. Lack of basic infrastructure including, clean water, sanitation, solid waste management, energy sums up a typical slum in Nairobi. The map below show distribution of slum settlements in Nairobi city by the administrative boundaries.

Figure 3.2 Distribution of informal settlements in Nairobi

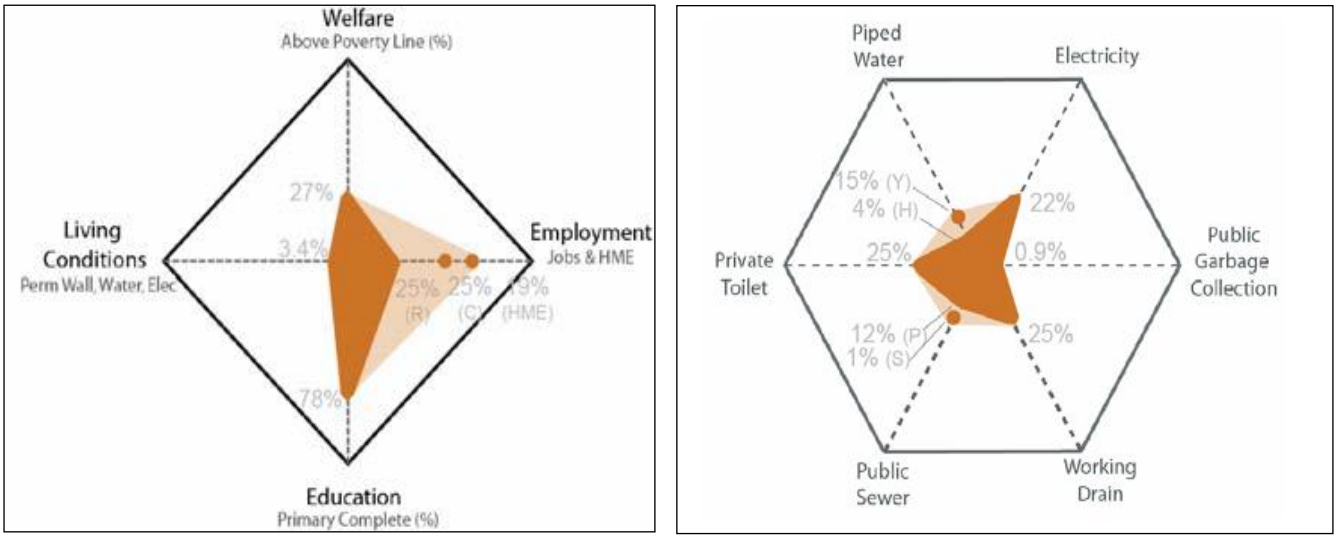


Source: Pamoja Trust (2010)

3.6.3.1 Slum Development Diamond and Infrastructure Hexagon in Nairobi

A study of informal settlements in Nairobi (Gulyani, 2006) shows that only 3.4% of the slum dwellers have access for good living conditions characterized by Permanent structure wall, access to water and electricity**.** The study further shows slum dwellers living above the poverty line at 2.7%**.** Access to infrastructure services e.g. piped water, electricity sewer waste collection is also very minimal as illustrated in the figures below.

Plate 1 Slum Development and Infrastructures in Nairobi



Source: Gulyani (2006)

3.7 Factors that Lead People to Settle in Slums

UN-Habitat (2003) indicate that provide the low cost and only affordable housing that will enable poor urban immigrants to save for their eventual absorption into urban society. As the place of residence for low-income employees, slums keep the wheels of the city turning in many different ways. The majority of slum dwellers in developing country cities earn their living from informal sector activities located either within or outside slum areas, and many informal entrepreneurs operating from slums have clienteles extending to the rest of the city. Most slum dwellers are people struggling to make an honest living, within the context of extensive urban poverty and formal unemployment. Slums are also places in which the vibrant mixing of different cultures frequently results in new forms of artistic expression. Out of unhealthy, crowded and often dangerous environments can emerge cultural movements and levels of solidarity unknown in the suburbs of the rich. Against all odds, slum dwellers have developed economically rational and innovative shelter solutions for themselves.

Slums are considered as a staging ground for people moving to the city or for people who are temporarily in trouble, a place where they can live cheaply until they establish themselves. The long-term aim of most slum dwellers is to make some money and find a better place to live. Many succeed, many others do not. Particularly for the increasing number of those without stable employment, who live a hand-to-mouth existence in the

rapidly growing informal sector, life is hard and always uncertain. Social exclusion, lack of empowerment, illness or living in a precarious and illegal situation make it very difficult for slum dwellers to do more than survive, sometimes in reasonable, if insecure, conditions, but just as often in poverty and despair.

The incomes of slum dwellers are mostly too low for formally regulated markets to provide them with any kind of permanent housing. They have acted to solve their own problems by building their own dwellings, or by building informal rental accommodation for each other. Rather than being assisted in their efforts by governments, they have been hounded and their homes frequently demolished, they have been overlooked when basic services are provided, and they have been ignored and excluded from normal opportunities offered to other urban citizens.

Slum areas are also a refuge for women who are fleeing difficult situations created by divorce or marital disputes. Women who opt or are forced out of their marriages and who don't have the financial muscle to afford decent lifestyles end up in the slums which are cheap and affordable. Due to their close proximity to cities, the slums provide the best location for those who seek for employment and livelihood opportunities. COHRE (2008) reveal that many women move to urban areas for a number of different reasons, ranging from seeking income opportunities, to fleeing conflict, environmental degradation, or family problems (especially those resulting from discrimination), to coping with health related problems like HIV/AIDS and other factors that too often leave women isolated and financially destitute. Because women often come to the city with very limited resources and job skills many of them end up in urban slums where they can be close to commercial areas and employment opportunities (COHRE, 2008).

3.8 Theoretical Underpinning of the Study

In many developing countries in the world slums pose as a huge problem as the lack fundamental resources and capabilities such as adequate sanitation, improved water supply, durable housing or adequate living space. This has forced many of these governments to try and find solutions with most of them resulting to slum upgrading.

According to United Nations (2010), this is a strategy in which the infrastructure of a slum is improved, such as giving adequate water supply and sewage to the community.

This study will be underpinned in Turner Theory on Slum and housing. In his book titled 'Freedom to Build' published in 1972, John F. C. Turner argued for a theoretical strategy to solve the problem of slums. Turner advices governments to not only tackle the housing problem, but also endevour to tackle all components of the slums. Turner argues that the solution to slums is not to demolish the housing but to improve the environment of the slums and that governments are in a position to get rid of unsanitary human waste, inadequate or polluted water and litter and from muddy unlit lanes in existing slums and therefore need not worry about shanty dwellings. Therefore the implementation of good sewage and clean water and good paths for people to walk on, people would gradually better their abodes on their own.

3.8.1 Theory on Slum and Housing by Turner

John F. Turner was amongst the first to formulate a theory on the phenomenon of slums and squatter settlements drawing inferences from Latin America. Turner describes two ways to define housing: Housing as a noun and housing as a verb. Housing as a noun refers to the physical structure: The house as a product or commodity. Housing as a verb focuses on the universal activity of housing. Housing primarily as a noun focuses on physical housing units whilst housing as a verb sees housing as an on-going process and concentrate on the role of housing within the context of the household's broader livelihood.

Turner lays emphasis on the functional side of housing rather than on the material side. He observes that a squatter can be considered as housing not in terms of what it is but in terms of what it does. This observation becomes relevant in developing countries where resources, especially financial, are extremely limited and the dwellers are in dire poverty. Turner (1976) argues that the important thing about housing is not "what it is but what it does in peoples lives and advocates that the value of slums be measured not in terms of how well it conforms to the image of the dwellers standards, but rather it be measured in terms of how well the structure serves its inhabitants.

Tisong (2011) citing Turner (1976) notes that for slum households whose building activities are not regulated by exogenous criteria, the proposition such that, households if given the autonomy to design, build, and manage the maintenance process; prospective households will be able to make their own arrangements for accommodation by supplementing their respective means of income by personal and local monetary resources such as their imagination, intuitiveness and capacity to use irregular sites, locally available building materials and tools, organizational capacities through self help initiatives.

Turner (1976) derives his theory by contrasting housing that emanate from a decentralized decision process where the occupants have the authority and that which results from a process where a large centralized authority controls major decisions. Turner substantiate his theory by observing the self help housing process in slums and squatter settlements and that of public housing programmes which produce large scale standardization (Turner, 1976). In conclusion, turner points out that, when tenure of property is secured and individual households have the authority to control major decisions regards their accommodation arrangements with respect to standards, location and tenure, both the process and the environment produced are economically viable as well as will stimulate the well being of the residents which are necessary conditions to propel an orderly urban growth (Turner and Goetz, 1967).

In line with Turner's approach the researcher is of the view that the successful provision of infrastructural services in slums is relevant to urban development. It is in seeking to address this, that the researcher takes a look at the challenges of infrastructure provision in slums with a view of proposing a sustainable framework for infrastructural provision in slums.

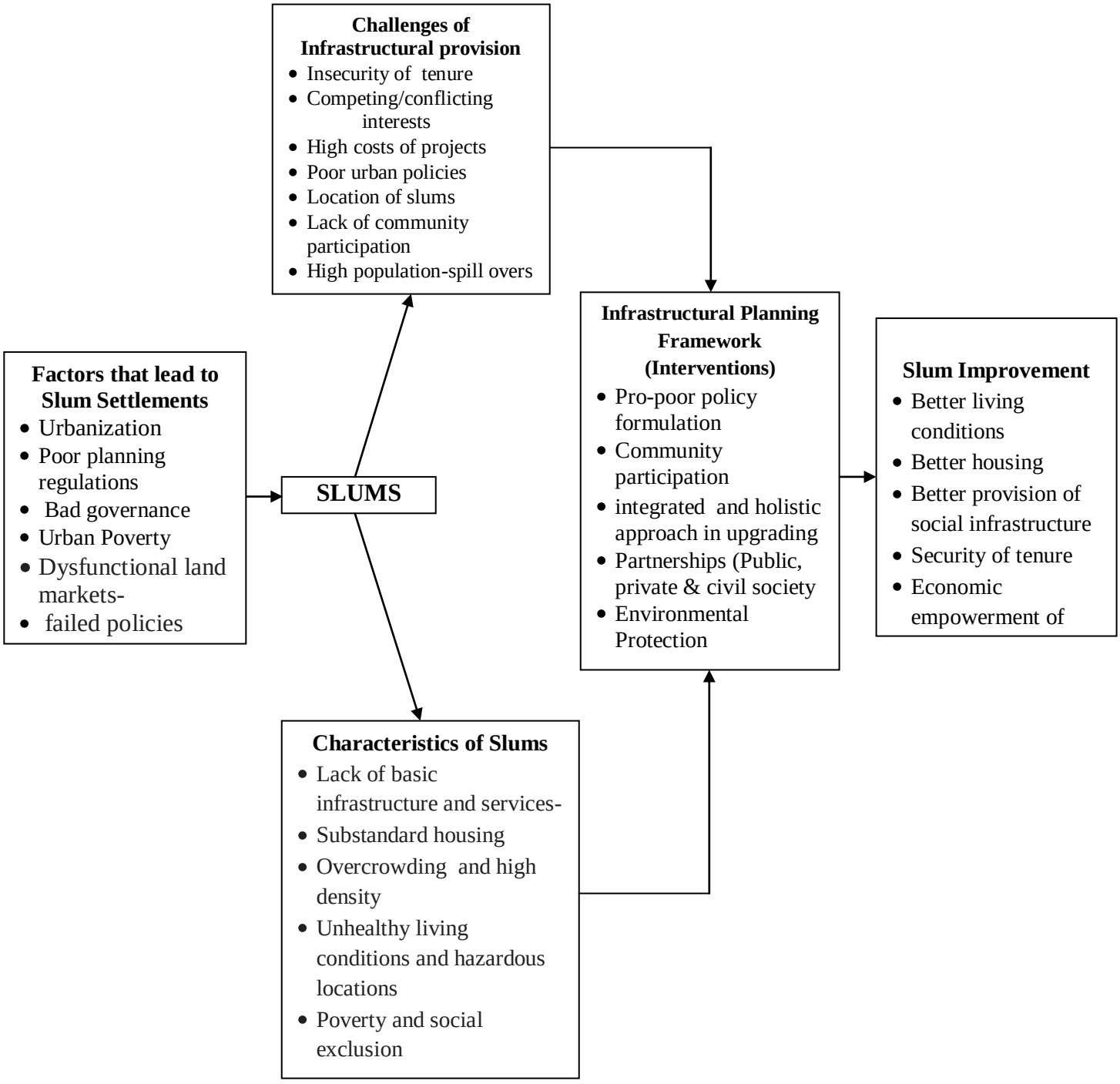
3.9 Conceptual Framework

The reviewed literature gives the definition and characteristics of slums and highlights the growth of slums in the world. The impact of the impact of urbanization on slum development and urban planning intervention has also been discussed. Case studies

reviewed on slum improvement interventions and theories on slums and housing provided a guide for the construction of the conceptual framework.

In this conceptual framework the study analyses the factors that lead people to settle in slums. Within these slums there are unique characteristics which provide a myriad of challenges in planning for and provision for their infrastructure. Understanding all these challenges requires an in-depth analysis and an informative position on the implications of all these characteristics and challenges on the field of urban planning for slums. By enhancing an infrastructural planning interventions for slums this study envisages a situation of improved slums that provide better living conditions for all slum dwellers. Figure 3.3 highlights the conceptual framework for this study.

Figure 3.3 Conceptual Framework



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CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the research design, target population, sample and sampling procedures, research instruments, instruments validity and reliability, data collection procedures and data analysis procedures

3.2 Research Design

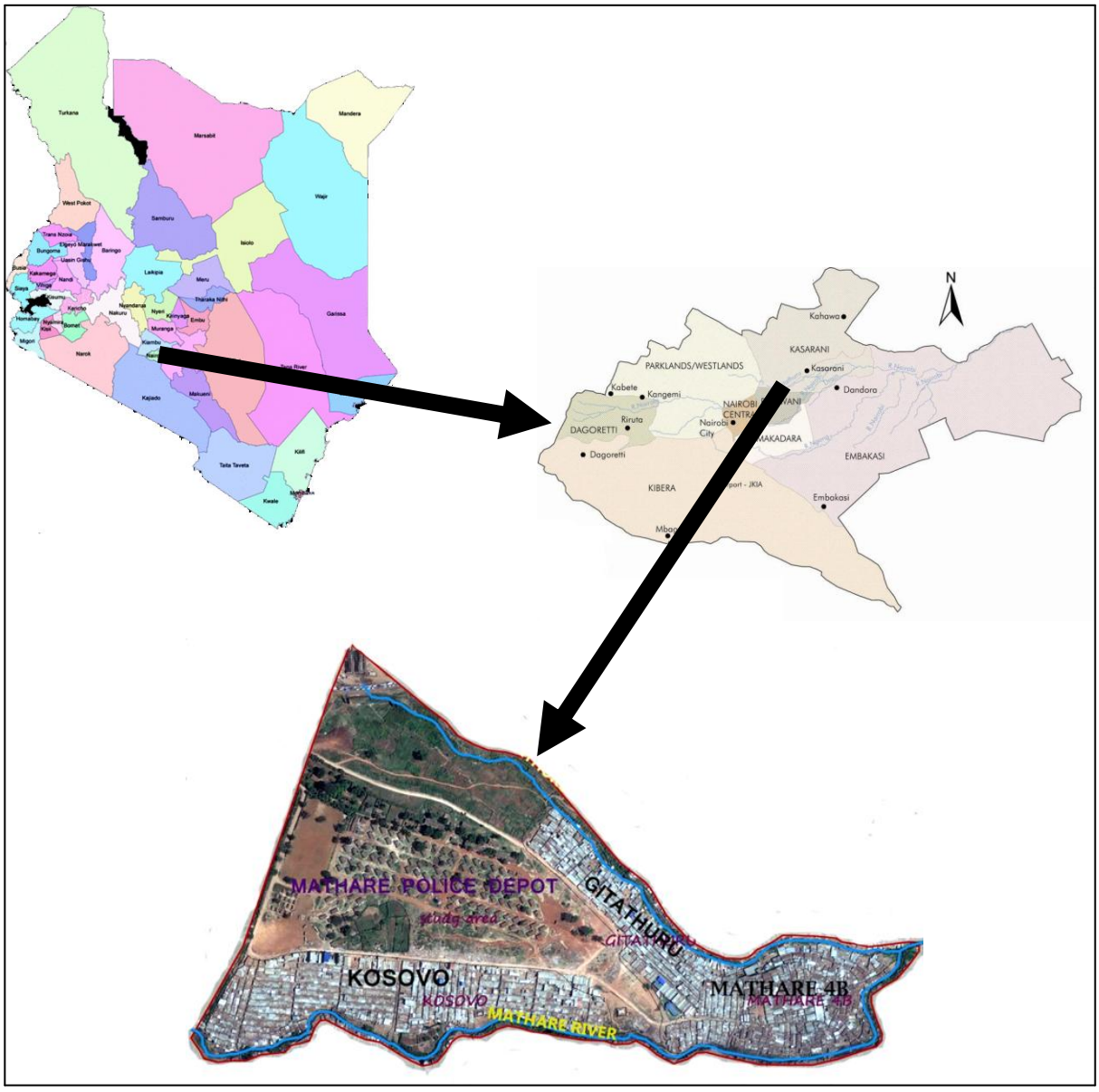
According to Borg and Gall (1989) a research design is a logical and valuable way of looking at the world. In this study, the researcher used mixed methodology. The use of quantitative and qualitative methods in social research has been widely discussed as both methods have their advantages and disadvantages. In order to offset the weaknesses and draw on the strength of both the use of mixed method research has become increasingly common in recent years (Bryman, 2006).

The researcher adopted a mixed method approach as it assists in understanding complex data and gives a more complete and comprehensive account of the enquiry (Creswell, 2003). The complexity in this particular research was the comprehension of the socio-economic and spatial structure of the selected slums and to understand the dynamics of infrastructure provision in the area of study. The quantitative research was in the form of close ended questions in a questionnaire and it provided numerical evidence and allowed statistical analysis. Open-ended questions, in the questionnaires, and semi-structured in-depth interviews constituted the qualitative part of this research. It gives a sense of the process and enhances the breadth and depth of the issue.

The quantitative and qualitative data were collected concurrently, the priority between the two methods is equal and the results of the two methods were integrated during the interpretation phase (Creswell, 2003). This allowed for any unexpected results from any of the methods to be explained through the findings generated by the other thus offering a more complete understanding (Bryman, 2006; Davies, 2003).

3.3 Study Area

Map 3: Map of Study Area



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The research was conducted in three slums in Mathare Valley. The slums are Kosovo, Mathare 4B and Gitathuru. It was considered effective to consider the three settlements in order to effectively undertake the study as the three settlements because major infrastructure elements e.g. the trunk sewer and trunk water systems passing through the settlements. The settlements also have natural boundaries of Mathare River and Gitathuru River that intersect in Mathare 4B.the settlement also have different social dynamics

different levels of service despite sharing trunk facilities and hence this would provide an opportunity to test integrated infrastructure planning and provision.

3.4 Target Population

According to Mugenda (1999), a population is a complete set of individual cases or object with some common observable characteristics. The study targeted all households in Kosovo, Mathare 4B and Gitathuru settlements (villages) in Mathare Valley Slums. Going by the population census of 2009, the three settlements had a total of 5,897 households with a population of 17,503 persons. (Table 3.1).

Table 3.1 Households and Population of Study Settlements

Village	Population			No. of Households
	Female	Male	Total	
4B	2,496	3,026	5,681	1,810
GITATHURU	1,645	2,092	3,737	1,241
KOSOVO	3,642	4,443	8,085	2,846
TOTAL	**7,783**	**9,561**	**17,503**	**5,897**

Source: MuST (2010)

3.5 Sampling Technique

Gathering data from all the households was not possible for this research, therefore an appropriate sampling procedure was chosen. A sample is a portion or subset of a larger group called a population (Fink, 2003). According to Borg and Gall (1996) sampling is a research technique used for selecting a given number of subjects from a target population as a representative of the population. Mulusa (1988) emphasizes that a sample must represent the target population or the universe in all aspects. Sampling refers to a research technique for a given number of subjects from a target population as a representative of that population. Sampling is significant since it is not possible to study every member in the whole population. It enables one to learn something about a large group by studying a few lists of the members thus saving time and money.

Sampling procedures can either be probability, where every person in the population has an equal chance to participate in the survey or non-probability where the samples are gathered in a process that does not give all the individuals in the population equal

chances of being selected. Typical techniques for probability samples are simple random sampling, stratified random sampling, systematic random sampling, cluster random sampling and mixed/multi-stage random sampling (Sarantakos, 2005).

For this study spatial stratified sampling and systematic random sampling approach was adopted. The spatial stratified sampling was used to map out households for the survey and was generated from a network of grids overlaid on the map of the settlements. In each of the settlement, grids were systematically identified and households within the grid extracted from the spatial database of the enumeration and mapping. The households were then selected through systematic random sampling. Through the utilization of randomization this sampling technique guaranteed that every household in the Mathare Valley Slums had an equal opportunity for selection. It also assured of the absence of both systematic and sampling bias ensuring that the sample was representative of the entire population.

3.5.1 Sampling Frame

Sample size determination aims at selecting part of the population from which information will be drawn to form conclusions about the entire population.

The following formula by Miller and Brewer (2003) was used to select the sample size for the study:

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

Where

α was the level of significance or margin of error(9%),

n was the sample size and

N was the sample frame.

In order to have a fair representative sample size, the sample size was determined at a 91% confidence level (At a 0.09 significance level).

$$n = \frac{5{,}897}{1 + 5{,}897\,(0.09)^2}$$

n = 121 households (Sample Frame used 120 households)

3.5.2 Sampling Size Distribution

The sample size of each study area was determined using the proportional method of sample size distribution.

$$4B = \frac{1,810}{5,897} x122 = 37$$

$$\text{Gitathuru} = \frac{1,241}{5,897} x122 = 25$$

$$\text{Kosovo} = \frac{2,846}{5,897} x122 = 58$$

Table 3.2 Sample Size Distribution

Village	No. of Households	Sample Size
4B	1,810	37
Gitathuru	1,241	25
Kosovo	2,846	58
TOTAL	**5,897**	**120**

Source: Author (2013)

3.6 Data Collection Instruments

The study employed the use of several sets of instruments which included a questionnaire, interview schedule, observation schedule and focus group discussion which provided the primary data while document analysis was used to gather secondary data.

3.6.1 Questionnaire

This is a research instrument that gathers data over a large sample. As stated by Orodho (2009) a questionnaire has a diverse number of merits upon which a researcher may opt to use it as an instrument to collect data. In this research structured questionnaires were used for the collection of household data in the three selected slum communities. Under this, a set of close and open ended questions were set and administered through a random sampling technique targeting a household head in the sample. The difficulty encountered was the unwillingness on the part of some respondents to provide some of the

information for fear of the outcome of the research. Incorporating community members in the research team helped explain with ease the purpose of the study and hence reduced time spent to convince the respondent.

3.6.2 In-Depth Interview Schedules

The researcher used in-depth interview schedules as it enabled the researcher to be in a position to use both open and closed ended questions in order to get a complete, clear and detailed understanding of the problem under study. The researcher collected information through personal interviews in a structured way which involved the use of a set of predetermined questions which were asked in the form and order prescribed. These instruments were used to collect data from key informants selected from the respective sectors of infrastructure service provision like NWSC, KPC, CCN, CBO's running community infrastructure project. The key informants' assisted in getting specific information on the specific infrastructure components being investigated in this study.

The research interviews yielded a high response rate in the survey and they also allowed the researcher to clarify ambiguous answers and where appropriate, sought follow-up information. Their shortcoming was that they were time consuming and expensive.

3.6.3 Observation Schedule and photography

This was used in order to obtain variable information on aspects of the people's livelihoods on a day to day basis. The physical environment of the households was observed and the information on their physical status was noted down. This included all forms of infrastructure e.g. water provision, sewerage, electricity, road network among others. Photographs on the issues pertaining to the objectives of the study were taken.

3.6.4 Document Analysis

Mathare valley slums have attracted many nongovernmental organizations with different interventions. Specific to this research two local NGO's namely Pamoja Trust and Muungano support Trust have been working with communities in the study area. Important to this research is that the organizations together with the community have gathered various sets of social–economic and spatial data at household level through community mapping and enumeration process. Most of this will form part of the

secondary data. Quick bird satellite-2010 imagery and the existing infrastructure maps will be used as the base map for the study..

3.6.5 Checklist

A checklist of infrastructure services was developed in order to document the level of infrastructure provision in the study area. The checklist had a geographical location of the infrastructure service facility. The location defined by X,Y coordinates was picked using a handheld GPS while the attribute data of the facility was recorded on the checklist. The X,Y coordinates were spatially represented in a GIS environment inform of a map to visualize their spatial distribution.

3.7 Reliability and validity of the Research Instruments

This refers to the degree to which a test measures what it purports to be measuring (Orodho, 2009). The process of developing and validating an instrument is in large part focused on reducing error in the measurement process. Reliability estimates evaluate the stability of measures, internal consistency of measurement instruments. The reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials. Although unreliability is always present to a certain extent, there will generally be a good deal of consistency in the results of a quality instrument gathered at different times.

The study adopted the data triangulation technique by using a combination of data sources with the effect that the strengths and weaknesses in each source are compensated when used together (Creswell, 2003). The aim was to improve the validity of the findings. The questionnaires, interview and observation schedule were examined, discussed and reviewed by the supervisor and the researcher who used the relevance of the content on the instrument in relation to the purpose, objectives and research questions. Suggestions given were taken into account and the necessary adjustments in the instruments made.

3.8 Data Collection Procedures

The researcher was able to benefit from the services of three research assistants and six community guides. The researcher took research assistants and the community guides

through induction training on how they were to administer the questionnaires. The research assistants were taken through the process of gathering data and how to administer the questionnaires while the community guides assisted in familiarization of the study area. Every settlement a team of was allocated one research assistant and two community guides. The researcher undertook questionnaire administration together with the research assistants.

A questionnaire was administered to the sampled house On the whole, a total of one hundred and twenty (120) were printed out and administered to selected households. Out of these only eighty five (85) were collected for the analysis as some had not been filled to the researcher's satisfaction due to lack of cooperation from some respondents and incomplete information from others.

The researcher personally undertook all interview schedules with key informants. This was undertaken by identifying the various key informants and seeking their indulgence. Appointments were booked for the interview schedules and the researcher ensured that he honoured all the appointments.

3.9 Data Analysis Procedures

Data analysis is the process of systematically searching and arranging the raw data, with the aim of increasing one's own understanding of the data (Miles and Huberman, 1994). In analysing the data for this study the researcher has followed the process suggested by Miles and Huberman that consists of five phases namely; data collection, data reduction, data display, conclusion drawing and verifying findings.

The data generated by questionnaires, interview and observation schedules were checked, edited organized and computer coded to reduce the mass of data obtained into a form suitable for analysis. The coded data was analyzed using Statistical Package for Social Science Programme (SPSS) which proved valuable in statistical analysis, data management (case selection, file reshaping, creating derived data) and data documentation. Photographs were analyzed through subjective analysis as they were objective.

The spatial data generated through visual image interpretation, field observations and the checklist were supplemented by GPS measurements, and later processed in GIS environment to facilitate spatial analysis and output display. and ArcGIS soft ware was used to carry out spatial analysis, offer interface between spatial and non spatial data and finally used to produce maps.

Descriptive statistics was attained through cross tabulation, frequencies, and descriptive ratio statistics. Cross tabulation involved the process of creating a contingency table from the multivariate frequency distribution of statistical variables. Content analysis was used to analyze the qualitative data. This allowed for the classification, sorting and enabled the researcher to arrange information and examine the relationships in the data. The analyzed data was later exported to Microsoft Word where the researcher was able to come up with the conclusions of the analysis.

The analysed data was then summarized into frequencies and percentages and presented in tables, bar charts and figures. Frequencies and percentages were adopted to present, discuss and interpret findings obtained. The research questions giving qualitative data were analyzed using content analysis procedures. The findings obtained were discussed and formed the basis for the research findings, conclusion and recommendations.

CHAPTER FIVE

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

5.1 Introduction

This chapter provides the presentation, analysis and interpretation of all the data collected from the area of study during the research period. Data was collected through various research instruments which included questionnaires targeting all the households in Mathare slums, focus group discussions, observation schedule, interview schedule with key informants and through document analysis. The quantitative data was analyzed using descriptive statistics and was presented in the form of tables, percentages, graphs and charts. Qualitative data that was gathered during the research period was analyzed through the use of content analysis. Results of the data analysis provided the information that has formed the basis for discussion, conclusion, and interpretation of the findings and recommendations of the study.

5.2 Demographic Information

The researcher administered one hundred and twenty questionnaires to randomly selected households in Kosovo, Mathare 4B and Gitathuru areas of Mathare Valley slums and also held three focus discussions besides undertaking interviews with key informants who included the area councilors, the chiefs, and elders among others. The researcher was able to employ the use of research assistants who helped in administering of the questionnaires.

5.2.1 Response Rate

As indicated in table 5.1 above the response rate was 70.8% Out of the 120 questionnaires administered only 85 questionnaires were fully responded to while the rest were either not handed back or had many questions which had not been answered. Among the questions that were not handed back 12 had been destroyed by some rowdy youths who had demanded for protection fees from two of the research assistants in the Kosovo and Mathare 4B areas and this contributed to the 29.2% for the no response.

Table 5.1 Response Rate

Response	Frequency	Percentage (%)
Responded	85	70.8
No Response	35	29.2
Total	**120**	**100**

Source: Field Survey (2013)

5.2.2 Household Response per Settlement

In this study the research assigned 120 as per the sample size distribution indicated in section 4.4.2. In total 85 questionnaires were fully answered to and formed the sample size for this study. Kosovo which had the most number of households formed 45.9% of the sample size, Mathare 4B formed 23.5% and Gitathuru formed 23.5% of the sample size. (Table 5.2)

Table 5.2 Household Response per Settlement

Village	Sample Size	Responded	Percentage (%)
4B	37	26	30.6
Gitathuru	25	20	23.5
Kosovo	58	39	45.9
Total	**120**	**85**	**100**

Source: Field Survey (2013)

In Gitathuru there was greater cooperation from the households while during the field study the research team encountered some challenges from the Kosovo settlement. Several youths had disrupted the process of administering the questionnaire as they had thought that the research team was on a political mission. With the field study being undertaken at a time when the general election was approaching this did not come as a surprise. Nevertheless, in all the instances the research team was able to explain and convince them of the nature and purpose of the study by producing the introduction letter from the University of Nairobi. Figure 5.1 below illustrates the response per slum.

Mathare 4B too had a similar issue though on fewer occasions. Gitathuru area on the other end had no cases of harassment or intimidation and the field study was carried out with more ease.

5.2.2 Gender of Respondents

Table 5.3 Gender of Respondents

Gender	Frequency	Percentage (%)
Males	40	47.1
Females	45	52.9
Total	**85**	**100**

Source: Field Survey (2013)

Of the household respondents that participated in this study, 52.9% were females while 47.1% were males as indicated in the table above.

5.2.3 Age Distribution of Respondents

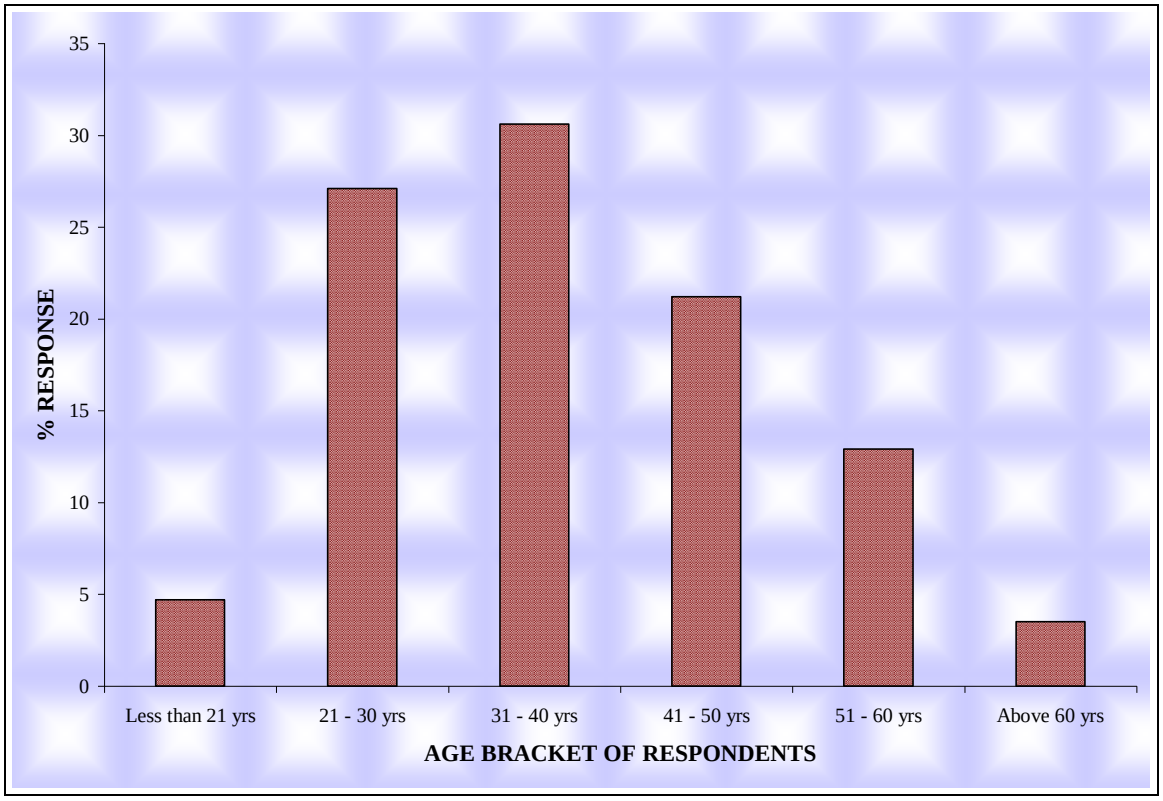
Table 5.4 Age Bracket

Age Bracket	Frequency	Percentage (%)
Less than 21 yrs	4	4.7
21 - 30 yrs	23	27.1
31 - 40 yrs	26	30.6
41 - 50 yrs	18	21.2
51 - 60 yrs	11	12.9
Above 60 yrs	3	3.5
Total	**85**	**100**

Source: Field Survey (2013)

From the findings of the study and as indicated in Table 5.3 most of the respondents in this study were between the age brackets of 31 to 40 years who were 30.6% while those between 21 to 30 years were 27.1% of the participating respondents. Those between 41 – 50 years were 21.2%, those between 51 – 60 years were 12.9% and those who were less 21 years were 4.7%. (Table 5.4)

Figure 5.1 Age Bracket of Respondents



Source: Field Survey (2013)

5.2.4 Marital Status of Respondents

As indicated from the table 5.4 above, most of the respondents, 55.2%, were married while 24.1% were divorcees, 15.5% widowed, 3.4% were single with remaining 1.7% being separated. The researcher found out that the number of married men far exceeded that of women. Most of the women were either divorced or widowed and this definitely affected their level of living as the burden of catering for their children and themselves shifted completely to them.

Table 5.5 Marital Status

Status	Frequency	Percentage (%)
Single	3	3.4
Married	47	55.2
Widowed	13	15.5
Divorced	20	24.1
Separated	1	1.7
Total	**85**	**100**

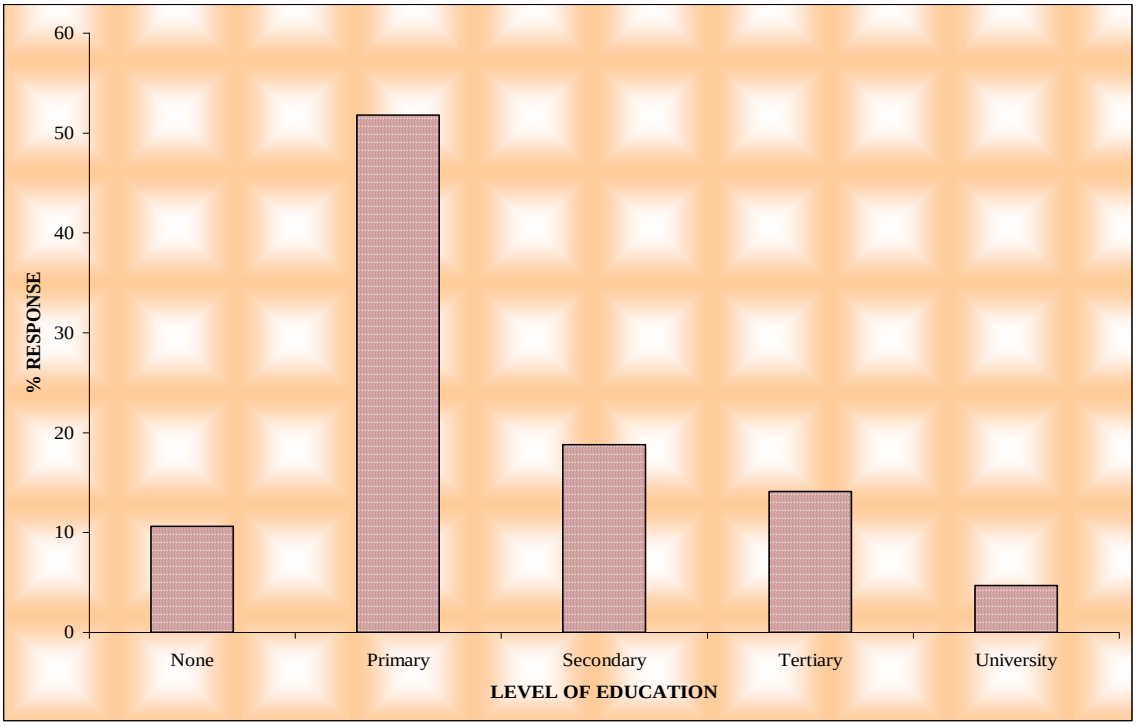
Source: Field Survey (2013)

5.2.5 Education Level of Household Heads

In this study the household head was viewed as the person who generally bears the chief responsibility for managing the affairs of the household and need was not necessarily the principal earning member of household.

The level of education of the respondents revealed that most of them, 51.8%, had only basic education i.e. up to primary level with 10.6% having no education at all. Those who had made it beyond primary level were 37.6% (secondary, 18.8%, Tertiary 14.1% and University, 4.7%). (Figure 5.2)

Figure 5.2 Education Levels of Household Heads



Source: Field Survey (2013)

Osinubi (2003) notes that income and educational status tends to move together in the same direction. With improvement in the level of education one is better placed in terms of income generation and therefore enhancing one's own purchasing power thus improving ones standard of living. Sociological Studies indicate the existence of a negative relationship between poverty and education. This is because the greater the degree of education of individuals/families, the likelihood of poverty declines (UNDP, 1998).

Table 5.6 Manifestation of Slums in the Study Area

Settlement	Manifestation of slums
Gitathuru	Poor sanitation, poor/substandard housing, lack of access roads, Overcrowding, Lack of security of tenure, encroachment to riparian reserve, high density, insecurity, settlement on rugged terrain
Mathare 4B	Poor sanitation, open drainages ,open defecation ,poor/substandard housing, lack of access roads, Overcrowding, Lack of security of tenure, encroachment to riparian reserve, high density, insecurity, settlement on a flood plain
Kosovo	Poor sanitation, open drainages ,poor/substandard housing, lack of access roads, business extension on road reserves, overcrowding and high densities, Lack of security of tenure, encroachment to riparian reserve, insecurity, settlement on rugged terrain.

Source: Field Survey (2013)

5.2.6 Structure Ownership Details

In this study most of the respondents (84.7%) were tenants with only 15.3% of the respondents being structure owners. (Table 5.7) Discussions with key informants revealed the cost of putting structures was not uniform in the three settlements; the cost was highest in Kosovo than the rest of the settlements. This was because the cost of space and cost of connecting to various infrastructure services was highest in Kosovo.

Table 5.7 Ownership of Housing Structures

Tenancy	Frequency	Percentage (%)
Tenant	72	84.7
Owners	13	15.3
Total	**85**	**100**

Source: Field Survey (2013)

It was further noted that ownership and tenancy trends had an ethnic dimension, whereas structures owners in the three settlements were predominantly Kikuyu's, tenants were from various ethnic tribes in various settlements. In Mathare 4B for example, the tenants were predominantly Luo's while in Kosovo the tenants were predominantly Kikuyus , however, in Gitathuru there were mixed ethnic groups.

The study also revealed that construction of new structures followed bureaucratic procedures and a potential structure owners had to get consent from the provincial

administration, village elders and finally in some settlements despite getting a nod from these two organizations ,one had to get goodwill from some youths who had established themselves into housing cartels.

5.2.7 Gender of House Owners

Findings of this study indicate that most of the structures (housing) in the area were male owned with 69.4% of the respondents revealing that the structure owners were male with only 30.6% being female owned. (Table 5.8)

Table 5.8 Gender of House owners

Head	Frequency	Percentage (%)
Male	59	69.4
Female	26	30.6
Total	**85**	**100**

Source: Field Survey (2013)

Though discussions with the local chief revealed the absence of illegal gangs within the slums some of the respondents indicated that in each of the villages (slums) there were actually some youth cartels whose main work was to protect certain business interests in their area. With many of this gangs being male dominated, over the years the male have thus been able to use their influence to acquire portions of land to construct their housing structures.

5.2.8 Area of Residence of Structure Owner

Most of the landlords (44.7%), and as indicated in table 5.9, lived within the slums while 45.9% lived outside the area of study. In these findings 9.4% did not live within the area of study. (Table 5.9)

Table 5.9 Area of Residence of structure owner

Residence	Frequency	Percentage (%)
Within the Slum	38	44.7
Outside this Area	39	45.9
I don't Know	8	9.4
Total	**85**	**100**

Source: Field Survey (2013)

5.3 Factors that Lead People to Settle in Mathare Valley Slums

The first objective of this study was to establish the factors that had contributed to the residents of Mathare Valley to reside within the slum settings. This section gives the researchers finding on the factors that have led people to settle in the Mathare Valley Slums.

5.3.1 Monthly Income of Households

Findings of the study indicate most of the households had a monthly income of less than 15,000 shillings. In total 74.1% of the households had to do with a monthly income of less than 15,000 shillings whereby 27.1% earned between 5,001 – 10,000 shillings, 20% earned between 2,501 – 5,000 shillings, 18.8% earned between 10,001 – 15,000 while 8.2% earned less than 2,500 shillings. Of the sampled households only 25.9% earned more than 15,000 shillings.

Table 5.10 Monthly Income of Households

Monthly Income	Frequency	Percentage (%)
Less than 2,500	7	8.2
2,501 - 5,000	17	20.0
5,001 - 10,000	23	27.1
10,001-15,000	16	18.8
More than 15,000	22	25.9
Total	**85**	**100**

Source: Field Survey (2013)

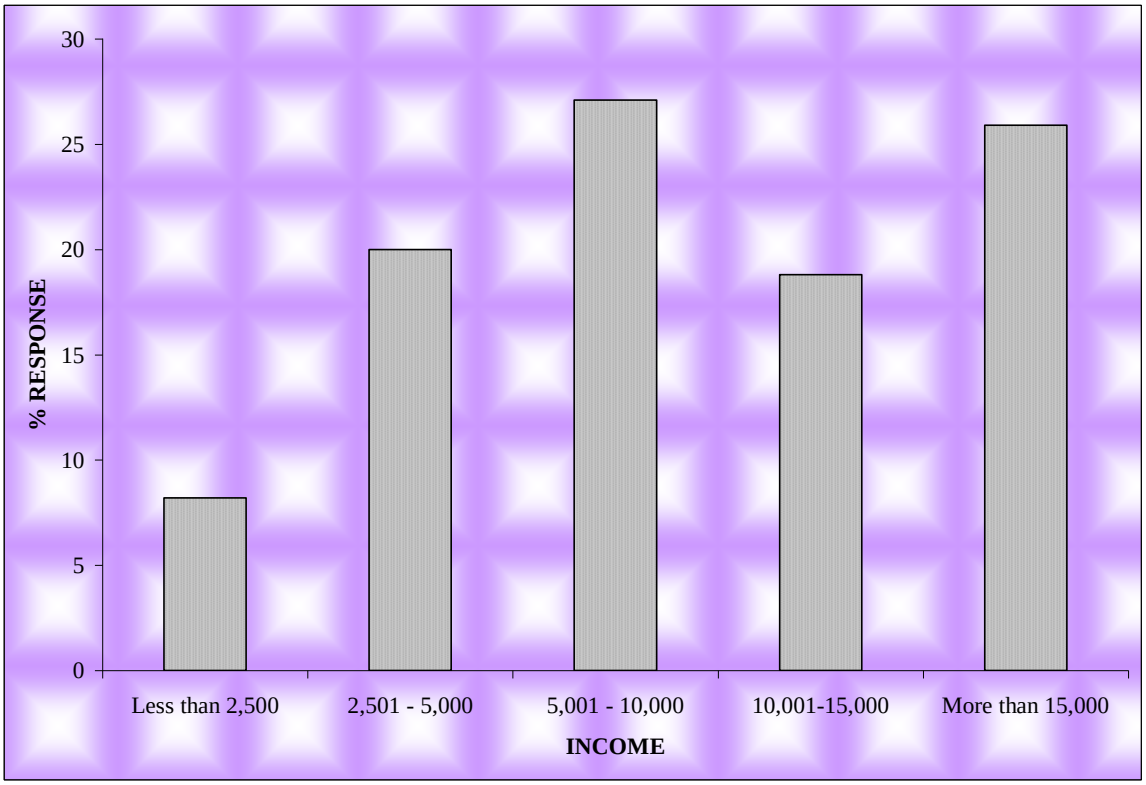
At the time of the study the dollar exchanged at a rate of 86 shillings against the US dollar. As indicated in table 5.6 above the number of households that earned between 0 – 10,000 shillings were 55.3%. Considering that on average each household had 4 members then mathematically all these households (55.3%) were living on less than 1US dollar per person per day i.e.

$$\frac{10{,}000\,Kshs}{4\,persons\ \ 31 days\ x\ 86\,Kshs} = \$0.94 / person / day$$

With income being a major determinant of household expenditure, as it puts a ceiling to the amount that can be spent within a period, it is then evident from these findings that the poverty prevalence in Mathare Valley slums is not only alarming but very high.

Discussions with various respondents revealed that the household earnings were not capable of sustaining the households. This was one of the major reasons that had forced the residents to settle in this locality. Figure 5.3 below shows the monthly income of the households.

Figure 5.3 Monthly Incomes of Households



Source: Field Survey (2013)

5.3.2 Main Source of Income for the Household

The findings of the study and as indicated in table 5.11 above most of the respondents involved themselves in casual/manual jobs with 47.1% of the respondents being in this category while 38.8% were self-employed, 10.6% were salaried and 3.5 were regular wage earners.

For the self employed the kind of economic activities they engaged in included; tailoring, cobbling, shoe shining, hawking, selling of groceries and shop operators among others. Some of the male respondents indicated that they engage in offloading at the busy

Eastleigh Estate. Some of the female respondents indicated that they engaged in prostitution while others had to be employed as bar waiters.

Table 5.11 Main Source of Income for the Household

Education Level	Frequency	Percentage (%)
Self Employed	33	38.8
Salaried	9	10.6
Regular wage	3	3.5
Casual/Manual Jobs	40	47.1
Total	**85**	**100**

Source: Field Survey (2013)

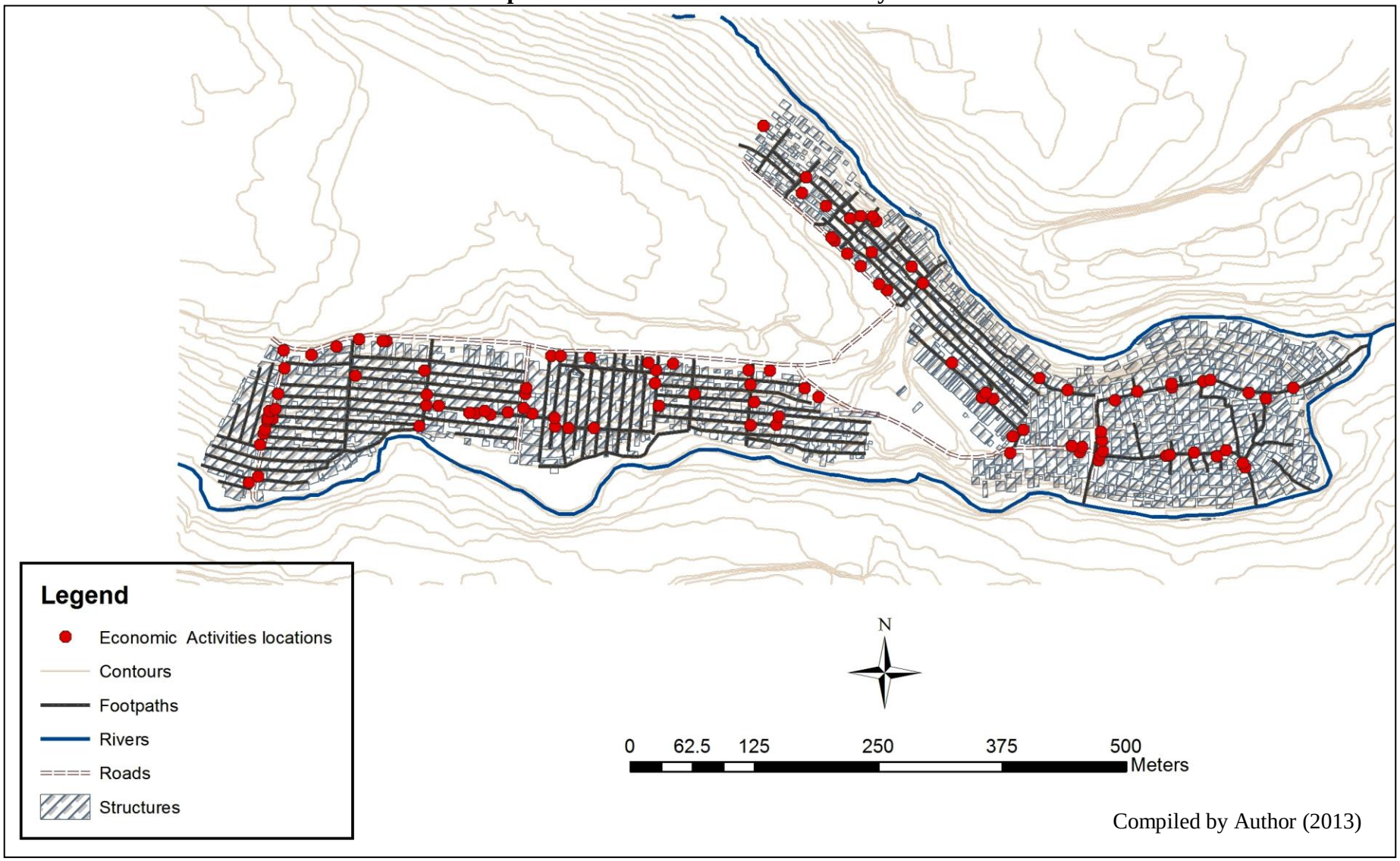
On the other hand some females had to hang around the homes of the rich to be given contractual work in doing house chores like washing of utensils, washing of clothes and cleaning the compound. Among the wage earners, rental income from housing had the most number of respondents while one of the respondents was a pensioner.

Plate 2: Some of the Economic Activities within Mathare Valley

Source: Field Survey (2013)

Observations during the field study, and as can be seen from the pictures above, revealed that there were so many economic activities that were ongoing within the slums .Most of the economic activities engaged by slum dwellers were provision shops, road side food selling, selling of charcoal and firewood. The study noted that there was concentration of the economic activities along the access roads to take advantage of the heavy human traffic flow. The net effect of this was encroachment to the road reserves by the business structure extensions. Map 4 shows the location of economic activities in the study area.

Map 4: Economic Activities in the Study Area



Compiled by Author (2013)

5.3.3 Monthly House Rent

Table 5.12 Monthly House Rent

Monthly Rent	Frequency	Percentage (%)
Less than 500	2	2.4
501 - 1,000	26	30.6
1,001 - 1,500	31	36.5
1,501 - 2,000	11	12.9
2,001 - 2,500	7	8.2
2,501 - 3,000	3	3.5
3,001 - 3,500	2	2.4
More than 3,500	3	3.6
Total	**85**	**100**

Source: Field Survey (2013)

Findings of the study indicate that the lowest paid monthly rent was 500 shillings with and 2.4% of the respondents were living in such houses which were single roomed. The highest number of respondents (36.5%) lived in houses that going for a monthly rent of 1,001 – 1,500 shillings and which were all single rooms. Households that paid a monthly rent of 501 – 1,000 were 30.6% (all living in single rooms) while 12.9% paid 1,501 – 2,000 and 8.2% paid a monthly rent of 2,001 – 2,500 which was for a two roomed housing unit. Those that paid 2,501 – 3,000 were 3.5% while those of 3,001 – 3,500 were 2.4% and those paying more than 3,500 shillings were 3.6%.

5.3.4 Origin of Households

The researcher sought to find out where the respondents had originated from before settling in Mathare by posing the question: '*Where were you living before you came to this area?'* Table 5.13 below gives these findings.

Table 5.13 Origin of Households

Origin	Frequency	Percentage (%)
Born in this Village	11	12.9
Different slum in Nairobi	24	28.2
Formal settlement in Nairobi	14	16.5
Outside Nairobi	36	42.4
Total	**85**	**100**

Source: Field Survey (2013)

Most of the respondents (42.4%) were living outside Nairobi before they came to Mathare while 28.2% had been living in others slums in Nairobi and 16.2% had come from formal settlements within Nairobi. These findings confirm that the major cause of proliferations of slums is high rate of urbanization. There is also a significant trend of inter slum migration with 28.2 % of respondents having migrated from other slums. If the slum situation is not checked then the slum phenomena will be irreversible as there will be generations whose their lives will be shaped in the slums from birth as indicated by the 12.9 % of the households that had been born and brought up within Mathare valley slums.

5.3.5 Reasons for Moving to Mathare Valley Slums

This question captures the views of the 87.1% of the respondents who moved into the Mathare Valley slums from other areas i.e. they had not been born and brought up in Mathare and who in the slums circles were not considered as *Wazaliwa*[1].

Table 5.14 Reasons for Moving to Mathare Valley Slums

Reasons	Frequency	Percentage (%)
Affordable rent	22	29.7
Employment	27	36.5
Marriage	15	20.3
Evictions from another informal settlement	5	6.8
Came to live with a relative	4	5.4
Moved out of parents house to live alone	1	1.4
Inherited	0	0.0
Total	**74**	**100**

Source: Field Study (2013)

Most of these respondents, 36.5%, had settled in Mathare while in such of employment while 29.7% had moved because of the presence of affordable rent and 20.3% had moved as a result of marriage. Respondents who had been evicted from other informal

1 Wazaliwa – a Kiswahili word meaning 'people born in a place'. In the slums it is used to mean people who have been born and brought up in the slums.

settlements and had thus opted for Mathare were 6.8%. Several respondents who were 5.4% of the total respondents had come to live with some of their relatives while one respondent indicated that the reason he had moved into Mathare was so as to be able to live on his own.

Discussions with various respondents and village headmen revealed that poverty was the major cause of people living within the slums. One of the headmen indicated that the poor moved into the slums as they provided low costs of living compared to the formal settlements in Nairobi. There close proximity to centres or areas booming with economic opportunities was also a contributing factor to people moving into slums. Eastleigh, Ngara Market, the Jua Kali shades at Kamukunji and the Grogon area along Kirinyaga road were some of the places that a good number of the slum dwellers earned an informal source of livelihood from and which were considered to be a walking distance.

5.4 Nature and Status of Existing Infrastructure

This section will focus on the nature and status of existing infrastructure and service provision within the area of study as captured during the field work. This will involve all data captured concerning provision of water, sanitation and sewerage, electricity, health care services and the existing road network within the Mathare Valley slums. The section also gives a highlight on the nature of housing within this area.

5.4.1 Nature of Structures

Most of the housing structures (83.5%), and as indicated by the respondents during the field study were residential while 9.4% acted as business cum residential units, 2.4% were institutional and 1.2% was for religious purposes. (Table 5.15)

Table 5.15 Structure Details

Structure Use	Frequency	Percentage (%)
Residential	71	83.5
Business	3	3.5
Business cum Residential	8	9.4
Institutional	2	2.4
Religious	1	1.2
Total	**85**	**100**

Source: Field Survey (2013)

Observations by the research show that the Mathare Valley area has housing units and structures of all kinds ranging from residential to business premises, institutional and religious units. Plate 3 shows the nature of some of the housing structures in the study area.

Plate 3: Type of structures in Mathare Valley Slums

Source: Field Survey (2013)

5.4.2 Type of Housing Material (Wall)

In the study area Gitathuru area was the settlement that had most of the structures built of stones with 50% of the households living in stone houses, 45% living in houses with iron sheets walls and one percent lived in houses made of bricks. None of the households interviewed lived in either mud walled houses or those made of scrap metal. Kosovo settlement had most of the households living in houses constructed with iron sheets with 82% of the households occupying such structures. Those who lived in stone and mud walled houses were 7.7% in each of them and whose lived in wooded houses were 2.6%.

Mathare 4B had the highest number of respondents living in mud walled houses with 46.2% of the respondents occupying this kind of structures while 50% lived in houses made of iron sheets and 3.8% lived in houses made of wood. (Table 5.16)

Table 5.16 Type of Housing Material (Wall)

Settlement		Type of Walling Material						
		Stones	**Mud**	**Iron sheet**	**Wood**	**Bricks**	**Scrap metal**	**Total**
Kosovo	**Frequency**	3	3	32	1	0	0	**39**
	%	7.7	7.7	82.0	2.6	0	0	**100**
4B	**Frequency**	0	12	13	1	0	0	**26**
	%	0	46.2	50	3.8	0	0	**100**
Gitathuru	**Frequency**	10	0	9	0	1	0	**20**
	%	50	0	45	0	5	0	**100**

Source: Field Survey (2013)

From Plate 4 it is observable that there is the emergence of new concrete framed structures running into several floors. Discussions with the two village headmen revealed that there was an emerging trend where rich land developers were buying several of the informal structures located in an area and constructing flats in their place. These modern units were better furnished and had better water provision and sanitation facilities compared to the former. Despite this, most of them had been constructed without any form of approval from the Nairobi City Council City Council. Of notable concern to the study was the fact that many of the flats within the slum area had been constructed without the involvement of the various professionals within the built environment such as architects, civil and mechanical engineers and physical planners among others and were a disaster in waiting in light of poor construction methods.

Plate 4: Typology of Structures within the Study Area

Source: Field Survey (2013)

5.4.3 Access to Basic Services

5.4.3. Source of Potable Water for Households

Findings of the study indicate that most of the households (42.4%) purchase their water from water kiosks located within the slums while another 9.4% purchased their water from mobile water vendors who delivered the water to their doorsteps. Households that fetched their water from yard taps located at selected points within the slums were 37.6% while those that had piped water in their households were 9.4%. (Table 5.17)

Table 5.17 Source of Potable Water for Households

Source of Water	Frequency	Percentage (%)
Piped Water in houses	8	9.4
Yard Tap	32	37.6
Well	1	1.2
Mobile water vendors	8	9.4
Water Kiosk	36	42.4
Total	**85**	**100**

Source: Field Survey (2013)

A visit to various water points showed that apart from the yard taps, where water was provided for free, to access water from all the other sources the households had to pay. The cost of water was 3 shillings per *mtungi*[2] *and* and 1 shillings per *kibuyu*[3]*of water.* Children fetched water with the *kibuyu's* while the adults and water vendors fetched water by use of the *mtungi.*

During interview with key informants, the researcher noted that the provision of water in the study area was adequate and that the settlements were well reticulated. This was possible because the community in partnership with the NWSC and PT a civil society organization had a pilot water project in Kosovo b whose success made it possible to replicate it to the other settlements in the study area.

The project advocated for a mix households connections and public water points in form of water kiosks. The tripartite partnership shares different roles for the success of the project, while the community role was to identify infrastructure sites within the settlement and to provide unskilled labour during the project implementation, PT advanced financial assistance in form of a loan for connection fee and meter deposit as the water company provided technical expertise and the skilled labour during the design and implementation phase of the project.

[2] Mtungi is a term used to denote a 20 litre container
[3] Kibuyu – a five litre container

The success of the project culminated in the establishment of an informal department within the water company to oversee provision of water in all informal settlements in the company's jurisdiction

5.4.4 Reliability of the Water Source

Most of the respondents in this study (78.8%) indicated that though their water source often had water, the supply was irregular. Only 12.9% of the respondents had water throughout or on a regular basis while 3.5% accessed water from sources that were only operational in the morning and in the evening, 3.5% only during the daytime and the remaining 1.2% only during the night. (Table 5.18)

Table 5.18 Reliability of the Water Source

Water Flow	Frequency	Percentage (%)
Throughout/regularly	11	12.9
Morning and evening only	3	3.5
Daytime only	3	3.5
Night time only	1	1.2
Often but Irregular	67	78.8
Total	**85**	**100**

Source: Field Survey (2013)

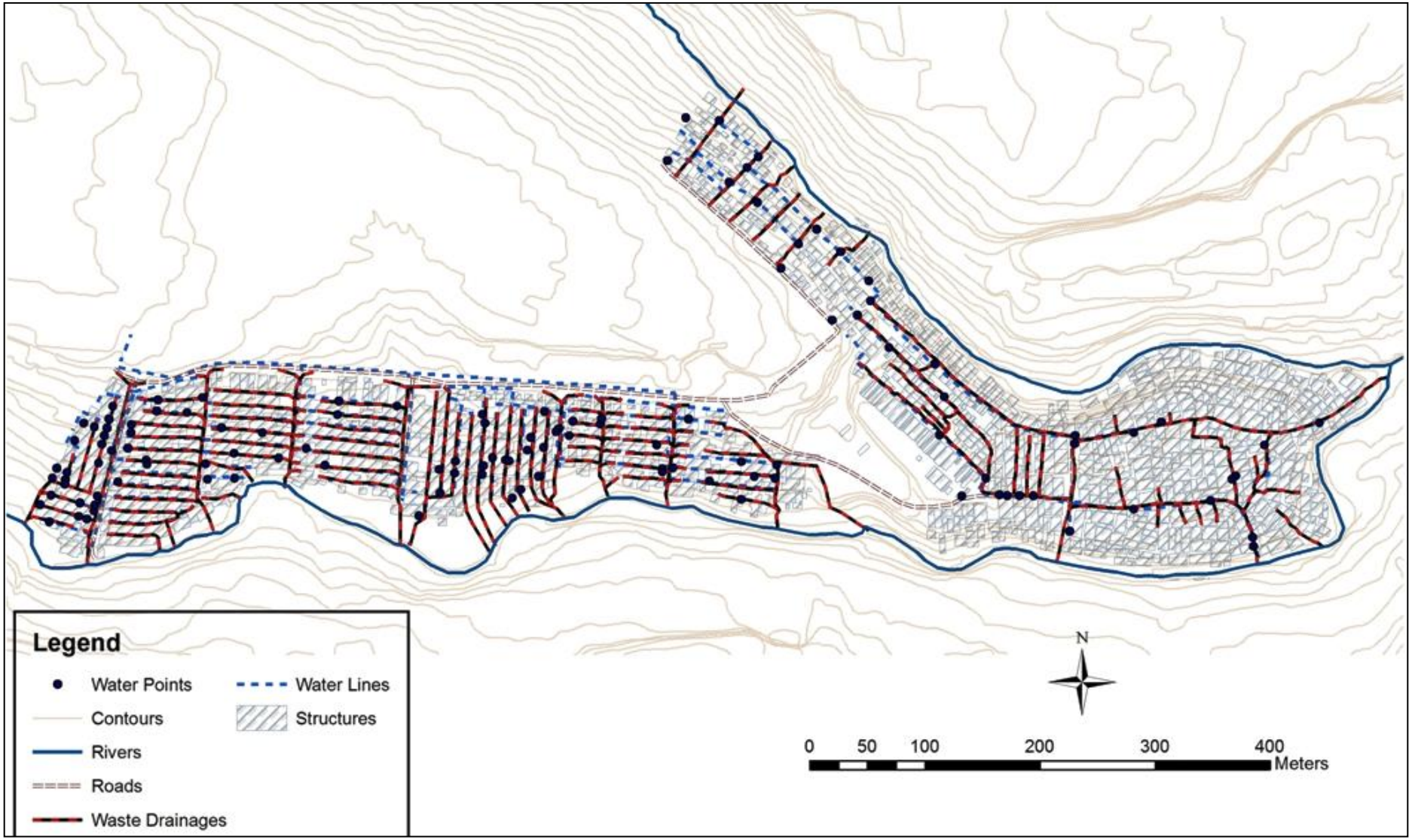
From the findings the households that had regular water supply lived in flats whose owners had factored in provision for storage tanks and this guaranteed the residents a regular supply of water. Though the yard taps and piped water sources provided water to the households they were affected by constant water rationing from the Nairobi Water Company. Water vendors and kiosk owners therefore had resorted to laying out storage water tanks that enabled them to be in business even when there was water rationing. Figure 5.4 shows one of the vending points run by the Nairobi Water Services. (Nb: the storage tank on top of the structure.

Figure 5.4 A Water Kiosk for Vending Water

Source: Field Survey

The study revealed that Kosovo settlement was well reticulated with water infrastructure unlike the other two settlements in the study area. Map 5 shows the water reticulation in the area of study. The extensive reticulation of water in Kosovo is attributed to a pilot project that was implemented by the Nairobi Water and Sewerage Company in partnership with the community with financing from a local NGO – the Pamoja Trust. It is also important to highlight that by the time of this study a replication of a similar initiative was on going in Gitathuru and Mathare 4B. The study was able to observe that the ongoing inititiave of replication of water reticulation in these two settlements was being hampered by lack of spacea for the pipes to be laid and for water kiosks.

Map 5: Water Reticulation Points in the Study Area



Complied by Author (2013)

5.4.5 Access to Sanitation; Drainage and Sewerage Facilities

The researcher sought to find out the nature of drainage and sewerage facilities in the slums by asking the question: *Is the slum connected to a city wide drainage and sewerage system?*

Table 5.19 Connectivity to City-Wide Drainage and Sewerage Facility

Response	Frequency	Percentage (%)
Yes	6	7.1
No	70	82.4
I don't Know	9	10.6
Total	**85**	**100**

From the findings of the study, majority of the respondents 82.4% indicated that the slums did not have any connectivity to the wider Nairobi city drainage and sewerage facility.

Plate 5: Open Drainage Systems

Source: Field Survey (2013)

As can be seen from figure 5.7 above the nature of the drainage system is in appalling state. The drainage systems is one of an open nature with the slums having no connection to the city wide drainage systems and this has led the residents of the area to create open

trenches which act as the drainage system and all lead to the nearby Mathare River. The stench and amount of litter in these open trenches is not only an eyesore but also a major health hazard. The study noted that the only open spaces left for kids to play became dead spaces due to the open drainage channels and could only become breeding avenues for mosquitos.

Figure 5.5 A View of the Mathare River full of all Kind of Wastes.

Source: Field Survey (2013)

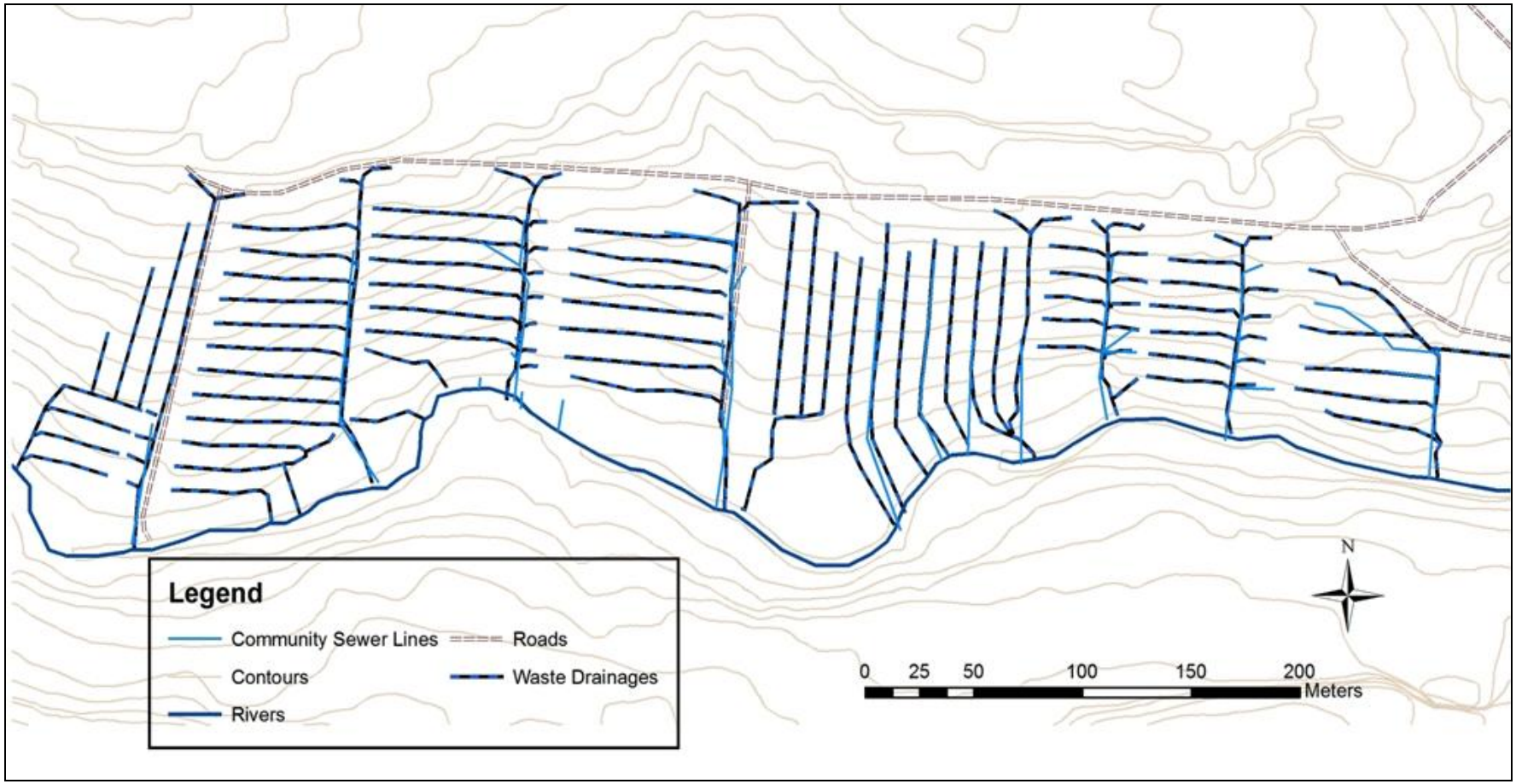
During the field work the research noted that the slums had no connections to the trunk sewer despite the fact that the sewer line cut across the slums. Physical observations of the trunk sewer line revealed that it was non-operational as it was blocked. Slum dwellers had developed coping strategies for sewer whereby individuals and groups running public toilets had designed and constructed community sewer lines especially in Kosovo while in other settlements hanging toilets were constructed next to the river for easy disposal of waste.

Challenges associated with the community sewer system included high costs of connection and the poor supporting infrastructure which resulted in often pipe bursts Lack of connectivity to the trunk lines meant that all the community sewers emptied to the river. Figure 5.5 above shows the appalling state of the Mathare River and in essence

depicts the nature of the sewerage system for households within the Mathare Valley Slums. The pictures of Mathare River show a river that is no longer flowing with water but one that is flowing with all kinds of waste.

The distribution of the community sewer lines is such that they end up emptying into the Mathare River. This situation is favoured by the topography of the location of the slums. The steep gradient allows fast flow of discharge through the sewer lines to the river. This is captured in Map 6 but it is important to note the entire connections are unplanned and are not systematic.

Map 6: Distribution of Community Sewer Lines in Kosovo



Complied by Author (2013)

Map 7: Cost of Connection to the Community Sewer

This map shows that the cost of connections to the community sewer systems increases as one goes away from the Mathare River. The households that were close to the river (represented by the blue dots) paid the least cost of connection with the costs being less than 5,000 shillings while settlements at the furthest edge, away from the river, paid an average connection fee of 15,000 shillings. This is attributed to the fact that the Mathare River acted as the main 'trunk line' for the entire community sewer system.

Complied by Author (2013)

5.4.6 Toilets

From the findings of this study, most of the households (34.1%) used WC that were connected to informal sewers while 24.7% used toiled facilities that had WC connected to formal sewer and 18.8% used facilities with WC draining into the river. On the hand 14.1% used ordinary pit latrines while 7.1% used VIP pit latrines and the remaining 1.2% had no toilet facility. (Table 5.20)

Table 5.20 Type of Toilet Facility

Nature of Facility	Frequency	Percentage (%)
Open Space	1	1.2
Ordinary pit latrine	12	14.1
VIP Pit latrine	6	7.1
WC - formal sewer	21	24.7
WC - informal sewer	29	34.1
WC - Drains/Rivers	16	18.8
Total	85	**100.0**

Source: Field Survey (2013)

Plate 6 shows some of the toile structures that have been put along the River Bank and which serve several households that live at close proximity to the river. The researcher found out that there were so many structure of this nature along the river banks and usually served selected households that had organized themselves into maintaining them. Though the standards were poor they provided some level of privacy as compared to defecating in the nearby bushes. The researcher was able to learn that most of the respondents avoided using these facilities after 9 pm due to security concerns and most of the families made use of *kasuku's*[4] for their short calls at night. In several instances during the field study the research team was able to come across children who defected in the open trenches without any of the adults questioning them.

[4] Kasuku – a container that was used to package a brand of cooking fat called Kasuku and which the several households use for their short calls at night.

Plate 6: Toilet Facilities Serving the People Close to the River

Source: Field Survey (2013)

Further up, away from the rivers there were laid pit latrines that acted as public toilets. The cost of usage of these facilities depended on the number of people per household that had registered to use them. A household of 3 persons paid a monthly fee of ksh.150 while that with 4 – 5 members paid Ksh.200 and those with more than 5 members paid a monthly fee of ksh.250 . The charges per family included toilet and bathroom use and one cloth washing session per week. The rates were under constant review and at the discretion of the toilet owner as seen in figure below. For walk in people the toilet charges were ksh.5 per use. One such public toilet is captured in Plate 7 below.

Plate 7: Public Toilet

In several cases the research was able to learn from some of the residents within the slum that some households would defecate in paper bags and throw the human waste in the open trenches next to their houses. This was usually common among households whose houses were situated along paths that had little human traffic.

5.4.7 Bathroom Facilities

Most of the households within the area did not have bathroom facilities with 62.4% of them falling within this group. Only had 37.5% of the household respondents indicated that their households had access to bathroom facilities. (Table 5.21)

Table 5.21 Presence of Bathroom Facilities

Response	Frequency	Percentage (%)
Yes	32	37.5
No	53	62.4
Total	**85**	**100**

Source: Field Survey (2013)

Many of the households that didn't have a bathroom facility had their members taking their baths within the house. Several of the respondents indicated that they took their baths outside their houses and this was done at night or very early in the morning but never during the day.

5.4.8 Solid waste disposal

Most of the respondents as indicated in the table above disposed garbage once in 2 days with 41.2% response for this category while 29.4% disposed of garbage everyday, 24.7% once in a week and 4.7% disposing of garbage once in a fortnight. The researcher further sought to find out the kind of collection points or where the household members disposed of this garbage. Table 5.22 gives the findings of the mode of waste disposal within the study area.

Table 5.22 Frequency of Garbage Disposal

Collection times	Frequency	Percentage (%)
Daily	25	29.4
Once in 2 days	35	41.2
Once in a week	21	24.7
Once in a fortnight	4	4.7
Total	**85**	**100**

Source: Field Survey (2013)

5.4.9 Mode of Garbage Disposal

The findings of the study show that 49.4% of the respondents disposed of their garbage or waste into open spaces within the slums. Respondents who disposed their waste into dustbins or paper bags which were collected by garbage collects for disposal were 25.9% while those who disposed into the river were 21.2%. The remaining 3.5% disposed of their waste into landfills. (Table 5.23)

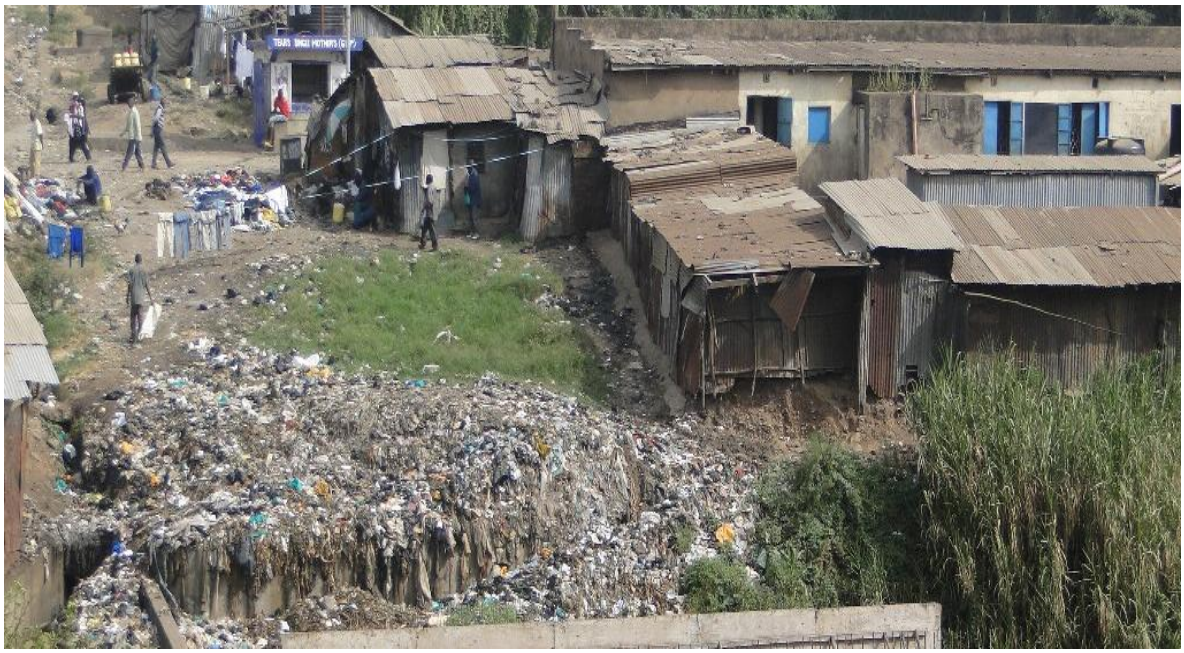
Table 5.23 Mode of Garbage Disposal

Garbage Disposal Points	Frequency	Percentage (%)
Dust bins/Paper bags	22	25.9
Into the River	18	21.2
Open Spaces	42	49.4
Land fills	3	3.5
Total	**85**	**100**

Source: Field Survey (2013)

Lack of concerted efforts on solid waste management within the study area has led to haphazard disposal of garbage within the study area as showing in Figure 5.6

Figure 5.6 Garbage Dumped on an Open Space



5.4.10 Garbage Collection

As indicated in table 5.24 above most of the respondents (62.4%) indicated that there were no garbage collectors within the Mathare Valley slums. Only 37.5% of the respondents indicated that there was the presence of garbage collectors within their settings. The following table further analyses the responses offered by the 37.5% (n=32) who indicated that there existed garbage collectors within their areas.

Table 5.24 Presence of Garbage Collectors

Response	Frequency	Percentage (%)
Yes	32	37.5
No	53	62.4
Total	**85**	**100**

Source: Field Survey (2013)

5.4.11 Authority in Charge of Garbage Collection

When asked '*Who was in charge of Garbage Collection?*, most of these respondents (68.8%) indicated that there were community based organizations that were in charge of garbage collection within the slums. On the other hand 25% indicated that there were private collectors and 6.3% indicated that the Nairobi City Council was the main garbage collectors. (Table 5.25)

Table 5.25 Authority in Charge of Garbage Collection

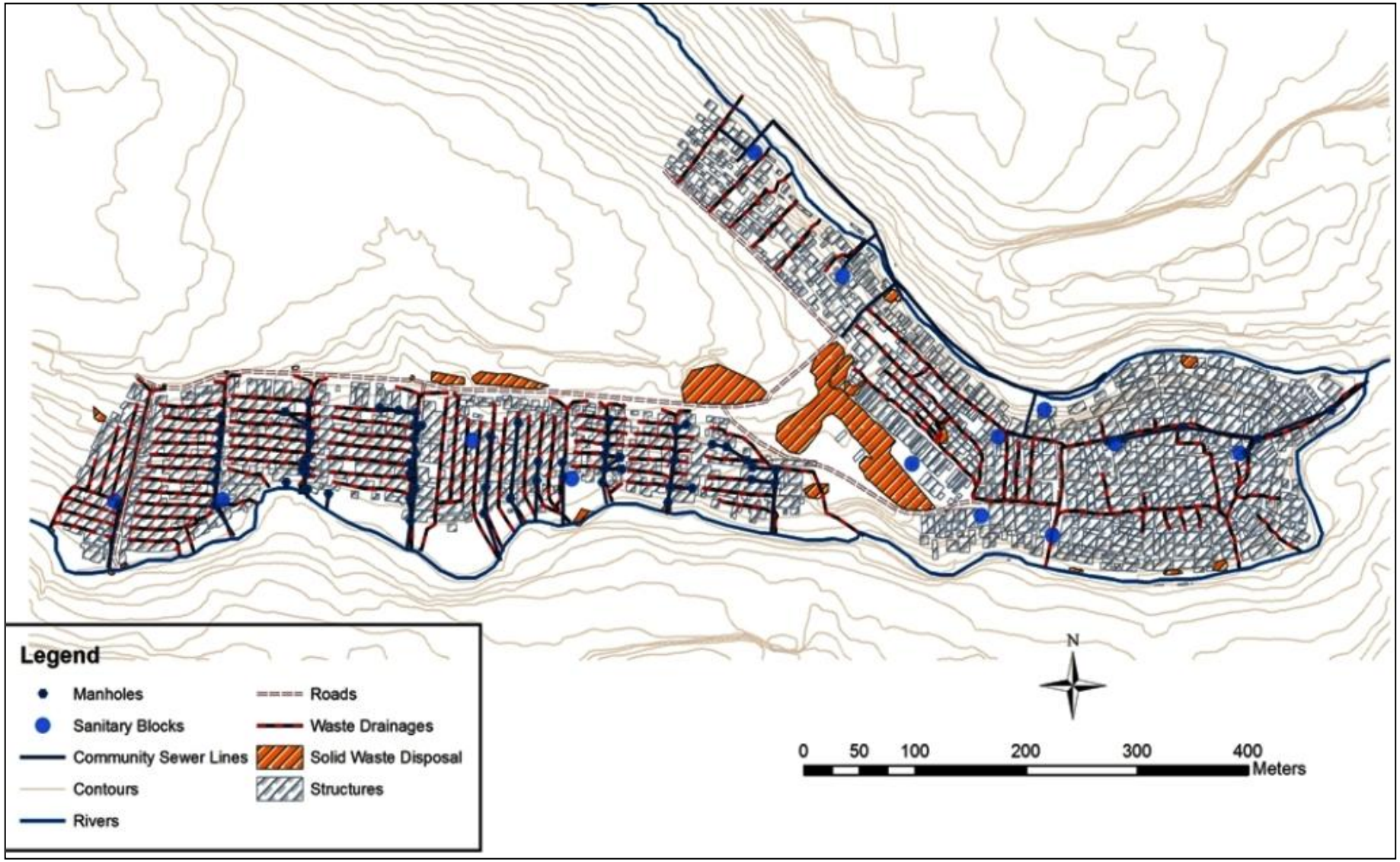
Authority	Frequency	Percentage (%)
The City Council	2	6.3
Private waste collectors	8	25.0
Community based organizations	22	68.8
Total	**85**	**100**

Source: Field Survey (2013)

Map 8 shows the sanitation situation within the study area. As can be seen from this map sanitary blocks were sparsely scattered within the settlements. Solid waste disposal was carried out on open spaces within the slums. As can be seen the biggest dumping sites were located where there were open spaces. These open spaces acted as dumping while at the same were utilized as playing fields by children. In several instances some parents complained that this had led their children to suffer injuries inflicted by broken bottles and other sharp objects. To some of the children the dumping sites provided them with materials of play while others made a living out of it.

Observation during the field survey revealed a situation needed urgent interventions so to tackle the problem of solid waste disposal and management that was an eye sore.

Map 8: Study Area Sanitation Map



Complied by Author (2013)

5.4.12 Source of lighting in the House

Findings of the study indicate that the two main source of lighting for the households were electricity and paraffin. The households that had electricity connection were 78.8% while those that used paraffin as the main source of lighting were 20% while 1.2% used candles as the main source of lighting. (Table 5.26)

Table 5.26 Source of Lighting in the House

Source of Lighting	**Frequency**	Percentage (%)
Electricity	67.0	78.8
Paraffin	17.0	20.0
Solar Energy	0.0	0.0
Portable battery	0.0	0.0
Candle	1.0	1.2
Total	**85**	100

Source: Field Survey (2013)

5.5 Infrastructure Provision

5.5.1 Presence of Projects for Infrastructure Improvement

Table 5.27 Presence of Projects for Infrastructural Improvement

Response	**Frequency**	**Percentage (%)**
Yes	36	42.4
No	**49**	**57.6**
Total	**85**	**100**

Source: Field Survey (2013)

Findings of the study indicate that most of the respondents in the study area were not aware of the existence of any form of infrastructure projects. The study confirmed that 42% of the respondents were aware of infrastructure projects within their settlements while 57.6% of the household respondents were not. (Table 5.27)

Some of the projects that were identified by the 42.4% of the household are highlighted in the following table.

5.5.2 Types of Infrastructural Improvements in the Study Area

Out of the 42.4% (n = 36) of the respondents who were aware of infrastructural improvements majority of them, improvement of water facilities had 91.7% response, while slum electrification had 80.6%, security lighting had 77.8%, construction of public toilets had 75% response, road rehabilitation had 50% and improvement of the housing structures had 41.7% response. (Table 5.28)

Table 5.28 Types of Infrastructural Improvements in the Study Area

Project	Frequency	Percentage (%)
Water projects	33	91.7
Road rehabilitation	18	50.0
Public toilets	27	75.0
Lighting/Adopt a light	28	77.8
Electrification	29	80.6
Upgrading of Slum Structures	15	41.7

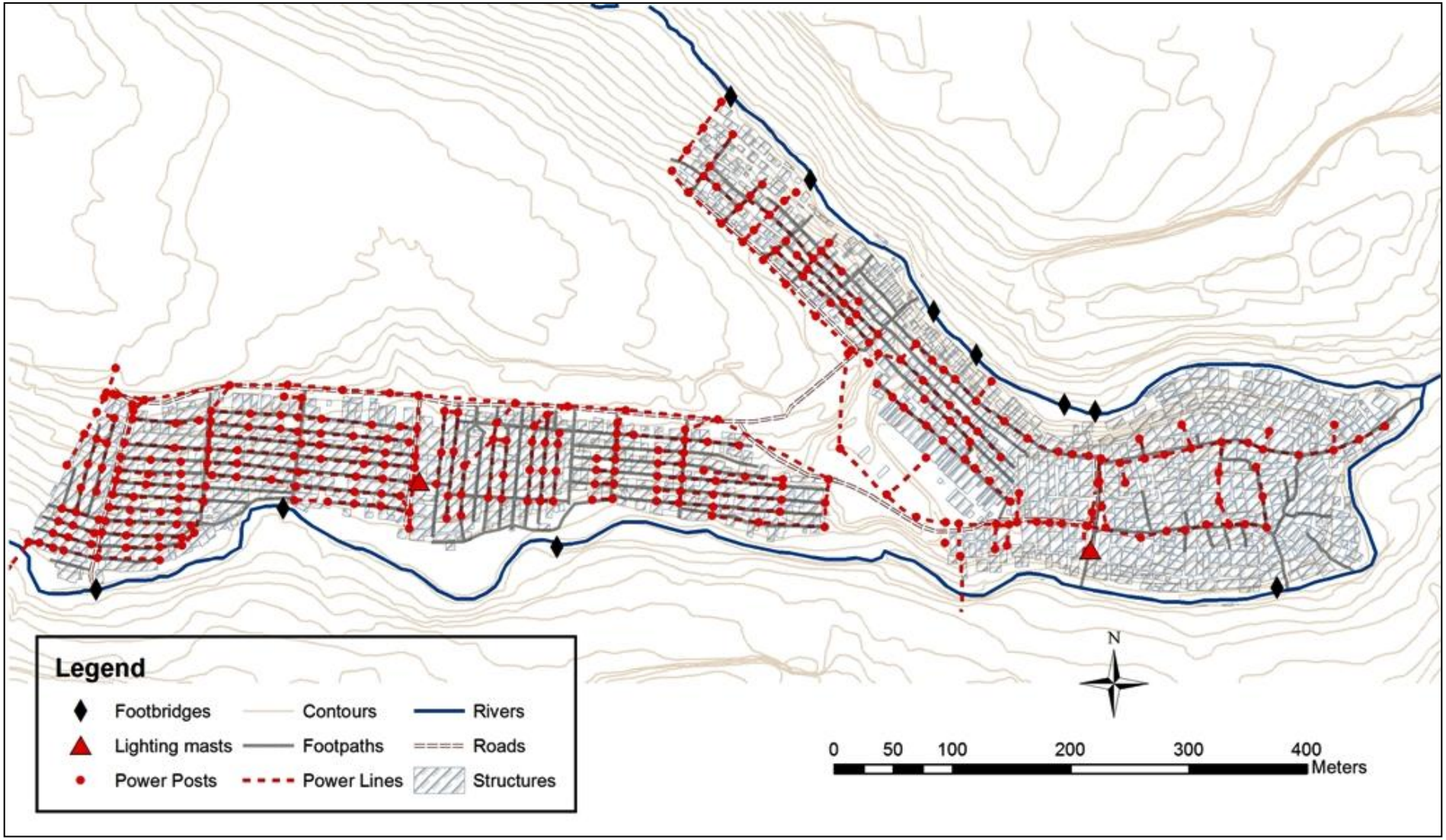
Source: Field Survey (2013)

Map 9 shows the existing electricity supply lines and the road network within the study area. There are two motorable roads adjacent to Gitathuru and Kosovo through to Mathare 4B. The two main roads and gravel while the rest of the access routes are merely foot paths. Encroachment on the otherwise motorable road in Kosovo is visible. At the time of this study there was no motorable bridge linking the settlements within the study area to Juja Road. However there are several footbridges facilitating the movement of people from one settlement to the other across the river.

From interview held with village elders revealed that the road through Mathare 4B was opened through organized community initiatives where households that were perceived to be settled on the reserve voluntarily demolished their structures. (Plate 9).

At the time of the field survey the Kenya Power Company was in the process of replacing the wooden electricity poles with the new concrete poles.

Map 9: Electricity and Circulation within the Study Area



Complied by Author (2013)

5.5.3 Security of Tenure

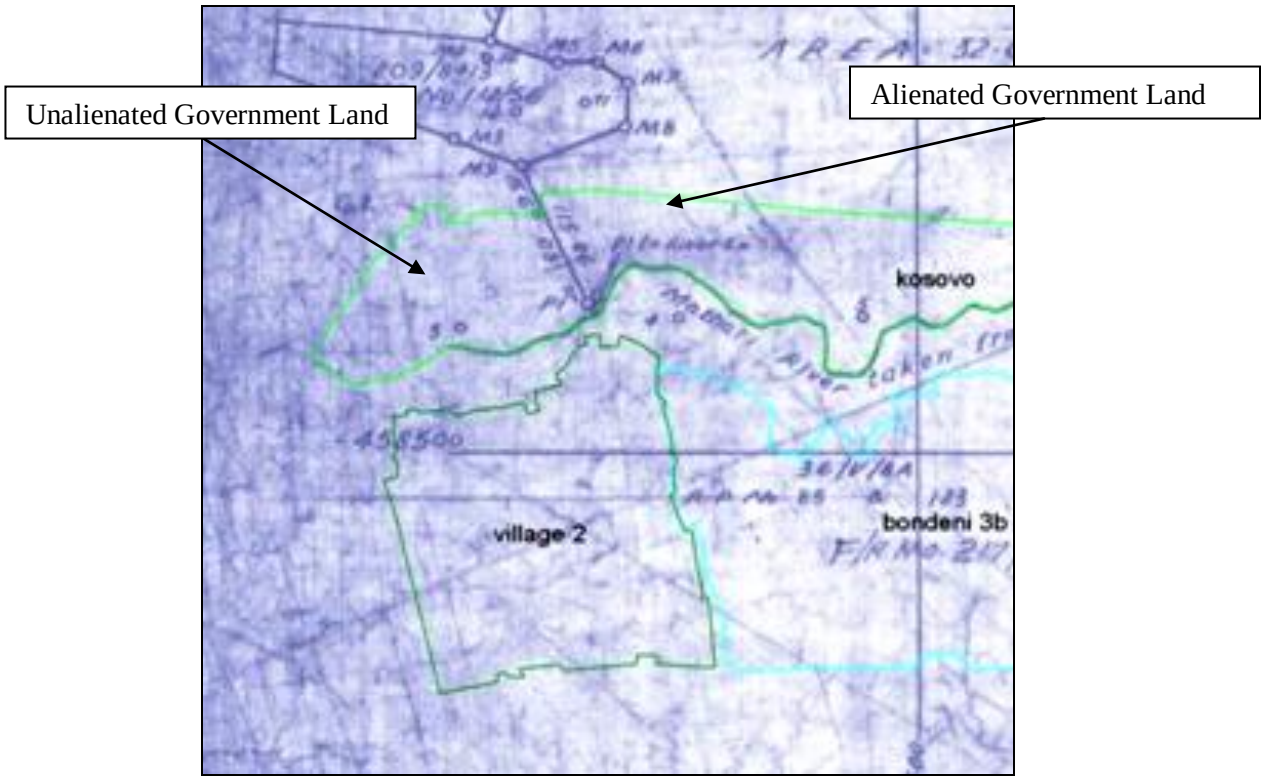
Table 5.29 Security of Tenure

Land tenure	Frequency	Percentage (%)
Secure	85	100
Insecure	0	0
Total	**85**	**100**

All the household respondents indicated that there was no security of tenure in the settlements. Occupation arrangements within the settlements were between the structure owners and the local chiefs. Respondents indicated that the village elders acted as the link between the structure owners and the local chiefs. They village elders allocated space for construction and some unreceipted levies were charged depending on the financial ability of the structure owners. Most of the ownership documents were letters from the area chiefs giving permissions for the owners of the structures to construct. In other words, none of the landlords in the area of study had any form of a legal ownership document to the land they occupied.

Lack of tenure was noted as the biggest challenge to infrastructural provision in the slum settlements. Interview with key informants from the Kenya Power Company and Nairobi Water and Sewerage Company revealed that mainstream service providers had shied away from investing in the area due to lack of legal ownership documents by the slum dwellers. One of the field officers of Kenya Power Company informed the study that documents in their position indicated that the land was government owned. This was the view shared by the slum dwellers. A scrutiny of survey maps availed to the study from the Survey of Kenya indicates that the land housing the settlements several L.R. Numbers which were: LR NO 209 /8600 approximately- 52.65 Ha and LR 209/65/3 which is already allocated to the Kenya Police Service. (Appendix II)

Figure 5.7 Cadastral Map Overlay of Kosovo

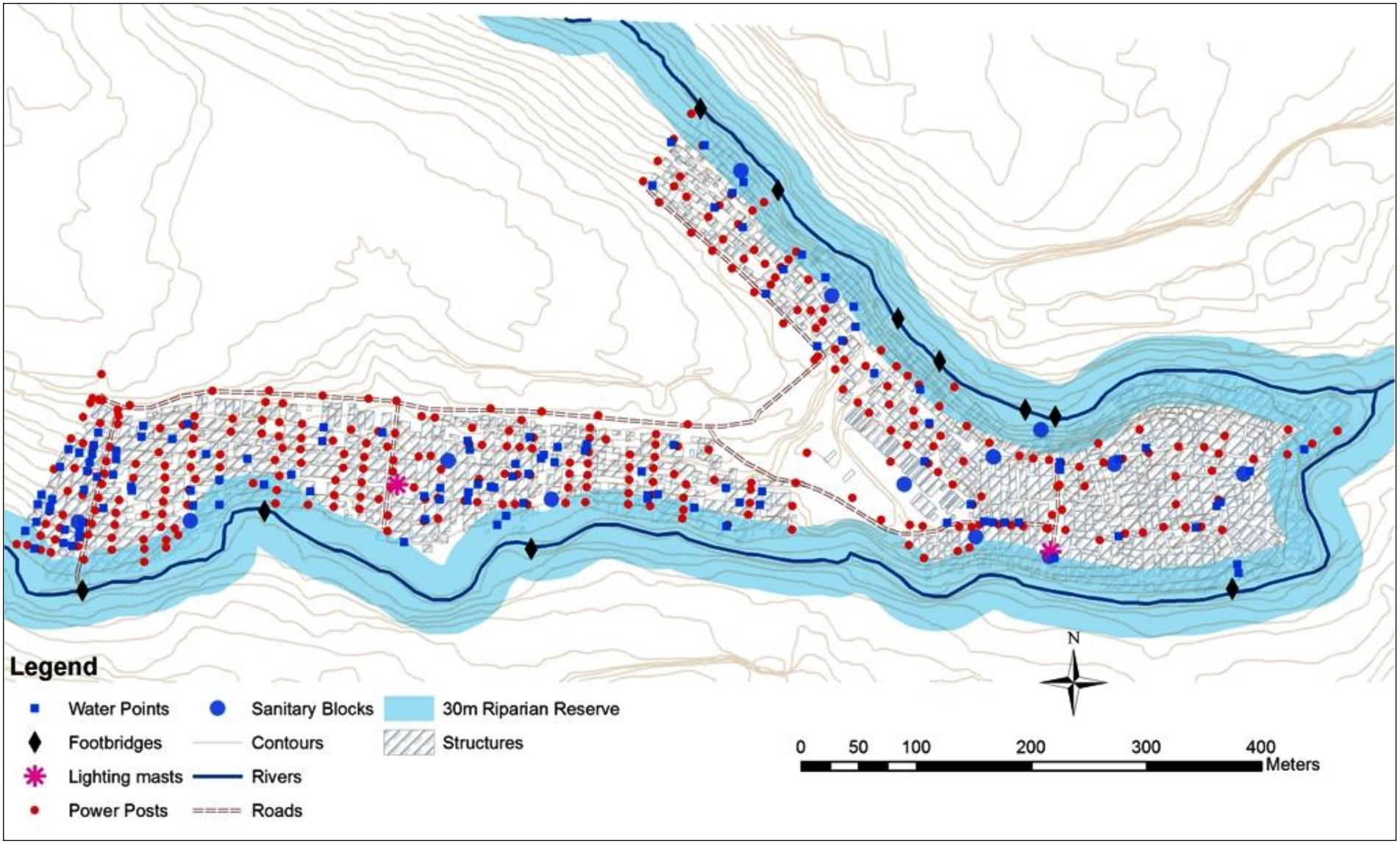


Source: Field Survey (2013)

In Kosovo, the study noted that the settlement lies on two land parcels. Figure 5.7 shows the positioning of Kosovo settlement on an alienated government land L.R. No 209/8600 and unalienated government land denoted as GL. Referencing planning on such a scheme thus becomes a challenge.

The study further notes that almost a half of Gitathuru and Mathare 4B lie on a riparian reserve. There settlements had significantly encroached on the riparian reserve of both Mathare and Gitathuru Rivers. This provides a planning challenge for such an area. Map 8 show encroachments on the riparian reserve on the study area.

Map 10: Riparian Reserve Encroachment at the Study Area



Complied by Author (2013)

5.5.3 Other Challenges in Planning and Provision of Infrastructure Services

Many of the tenant respondents stated that absentee structure owners were a major challenge in the provision of quality housing in terms of maintenance and repair. The tenants complained that the landlords only came at the end of the month or sent their agents to collect the rent. As such most of the tenants did not have an avenue of raising complaints in regard to issues pertaining to repair and maintenance of the housing structures. This had led to many of the structures especially in Mathare 4B into a deplorable state. Tenants therefore resulted to migrating to other better structures once their finances permitted them. In other words their existed little mutual relationship between the tenants and the structure owners. For most of them the relationship was purely financial.

In Kosovo, unlike the other two settlements, there were provision for 9 metre roads within the settlement but encroachment by the structure owners next to the road had over the years led to the roads being reduced into footpaths. Several respondents claimed that this had been possible through corruption that led to area administrators apportioning parts of the road reserve to individuals for either additional rental rooms or business extensions.

One of the village elders informed the study that some of these provisions for road reserves within the slums were undertaken by progressive administrators who had the hope of improving the living standards of the slums dwellers. Most of these leaders ended up getting into conflict with structure owners with some of them using their influence to have them transferred.

As can be seen from Figure there is encroachment occasioned by business and residential extensions reducing from 9 metres (wide) to barely 3 metre (wide).

Provision of services such as water, sanitation and electricity had been hampered by cartels or gangs of youths who were the beneficiaries of the absence of a functional water provision and sanitation system. With the a non functional trunk sewer line running across the settlements, illegal groups have joined hands and constructed informal sewer systems that drain into the adjacent Mathare and Gitathuru Rivers and make a living from

the connections. Any attempt to create a formal sewer line has been met with resistance from the groups that run the informal sewers.

Figure 5.8 Encroachment on a Road Reserve

Source: Field Study (2013)

Discussions with some community health workers revealed that provision of health services was not only hindered by lack of health facilities but more so by the environment and lifestyles of the slums dwellers. Unhygienic practices within the area of study were seen as a hindrance to the effective provision of sustainable free health care within the settlements. This is due to the high cost that would be involved with such a measure. Plate 8 shows some of the unhygienic practices that study came across.

Plate 8: Some Unhygienic Practices in Mathare Valley Slums

Person searching for Scrap metal in the river

Children fetching water in Mathare River

Source: Field Survey (2013)

5.5.4 Intervention Measures for Infrastructural Provision

Findings of the study revealed that some members of the slum communities had been able to come up with measures to provide for certain infrastructural provisions. In some instances in Gitathuru extensions that stood on road reserves had been demolished by residents who joined hands to ensure that the road reserves were left intact. Most interventions in the area were by public participation. Plate 9 gives an example.

Plate 9: A Cleared Road Reserve through Demolition

5.6 Planning Implications

Land Tenure

Contrary to the community understanding that the slums in the study area were on government land, the study established that the settlements were on Government land but had already been alienated to Kenya Police Service. Kosovo settlement was found to lie in two cadastres - alienated Government Land and an alienated Government Land.

Riparian reserve and road reserves

The study established that slums in the study area had encroached significantly into the riparian reserves of Mathare and Gitathuru Rivers and to roads. There were also infrastructure investments in the riparian and road reserves.

Topography

Kosovo and Gitathuru settlements have very steep slopes and some of the existing structures are built along the slope .Mathare 4b on the other hand is on a flood plain.

Community planning

The study established that slum communities had developed coping strategies on some issues requiring planning. In Kosovo for example the community had designed and constructed a community sewer system where various households had connected to. The problem however was that they all emptied into the adjacent Mathare River. Most of the roads run along the steep slope lading to a lot of galleys due erosion. Moreover there were structure owner and tenants conflicts that hindered effective community participation**.**

High Densities

The study area had very high densities and one of the challenges established in infrastructure provision is lack of space. Space requirement for infrastructure would lead to displacements and loss of livelihoods .

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The aim of this study was to explore the challenges of infrastructure planning and provision in urban slums by taking a case study of Kosovo, Mathare 4B, and Gitathuru slums in Mathare Valley. This chapter offers the conclusions linking the results and findings to the general literature and shows the greater context and implications. Recommendations for actions and further research are also outlined.

6.2 Summary of Findings

a) Factors that lead people to settle in Mathare Valley Slums

The findings of the study indicate that 36.5% of the respondents had settled in Mathare while in search of employment while 29.7% had moved because of the presence of affordable rent and 20.3% had moved as a result of marriage. Others had moved into Mathare as a result of evictions from other informal settlements while other came to live with their relatives. Nevertheless, this study finds poverty as the leading contributor to the settlement of the residents in the slums and by extension the result of their expansion. The proximity of Mathare to the CBD (Central Business District) and the Eastleigh - business hub provided an opportunity for those earning meager wages and salaries to cut costs on various budget lines. Some of the cost cutting measures include walking to and from work and low monthly rent. There are a section of households who were born and brought up in the slum, for this category of people the slum defined their community and the social structure within which they had to contend with. As earlier discussed different ethnic communities when they migrate to the city they tend to associate with their fellow tribesmen and hence for example the different slums in the study area had preference for different ethnic groups. Security in slums as identified in the research is a major issue hence majority of criminals in form of illegal gangs would use slums as hiding places as it would be hard to trace them when they disappear in the overcrowded and densely populated areas.

b) Nature and Status of Existing Infrastructure in Mathare Valley Slums

Most of the housing structures (83.5%), and as indicated by the respondents during the field study were residential while 9.4% acted as business cum residential units, 2.4% were institutional and 1.2% were for religious purposes. Mathare 4B settlement apart from being the oldest of the three settlements had the poorest form of structures with the highest number of households living in mud houses. Majority of the households in Kosovo lived houses made of iron sheets. Gitathuru Settlement had the most number of households living in stone walled houses. Discussions with the area administrative officers revealed that none of the housing structure had been built on land with title deeds. Most of the ownership documents were letters from the area chiefs giving permissions for the owners of the structures to construct. In other words, none of the Structure owner in the area of study had any form of a legal ownership document to the land they occupied. Visits to the Survey of Kenya revealed that the area on which the settlements occupied was Government alienated land to the police service. Settlement like Kosovo identified to be on two different parcels of land, a section on government unalienated land and the other on government alienated land. This causes confusion on negotiations towards security of tenure.

All the settlements in the study area border a river, ideally river frontages are associated with prestige this is not the case in the study area, the back of the structures instead fronted the river. This was due to the polluted state of the river, furthermore many of the structures had encroached on the riparian reserve. For example in Mathare 4B almost a third of the settlement was on riparian reserve making the structures vulnerable to flooding.

The main roads leading into the informal settlements are earth roads with widths ranging from 3 to 12 m. Despite provision of motorable roads ,over time the community have built business and residential extension thereby reducing the otherwise motorable roads into foot paths. All the roads in the study area were gravel surfaced. The settlement however had good connectivity to major roads i.e. Thika superhighway and Juja road that connected the slums the wider neighborhoods.

Many households in the study area enjoyed electricity connection from the Kenya power company through a slum power project. Due to the challenges associated with this project mainly tripping of power most of the households had resulted to illegal connections. During the field work the study was able to observe that many of the household's had poor wiring of their electricity connections with lose wires hanging dangerously. There were cartels of people who connected the households with electricity at monthly rate of 300 shillings. The study was able to find out that some of them worked in cahoots with officials from the Kenya Power and Lighting who would connect electricity from the main supply line to a house whose occupant would then supply other houses within the area. In Gitathuru where most of the houses were built of stones the study was able to learn that most the houses were metered and electricity supply had been formalized.

The sanitation of all the three slum settlements was very poor with the settlements having a non functional trunk sewer and drainage system. This had resulted to most of the waste from the settlements ending up in the nearby Mathare River which highly polluted. The communities have however designed and constructed their sewer system to help reduce accumulation of human waste ion the settlement. This local solution has however had environmental implications because the sewers empty directly into the rivers. Lack of solid waste management system has led many of the households disposing their household waste in hips that have over time resulted into dumpsites. The open spaces where kids would play have either been made dumping sites or spaces for channeling liquid waste.

c) Sustainable Infrastructural planning Framework for Mathare Valley Slums

This study notes that there are many interventions on infrastructure provisions in the study area by various stakeholders. Pilot project for water and electricity have been piloted in Kosovo but have failed to be replicated successfully in other settlements. This is because there has been a minimal effort to integrate these projects with other sectors of infrastructure and services.

Different NGO's operate in isolation and do not seek partnership with local authorities for planning guidance or when they seek , it doesn't yield much and hence lack planning

input from the local planning authorities thus always ending up with stand-alone projects whose impacts are minimal and whose sustainability is not guaranteed .For example the water project only looked at water provision but did not take consideration of how the waste water would be handled consequently despite having water open drainages carrying waste water has been a sanitation and hygiene issue in the settlement.

Lack of proper and up to date planning data for slum areas made it hard to identify and prioritize planning interventions for example whereas the study revealed that major roads are continuously being encroached into and that sanitation is at its worst ,no interventions in these two sectors have been undertaken .

Lack of pro-poor planning standards have left majority of slum dwellers deprived of better services that otherwise they would have enjoyed. The plot sizes in slums are too slums as noted in like Kosovo of 20ft*20ft, applying standard building codes in such sets becomes difficult and hence even seeking plan approvals becomes un imaginable hence the emergence of the poor quality housing as nobody is aware of what developments happens in the slums.

The research concurs that where communities are meaningfully engaged from conception, through design up to implementation of a slum project and where roles are clearly outlined for each stakeholder, there is a greater likelihood of the project succeeding. However the research shows that such a project cannot be sustainable if there is no post implementation strategies put in place. The Kosovo water project is a victim of such oversight. When partners hand over the projects to the community without such a frame work, it becomes difficult for the community to manage the project in a sustainable manner.

6.3 Conclusion

In conclusion the study has established that challenges associated with infrastructure planning for urban slums are majorly because of the precarious location that the slums are located. This coupled with lack of secure tenure and high costs of the infrastructure makes investment in such projects difficult. Failed urban policies and competing and conflicting interests within different actors in the planning sector have contributed to the

low pace of infrastructure provision in urban slums. The study concludes that infrastructural provision is most effective when it's linked with other initiatives and when communities participate in decision making through partnerships and collaborations with national local governments and private sector. By making slums an integral, creative and productive part of the city, equitable policies for investment in urban infrastructure and services for urban slums would be realized hence improving the living conditions of the slum dwellers.

6.4 Recommendations

This study recommends that the government and policy makers develop pro-poor policies that would take care of the peculiar nature of the urban slum. Such policies should not only look into the upgrading of slum infrastructure but also aim at looking at poverty reduction Strategies. This should entail an integrated and holistic approach in Infrastructural provision as this would have greater impacts to the slum dwellers and would guarantee sustainability of any intervention.

The study further recommends the governments provides security of tenure in slum areas as this will facilitate improvement of the living conditions as slum dwellers and investors would be willing to invest in their property without fear of demolitions and evictions. As a matter of urgency attempts should be made towards recognizing the informal tenure arrangements existing in various slums as a process towards regularization of the settlement and subsequent delivery of secure tenure.

There is need to encourage partnerships between the governments, civil society organizations and institutions of higher learning towards tackling issues surrounding slums. This should be encouraged and funded in order to understand and offer possible alternatives towards solving the slum problem. There should be a coordinated approach of collecting; storing and updating of slum data. The government should invest in a data system that allows the capturing of peculiar data of slum dwellers for example the informal tenure of slum dwellers. Development of a slum Atlas of slums and a database of slum dwellers would assist in planning.

The study recommends that as a matter of urgency there is need to replicate the prototype Community Cooker (designed by Architect James Archer), currently operational at Laini Saba in Kibera slums that uses dried rubbish to supply the residents with low cost heat for cooking and boiling water, while improving the local environment through rubbish collection. Figure 5.1 shows the prototype Jiko in use at Laini Saba in Kibera.

Figure 6.1 Residents gather at the Community Cooker in Laini Saba, Kibera

Source: Smithsonian Cooper-Hewitt, National Design Museum (2011)

The study also recommends that infrastructure projects in slums should not be 100% funded through grants, it's important to establish a saving culture with the slum dwellers so that they contribute partly towards their projects. By so doing it enhances ownership of the projects and guarantees their sustainability. It's often said where your money is your heart is.

As a long term strategy for reducing poverty in the slums there is need to invest in human capital, especially in education, shelter and social services will increases the slum dwellers productivity and also attack some of the most important causes of poverty.

Urban Slum projects should be designed in a more flexible way and should embrace community participation in all stages of implementation. This will go a great way into

increasing social cohesion with the slum communities and help reduce mistrust among the implementers and the community.

6.4.1 Sustainable Planning for Infrastructure Provisions in Slums

To achieve a sustainable infrastructure in slums there is need to critically adhere to the following principles while considering any planning measure within the slums.

1. All planning for infrastructure interventions within the slums should respect the ecology taking into consideration the natural environment of the city.
2. Although the slums are located on prime land, land use for slum areas should be determined on the basis of social and environmental considerations and not on the basis of land value (or potential land value) alone.
3. Planning must give priority to the needs of the majority of the population. In Kenya this calls for priority being given to the low and middle income earners who form the majority of the population.

6.5 Suggestions for Further Study

The study finds the need for a study to be undertaken to determine how various stakeholders can be integrated in niche marketing to attract investments for infrastructure improvements within the slum dwellings. Finally, the study suggests that further study be undertaken to determine how issues surrounding struggles between tenants and structure owners in service provision can be alleviated.

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APPENDICES

APPENDIX I

HOUSEHOLD QUESTIONNAIRE

I am a student at the University of Nairobi undertaking a Masters Degree in Urban and Regional Planning at the School of Built Environment. As part of the requirement for the degree, I am undertaking a research project on *the Challenges of Infrastructure Planning for Urban Slums: Case Study of Kosovo, Mathare 4B, and Gitathuru Slums in Mathare Valley*. I would like to request for your participation in this questionnaire. The information obtained is intended purely for academic purposes and as such will be treated with utmost confidentiality.

Section A: Demographic Information

1. Name of Village .....
2. Gender
   a) Male ☐ b) Female ☐
3. What is your age? .....
4. Marital Status
   a) Single ☐
   b) Married ☐
   c) Widowed ☐
   d) Divorced ☐
5. What is your highest level of education?
   a) None ☐
   b) Primary ☐
   c) Secondary ☐
   d) Tertiary ☐
   e) University ☐
6. What is your household's monthly income?.....
7. How much rent do you pay in a month?.....
8. What is your household size?.....
9. Who is the household head?.....
10. i) Do you know who your landlord is?

a) Yes ☐ b) No ☐

ii) What is his/her gender?

a) Male ☐ b) Female ☐

Section B: Reasons of Settling in Mathare

11. For how long have you lived in this area? .....

12. Where were you living before? .....

13. i) Are you comfortable with being in this area?

a) Yes ☐ b) No ☐

ii) Why? .....

14. What made you leave your previous area of residence .....

15. Why did you choose to settle in Mathare Valley Slums? .....

.....

.....

16. Do you have plans of leaving this area?

a) Yes ☐ b) No ☐

17. If yes, when and where do you plan to go settle? .....

.....

Section C: Nature and Status of Existing Infrastructure

18. How many rooms does your current house have?.....

19. What type of building material has been used for the walling?

a) Stones ☐

b) Mud ☐

c) Iron sheet ☐

d) Wood ☐

e) Bricks ☐

f) Scrap metal ☐

20. What is the nature of the floor?

a) Concrete ☐

b) Wood ☐

c) Earthen ☐

d) Others? Briefly explain. .....

21. Which of these purposes best describes your housing?

a) Residential ☐

b) Commercial ☐

c) Residential cum Commercial ☐

d) Others? List .....

22. What is your source of water?

a) Piped water in the house ☐

b) Yard tap ☐

c) Well/river ☐

d) Water vendors ☐

e) Rain water ☐

23. How far is the watering point? .....

24. What amount of water does your household use in a day?.....

25. How much do you pay for the water?.....

26. How can you rate the reliability of the water provision in this area?

a) Throughout/regularly ☐

b) Morning and evening only ☐

c) Daytime only ☐

d) Night time only ☐

e) Often but Irregular ☐

27. What challenges are you faced with in accessing water services?.....

.....

.....

28. What type of toilet serves your household?

a) Public toilet ☐

b) Private toilet ☐

29. How far is the toilet from your house? .....

30. i) Do you pay for you to use the toilet?

a) Yes ☐ b) No ☐

ii) If yes, how much? .....

31. What can you say on the nature and qualities of toilets available in this area?

.....

.....

32. Mode of waste disposal?

a) Dust bins ☐

b) Into the River ☐

c) Open Spaces ☐

d) Land fills ☐

e) Others, specify? .....

33. Who is in charge of waste collection in this area?

a) The City Council ☐

b) Private waste collectors ☐

c) Community based organizations ☐

34. Where do you dispose off your used water? .....

35. Source of lighting in the houses

a) Electricity ☐

b) Paraffin ☐

c) Solar energy ☐

d) Portable battery ☐

e) Candle ☐

36. Type of electricity connection in the houses

a) Formal ☐

b) Informal ☐

c) Both formal and informal ☐

d) None ☐

37. Source of cooking energy

a) Charcoal ☐

b) Electricity ☐

c) Firewood ☐

d) Briquettes ☐

e) Paraffin ☐

f) Gas ☐

38. How much do you spend on both lighting and cooking energy? .....

39. i) Do you have any school going children?

a) Yes ☐ b) No ☐

ii) If yes which kind of school(s) do they attend?

a) Public schools ☐

b) Private schools ☐

c) Religious schools ☐

iii) Why did you choose this type of school? .....

.....

iv) If no in (i), why then don't they attend school? .....

.....

40. What can you say about the type of education being provided to your children? .....

.....

41. Where do members of your households seek health services from? .....

.....

42. Accessibility of health care services

a) Easily accessible

b) Accessible

c) Not Accessible

43. What is your opinion on the quality of health care being provided in this area over the past few years?

a) Has Improved ☐

b) No Change ☐

c) Has deteriorated ☐

44. Please briefly expound .....

45. Which ailments are common in this area? .....

.....

46. Rate the nature of healthcare provided in this area?

a) Excellent ☐

b) Very Good ☐

c) Good ☐

d) Fair ☐

e) Poor ☐

47. Is the road network adequate?

a) Yes ☐ b) No ☐

48. What is the nature of your neighbourhood security?

a) Secure ☐ b) Insecure ☐

49. If secure, what has contributed to the neighbourhood being secure?.....

.....

50. If not secure, what are the causes of insecurity? .....

.....

Section D: Challenges facing Infrastructure Provision in the Slums

51. i) Within you stay in this area have there been any projects that have targeted infrastructure improvement and upgrading in this area?

a) Yes ☐ b) No ☐

ii) Is yes, which ones?.....

.....

52. From your own point of view, which challenges do you think face the provision of the following services and facilities?

a) Water

.....

.....

b) Health Services

.....

.....

c) Electricity

.....

.....

d) Sewerage

.....

.....

e) Roads

.....

.....

.....

f) Recreation

.....

.....

Section E: Intervention Measures

53. What measures do you think can be put in place so as to enhance infrastructural provision in slums?.....

.....

.....

.....

.....

.....

54. How are these measures going to be sustained? .....

.....

.....

.....

.....

APPENDIX II

INTERVIEW SCHEDULE

1. Name of respondent.....
2. Date of interview .....
3. Title/position .....
4. Organization.....
5. Department.....

Infrastructure Service provision

6. Indicate your slum infrastructure Provision Services (**Past and Present**) on the table below.

No.	Project/Programme	Duration	Threats and opportunities
1			
2			
3			

Challenges of infrastructure Provision

7. What have been the problems of infrastructure provision in:

Kosovo.....

.....

.....

Mathare 4B.....

.....

.....

Gitathuru .....

Suggested improvement of Infrastructure Provision

8. In what ways can infrastructure provision in the following settlements be enhanced?

Kosovo.....

.....

.....

Mathare 4B.....

.....

.....

Gitathuru .....

9. In your own opinion which stakeholders do you think determine the success of infrastructure provision in the slums?

.....

.....

APPENDIX III

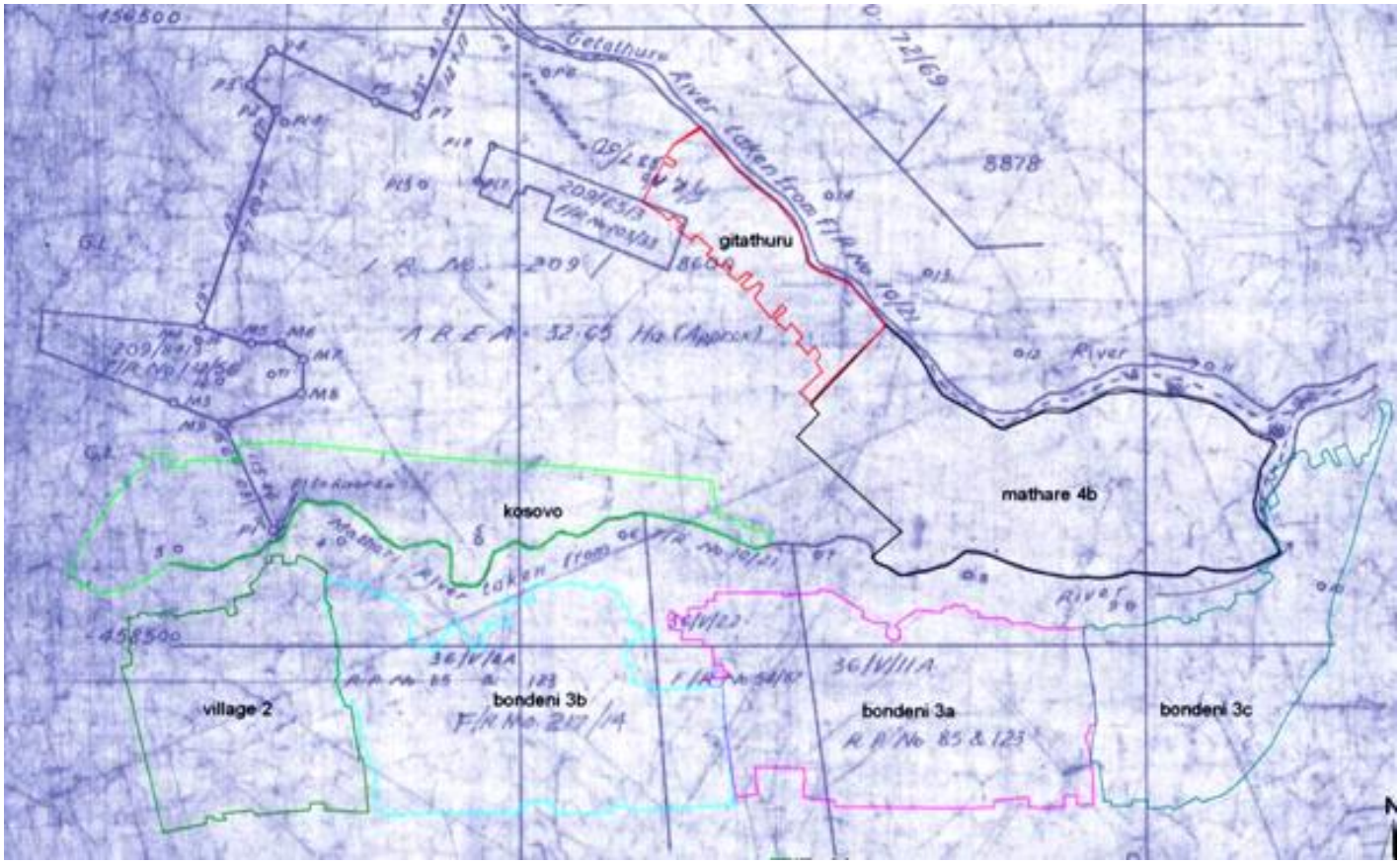
CHECKLIST

Name of Settlement.....

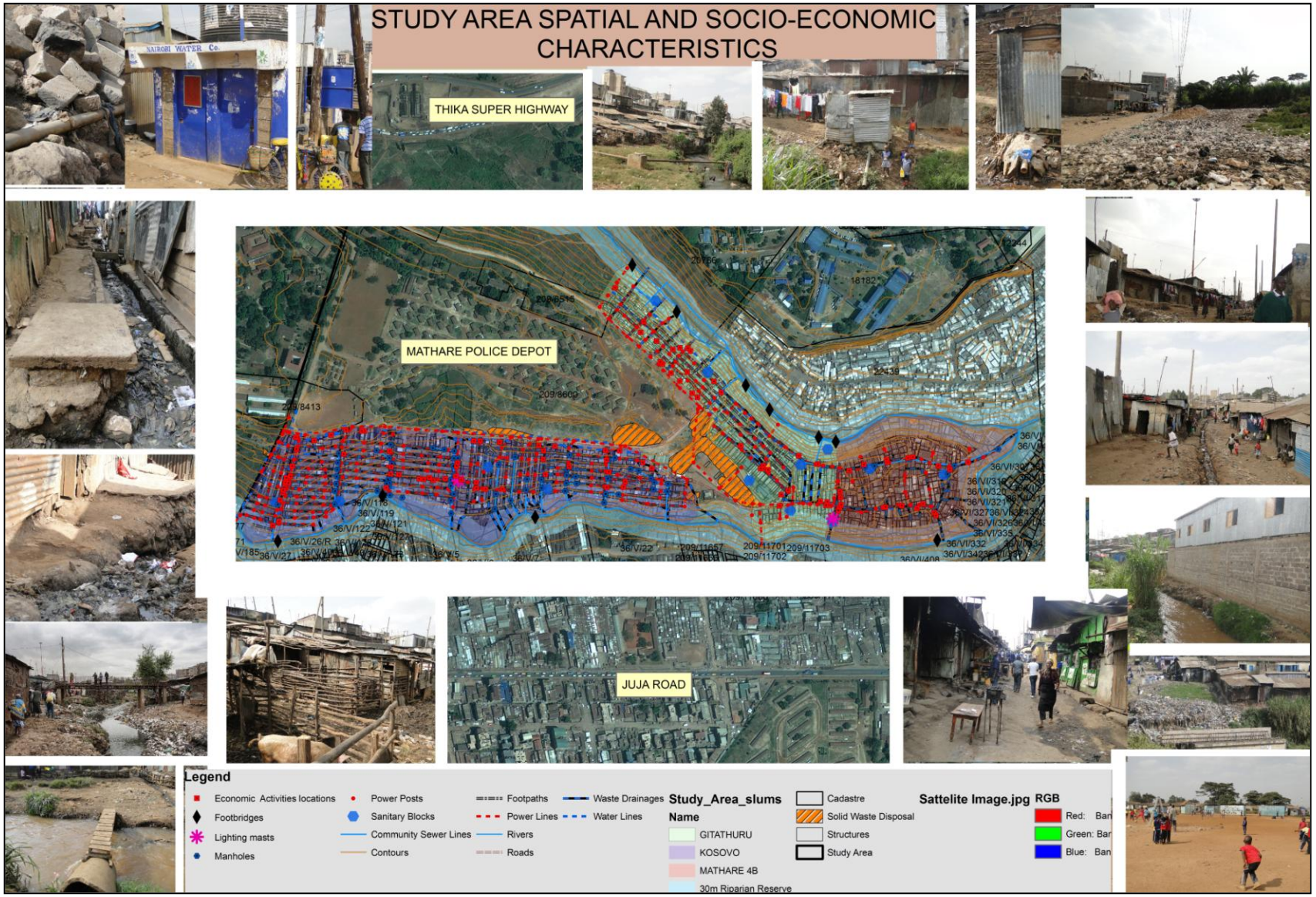
	GPS coordinates			
Infrastructure	**N**	**E**	**Status**	**Interventions**
Water				
Electricity				
Health				
Sanitation				
Sewerage				
Roads/Footpaths				

APPENDIX III

CADASTRAL MAP OVERLAY OF THE STUDY AREA



APPENDIX IV



Complied by Author (2013)