RELATIONSHIP BETWEEN SOCIO-ECONOMIC EXCLUSION AND COMMUNITY BASED WASTE MANAGEMENT PRACTICES IN KIBERA INFORMAL SETTLEMENTS, NAIROBI COUNTY, KENYA

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NOVEMBER, 2016
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DEDICATION

This work is dedicated to my parents first my father the late Raphael Mburu Kinyanjui may Almighty God rest his soul in eternal peace. I also dedicate this work to my loving mother Mrs. Nancy Wambui Mburu. They are the ones who took the noble step of taking me to school and they sacrificed much in life so that I can achieve my academic pursuits.
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I am also thankful to my siblings who supported and encouraged me in my work. Special thanks also go to my colleagues in the Department of Environmental Studies and Community Development in Kenyatta University, your support and encouragement cannot be over emphasized.

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I would also like to thank Kenyatta University for awarding me a tutorial fellowship to pursue my PhD degree through their staff development programme. Lastly, I would like to thank the Dean, School of Environmental Studies, Prof James Kung’u, for awarding me a Kenyatta University research grant.
ABSTRACT

One of the greatest environmental challenges in the 21st century is ensuring successful implementation of participatory community based waste management practices in cities particularly in slums and informal settlements. This study aimed at investigating the relationship between socio-economic exclusion and community based waste management practices in Kibera informal settlements, Nairobi County. To achieve the study objectives this study was guided by Marxist theoretical framework on the occurrence of slums and the dynamics of waste management. The theoretical framework demonstrates how socio-economic exclusion has forced people to live in places where there are no basic facilities like sanitation, proper sewers and garbage collection systems. The study objectives included: establishing the main forms and causes of socio-economic exclusion among the residents of Kibera, main challenges of solid waste management in Kibera, evaluated the main impediments to the current strategies applied in enhancement of waste management practices in Kibera, assessed at the nexus between socio-economic exclusion and sustainable waste management practices and lastly it identified and discussed sustainable participatory approaches of fostering community based solid waste management practices in Kibera. The study was a descriptive research and it was carried out in seven sub-locations of Kibera informal settlements namely: Kibera, Lindi, Makina, Silanga, Laini Saba, Gatwekera and Olympic/Kianda. The research used primary and secondary data. It employed quantitative techniques to obtain responses from 393 respondents and qualitative means to establish the extent of socio-economic exclusion and poor waste management practices. The data collected were coded, cleaned and analyzed using the Statistical Package for Social Science (SPSS). Analyzed primary data (quantitative) was integrated with secondary data and synthesized in line with study objectives. The analyzed data (qualitative) is presented in narrative form under identified thematic areas. Frequency tables, graphs, charts, figures and photographs have been used to present the results. The study found out that the forms of socio-economic exclusion in Kibera include: impoverishment, labour market exclusion and service exclusion. It is usually caused by lack of participation, unemployment, low income, crime and ethnicity. Further, the study found that the main challenges of solid wastes are: lack of access roads, lack of recycling, lack of dumping ground and financial challenges. Moreover, sustainable participatory based community waste management practices only 23% of the residents had been trained mostly by community based organizations meaning that the government and other actors should do more. The study concludes that financial services, age and government services exclusion exists in Kibera due to ethnicity, lack of participation and unemployment, causing poverty and poor waste management leading to the spread of communicable diseases like malaria and typhoid. It is hoped that this study will influence policy making processes whereby urban planners and other stakeholders can get insight into the dynamics that shape socio-economic processes and waste management in Kenyan slums.
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<td>African Development Bank</td>
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<tr>
<td>AEDI</td>
<td>Australian Early Development Index</td>
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<tr>
<td>APHRC</td>
<td>African Population and Health Research Centre</td>
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<td>CBO</td>
<td>Community Based Organisation</td>
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<td>CBWMP</td>
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<td>CDF</td>
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<td>Child Social Exclusion</td>
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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The number of people living in urban areas in all countries has increased with over two billion people living in the slums. Currently, 829 million people from developing countries are living in slums (UN-Habitat, 2012). The slum dwellers remain socially, politically and economically excluded. The socio-economic exclusion of slum dwellers is whereby they are constrained from participating in the social and economic spheres of the city and this makes them poorer (Arimah, 2011). Majority of these people live in dehumanizing conditions in the slums of Africa, Asia and Latin America (UN-Habitat, 2003).

Most slums in the world have limited access to water and sanitation, are built on or near growing amounts of uncollected wastes and deteriorating air quality. These slums are a physical and spatial manifestation of increasing urban poverty and intra-city inequality (UN-Habitat 2007). Some of the major characteristics of these slums are poor environmental conditions and domestic services degeneration. The above is caused by economic, social and political exclusion coupled by failure of policies at all levels-global, national and local. At the local level, the lack of capacity to cope has left slum residents occupying land illegally in places where there is insecurity and environmental degradation resulting from improper waste management (UN, 2012; UN-Habitat, 2003).

Social exclusion is a phenomenon in society and economy whereby wealth distribution is in a way that marginalizes others (Gurtberlet, 2009; GSDRC, 2015). The concept
explains a situation that consists of the separation of individuals or groups from the rest of the society through economic deprivation as well as social and cultural segregation. The most excluded citizens earn their living from informal economic activities in the affluent residential areas within the same cities (GSDRC, 2015). Besides, there are many instances of children, women and men working in enterprises involving recycling of domestic waste, this compromises the achievement of sustainable development goal (SDG) number 10 of reduced inequalities and goal 11 of sustainable cities and communities (UN, 2015 b).

Currently, there are serious challenges of waste management globally more so in the slums (NUFC Report, 2010). The United Nations estimates that 40% of slum dwellers live in areas which are life threatening. In developing countries many cities fail to collect significant proportions of the household wastes. For example; in South American cities, 20-50% of the household waste is not collected, a similar situation is reported from other parts of the world. In Calcutta, only about 82% of the waste is collected (Ferguson & Maurer, 1996 cited in Gurtberlet, 2009).

In Sub-Saharan Africa more than 70% of the urban population live in slums and this has been on rapid increase due to lack of effective interventions. In East African countries, local authorities are unable to handle most waste materials and have changed their legislation on solid waste management to involve private sector (Frost & Sullivan, 2010). The East African region, Kenya included has a high population living in slums particularly in Somalia, Sudan, Tanzania and Uganda where 83% to 99% of urban
residents live in slums. Majority of these slums are excluded and have been regarded as “expressions of social exclusion” (Arimah, 2010).

Slums in East Africa spring from rapid population growth coupled by inappropriate economic, social and political policies that have led to spiraling urban unemployment, overstretched and deteriorated infrastructure, poor services delivery systems, environmental degradation, acute shortages of affordable housing and residential land. These factors have resulted in rapid proliferation of slums, informal settlements and overcrowding (UN-Habitat, 2010b). However, all is not lost in Eastern Africa, Uganda and Rwanda have been successful in reducing the slums population by 20% between the year 2000 and 2010 (UN-Habitat, 2010c). This was possible due to local government officials adopting bold policy reforms, preventing future slum growth with equitable planning and economic policies. There were also adequate resources, strong monitoring and scaling up of successful local projects.

In Kenya there are widespread environmental challenges in the slums. They include: air, land and water degradation (UN-Habitat, 2012). Despite the fact that these localities carrying capacities are relatively low, the slums are still expanding due to natural population increase and in-migration. Most of the slum residents in areas such as Kibera in Nairobi experience socio-economic exclusion; whereby they appear to have been cut off from networks of mainstream employment, friends, relatives and social amenities. These circumstances create extreme urban poverty and people turn to survival livelihoods that degrade the already fragile environment. Some of these degradations are seen in solid
waste management, human and liquid wastes. The residents in these slums live under
deleterious conditions lacking most basic needs and social amenities. They also face
multi-dimensional challenges which require multi-faceted interventions (Mutisya &
Yarime, 2011). In addressing the above issues of waste collection in Nairobi there are
various stakeholders involved among them, the private sector and NGOs.

The UN-Habitat in partnership with the Government of Kenya and other CSOs has been
instrumental in helping manage urban waste and alleviate poverty especially through
Kenya Slums Upgrading Program (KENSUP). The programme was started in 2001. Their
first targets were slums in Nairobi, Kisumu, Athi River and Mombasa (UN-Habitat,
2008). There have been some achievements like building of cheap and affordable houses
but in most of these areas there are also challenges such as coordination of intervention
programmes carried out by UN agencies like UN-Habitat, UNDP and UNEP, GoK, CSOs, NGOs and local CBOs (UN-Habitat, 2003).

In Nairobi a big percentage of solid waste among the slum residents such as those in
Kibera who can be said to be socio-economically excluded is not collected posing a big
health hazard. The extent and nature of the solid waste management problems can be
underscored as follows. First, the collection ratio is low, in fact it is estimated to be as
low as 25%. Secondly, there is high inequality in the infrastructural service delivery
especially geographical service distribution (UNEP, 2005). While high income and
middle residential areas are well serviced by NCC and private companies, small private
firms are increasingly servicing some of the relatively better off low income areas. Slums
and other unplanned settlements receive no waste collection service save for localized interventions by community-based organizations (CBOs). The residents in low-income areas in Nairobi are dissatisfied with waste collection services and are willing to pay for improved services in spite of their low incomes (UNEP, 2005).

Kasozi and Von Blottnitz (2010) observe that in Nairobi there were about 115 registered private waste collection companies and 135 CBOs and Youth Groups in 2010 operating mostly in the wealthier neighbourhoods. A similar view is given by Ochieng’ and Matheka (2009). In this regard waste collection in Nairobi is spontaneous and there is unplanned competition especially in the poor neighbourhoods. Other actors like United Nations agencies have also been promoting pro-poor community based waste management. UNDP organized such a programme in 2005 where the primary objective was to develop policies and action plans which enhanced effective and efficient city council solid waste management in Nairobi with particular emphasis on benefiting the urban poor.

Mutisya and Yarime (2011) observe that Kibera like other slums has been isolated by the NCC in Garbage collection. Solid wastes both domestic and human are washed into water channels resulting in negative perception, environmental degradation and deterioration of community development and cohesion. Waste collection services are provided only sporadically due to poor accessibility and very high waste generation which cannot be handled with available vehicles and equipment. The recycling equipments used by NGOs like Calorina for Kibera are inadequate in handling many tonnes of Kibera’s waste
generated daily. Other problems include: inadequate financing, lack of recognition of the importance of satisfactory and effective waste management by policy NCC department of waste collection and inadequate training of managers to handle the large amounts of wastes (Umande Trust, 2007). There are also CBOs working in Kibera like Taka Ni Pato which aims at establishing effective and environmentally friendly solid waste management systems led by the community members themselves (Hiltuten, 2010).

1.2 Problem Statement

The background to the study has shown that people who live in slums today in different parts of the world including Kenya remain socio-economically excluded in waste management (UN-Habitat, 2003; Mutisya and Yarime, 2011; UN-Habitat, 2012; UN, 2015a; UN-Report, 2015b). According to UN (2012) report one of the reasons for this is that local authorities do not have the capacity to provide proper waste management services. Local municipality’s exclusionary and unequal provision of urban services has further worsened the situation by exposing the Nairobi slum residents to health risks leading to communicable and non-communicable diseases like cholera, dysentery, diarrhoea, respiratory problems and high infant mortality rates (UNEP, 2005; Alwenya, 2009; UN, 2015a, UN-Report, 2015b).

Studies done on socio-economic exclusion and waste management in slums shows that sustainable interventions needs to take an integrated approach. This implies social, health, economic and governance related issues should be addressed. In a survey carried out in Nairobi slums, Van Dijki and Oduro-Kwarteng (2007) note that 48% of the respondents
did not receive solid waste collection service at all, 3% are serviced by NCC, 4% by CBOs and 45% relied on private companies. Kazungu (2010) further argues that waste in Nairobi is not considered as an asset. To address the issue of waste management and socio-economic exclusion the Kenyan government has put in place national policy frameworks, that in different ways address social issues for example the Economic Recovery Strategy (ERS), Vision 2030 and the Constituency Development Fund (CDF). But this has not been successful (Jones et al., 2008). The study therefore assessed why various GoK strategies continue to fail despite there being a concerted effort in reducing socio-economic exclusion in Kibera.

There was also a need to establish the connection between socio-economic exclusion and unsustainable waste management in Kibera slum. This is because the problem of waste management continues to affect many slums especially Kibera. The study intended to assess the nature and extent of waste management problems and socio-economic exclusion in Kibera slum because it is one of the most studied in Africa, yet its residents remain poor and excluded and they face persistent problems of solid and liquid waste management. A study by JICA found that 75% of low income areas in Nairobi do not receive any waste collection services (UNEP, 2005). Considering the issues already mentioned, the study further examined the reasons why Kibera residents remain poor and excluded. Also the study sought to examine whether the strategies of changing wastes into assets have been successful in eliminating socio-economic exclusion.
There are many actors in Kibera like the UN agencies, international development agencies, CBOs, NGOs, GOK among others and their activities are not well coordinated (UN-Habitat, 2008). Their interventions have failed to make significant improvement in the lives of Kibera residents (Mutisya and Yarime, 2011; UN-Habitat, 2010b; UN-Habitat, 2003). Consequently, the study sought to evaluate the reasons why the strategies by the different actors mentioned have not been successful in addressing socio-economic exclusion and waste management issues in Kibera.

1.3 Justification of the Study

This study can be useful to urban planners and other stakeholders like NCC, GoK, CBOs, FBOs and CSOs so that they can get insight into the dynamics that shape waste management and socio-economic exclusion in Kenyan slums. The policy justification is that the study can be used to help planners in other parts of the world address the issue of socio-economic exclusion and waste management. It can also help in the harmonization of the efforts of the relevant UN agencies, local government departments and CBOs which focus in poverty mitigation and sustainable environment management in slums in line with the Strategic Objectives of Agenda 21 of 1992, UN-Habitat Agenda, MDGs 1 and 7, SDGs 1,6,10 and 11(UN, 2015; UN-Report, 2015), Kenya’s Vision 2030 and the Integrated Solid Waste Management Plan For the City of Nairobi (2010).
1.4 Research Objectives

1.4.1 General Objective

i) To access how socio-economic exclusion is related to community based waste management practices in Kibera informal settlements.

1.4.2 Research Questions

i) Why do we have various forms of socio-economic exclusion in Kibera?

ii) Why do the current waste management methods face challenges and what improvements can be made to them?

iii) Does socio-economic exclusion cause the poor waste management methods?

iv) How can communities adopt sustainable participatory approaches in waste management methods?

1.5 Specific Objectives

i) To investigate the main forms and causes of socio-economic exclusion among the residents of Kibera.

ii) To evaluate the main challenges and impediments to the current strategies applied in enhancement of community based waste management practices in Kibera.

iii) To assess the relationship between socio-economic exclusion and solid waste management practices in Kibera.

iv) To identify sustainable participatory approaches used in fostering community based solid waste management practices in Kibera.
1.6 Research Hypotheses

H01: There are no significant differences in socio-economic and demographic characteristics in the seven sub-locations of Kibera.

H02: The causes of socio-economic exclusion in Kibera informal settlements do not significantly differ within the seven sub-locations of Kibera.

H03: The involvement of Kibera residents in sustainable community based waste management practices does not significantly vary in the seven sub-locations.

1.7 Theoretical Framework

This study was guided by Marxist theoretical perspective in explaining the relationship between socio-economic exclusion and waste management problems in urban areas. This perspective sees population growth not as the cause of environmental degradation but rather emanating from patterns of consumption, distribution of resources, different social organizations and patterns of ownerships. Fundamentally, pollution and environmental degradation of contemporary third world countries can be explained in terms of their incorporation of the capitalist world (Jahan, 2008).

Marxist methodologies in social science have a great diversity in emphasis. This is evident when you look at the work of Marxist scholars like Gerald Cohen, Ralph Miliband, or Michel Foucault (Little, 2012). David Harvey is perhaps the most renowned contemporary Marxist in explaining the dynamics of the city by linking capital, territory and urban agglomeration (Castree, 2007). The Marxist approaches in explaining socio-
economic exclusion place the responsibility of exclusion neither on the individual as do possessive individualists nor on the nation-state system in the style of collectivists but on the forces and relations of production. The actors who cause socio-economic exclusion are capitalists and other powerful and privileged actors who exploit the labour of others and in their exploitation of nature have a vested interest in perpetuating poverty (Quark, 2008). The emerging social norm based on a flexible labour market and structural social exclusion is driven by the neoliberal capitalist ideology, the manipulation of political processes and the subordination of policies to business interests (Quark, 2008).

Marxist economic theory emerged in the 19th century as a holistic theory. Bourgeois environmental science has meanwhile made significant progress in mapping the detrimental consequences of capitalist production and consumption. It has moved far beyond the parameters of all classical economic thinking, to expose the enormous risks of unplanned, competitive and exponential growth (Custers, 2005). In the study modern day Marxist theories can help us to grasp the dynamics that shape the developing world’s city slums and way to achieve sustainable waste management practices and socio-economic inclusion.

Marxism emphasizes the importance of careful empirical and historical inquiry. It values explanatory hypotheses that can be rigorously developed in such a way as to explain and predict social outcomes. That is done through; formulation of theories and careful study of existing empirical and historical data, examining non-material institutions from the point of view of their role within a social system of production and control, examining
the nature of inter-group exploitation and class structure. There are also explanatory hypotheses that can be rigorously developed in such a way as to explain and predict social outcomes (Little, 2012).

Although the original Marxian theory cannot be applied today in its original form it is still relevant in explaining the environmental degradation seen in slums (Custers, 2005). Through Marxist methodologies we were able to link environmental degradation (waste management problems) and deprivation (socio-economic exclusion) in the slums like Kibera. Marxism uses careful examination of scientific phenomena to make social phenomena. The Marxist methods like historical inquiry and social predictions guided research activities, data analysis and presentation, discussions of the main findings, conclusions and recommendations made.

1.8 Conceptual Framework
A conceptual frame work has been described as an organized and systematic set of interrelated concepts that specify the nature of relationships between two or more variables, with the aim of understanding a problem and concepts as symbolic statements describing a phenomenon or a class of phenomena (Green, 2014). In the conceptual framework used, the independent variables consisted of socio-economic exclusion indicators like unemployment, low income, poor housing, limited urban services and poor health. Dependent variables consisted of unsustainable waste management practices. The intervening variables which were the solutions to unsustainable waste management consisted of waste composting, minimization, recycling, reusing, reselling, governments’
policies and training. On the other hand the unsustainable waste management issues under investigation included open dumping and burning, non recycling and reselling, lack of collection services and lack of skills.

Figure 1.1: Conceptual Framework

Source: Researcher
The independent variables which are the socio-economic indicators portray a society experiencing deprivation. This leads to practices of unsustainable waste management which falls under dependent variables. Unsustainable waste management is caused by among other things lack of participation, lack of reselling and reusing of wastes and unfavorable government policies in the slums like Kibera (intervening variables). If that happens there is the emergence of socio-economically excluded communities like Kibera informal settlements. The cycle can go on and on in what Begum and Moinuddin, (2010) describe as socio-economic exclusion’s cycle of reinvigoration.

The conceptual framework illustrates that if people suffering for instance from low income and unemployment reports like SEU (2014) show that they are already alienated from the mainstream society. Those people can participate in CBWMP and with favourable government policies targeting their specific geographic areas, they can engage in sustainable waste management practices like waste reselling and composting. This will increase their socio-economic status and there will be emergence of socio-economically inclusive communities thus break the cycle of socio-economic exclusion.

1.9 Scope of the Study
This sub-section defines the scope of the research work. The study focused on Kibera slum and covered the sub-locations of Kibera, Lindi, Makina, Silanga, Laini Saba, Gatwekera and Olympic/Kianda. All the sub-locations in Kibera were selected because they have differences in demographic and socio-economic characteristics. The study sampled Kibera residents aged 18 years and above who were head of households because
they can give informed responses about socio-economic exclusion and waste management issues affecting them and Kibera residents. Interviews were got from residents and key informants working in waste management sector in Kibera and Nairobi city. The study was proposed and executed within a period of three and half years.

1.10 Operational Definition of Terms

**Community-Based Solid Waste Management**- This involves activities carried out by members of communities to clean up their neighborhoods and/or to earn an income from solid waste.

**Household Waste**- This is waste from domestic properties including waste from residential homes and premises.

**Informal Settlements**- These are unplanned settlements and areas where housing is not in compliance with the current building and housing regulations.

**Municipal Waste**  This is waste collected on behalf of the local authority. It comprises mostly household waste but may include some commercial and industrial.

**Slum** - A heavily populated urban area characterized by extremely poor housing and squalor, usually inhabited by very poor or socially disadvantaged (UN-Habitat, 2003).

**Social Exclusion**- Social exclusion is a process by which certain groups are systematically disadvantaged because they are limited, not considered or even discriminated against on the basis of their ethnicity, race, religion, sexual orientation, caste, descent, gender, age, disability, HIV status, migrant status or where they live.

**Socio-economic Exclusion**- A situation whereby an individual is unable to participate in the basic social and economic functioning of the society in which one lives in.
**Solid Waste Management**- Is the planning and implementation of strategies that handle solid wastes.

**Waste**- Waste is anything discarded by an individual, household or organization. As a result waste is a mixture of different substances some of which are hazardous to health.

**Waste Management** -Waste management refers to the practices and procedures or the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of waste.
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature review has been done under five thematic areas based on the research objectives. They include: the concept and dynamics of socio-economic exclusion, main forms and causes of socio-economic exclusion of residents living in slums, challenges of waste management in Kenyan slums and sustainable participatory approaches of fostering community based waste management practices with a focus on Kibera slum in Nairobi County.

2.2 Concept, Types and Causes of Social Exclusion among the Residents of Kibera

Informal Settlements

There are many theories used by different scholars in explaining the occurrence of environmental degradation and dynamics of socio-economically excluded people living in urban areas particularly slums. Earlier theories like the theory of residential differentiation from the Chicago School see cities as a colonization of different quarters by different income and economic groups (UN-Habitat, 2003; Ruoppila, 2006). More recent ones like neo-liberal urban economists regard slums as the natural response of the market in providing housing for the poor people. Post-modern theories and concepts of urban spaces provide more appropriate explanation to the cities of the 21st century (UN-Habitat, 2003). One of its main tenets is that we should have society of inclusion, tolerance and multi-culturalism (Crouse, 2012). On the other hand, the major criticism of post modern approach is its apparent unlimited relativism. It privileges the views of all
individuals and there appears to be no limit to the range of possible interpretations of any situations (Aguilar, 2002).

The concept of socio-economic exclusion originated in the French Republic Tradition (Sen, 2000). The earlier explanation of socio-economic exclusion was based on poverty, underclass and deprivation. Nowadays the concept of social exclusion is more dynamic and adopts a more holistic approach to life is satisfaction. Individuals are socially excluded if geographically they reside in a society but for reasons beyond their control, they cannot participate in the normal activities of citizens in that society as they would have liked to (EPSRC, 2005).

Another definition of social exclusion is by SEU Report (2001) which see the concept as a shorthand term for what can happen when people or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, poor housing, high crime, bad health and family breakdown. In the developed countries, the term social exclusion tends to be associated with the processes of social disqualification and forms economic and social problems that affect urban areas. The case is different in most of the developing countries where the term usually refers to population groups that have never had acceptable living conditions (Begum & Moinuddin, 2010).

According to Spicker (2005) exclusion occurs in all societies and is in three contexts. First, financial; exclusion from the labour market; this type of exclusion is identified with long term unemployment. The other context of social exclusion is on the social scene that identifies exclusion with alienation of social networks. On the other hand, Galabuzi and
Teelucksingh (2010) say that social exclusion is manifested through structural inequalities and unequal outcomes in access to social, economic, political and cultural resources. The most identifying aspect of socio-economic exclusion is that it weakens the link between an individual and the society (Baker, 2001). This study strived to establish through qualitative and quantitative means which aspects of socio-economic exclusion are prevalent in Kibera.

In the discourse of socio-economic exclusion there is need to distinguish it from poverty. Whereas poverty is lack of basic commodities in the society, socio-economic exclusion is a multi-dimensional notion of participation in the society and involves a combination of physical, material, relational and societal needs, over time. A good comparison of the two terms is given by Mathieson et al., (2008) who observes that poverty takes one dimension, involves physical needs, focuses on distributional issues, is static and occurs on individuals and at household level. While socio-economic exclusion is multi-dimensional, focuses on physical and material needs as well as societal participation. They further argue that socio-economic exclusion focuses on distribution as well as relational access to social and economic goods. Additionally, they state that socio-economic exclusion is dynamic and occurs at three levels; individual, household and community.

To gain more insight of socio-economic exclusion concept, Schienstock et al., (1999) compare the concept with the concept of social inequality to see how they differ. They argue that social exclusion focuses on different areas of the society, is multidimensional
and a dynamic concept. They also add that it has subjective aspects like vulnerability. As for the political aspect they note that it includes participation in the social dialogue, empowerment and addition of resources. On the other hand, social inequality focuses on the economic sphere of the society, is one dimensional and static. It is an objective concept that focuses on distribution of economic goods.

2.2.1 Types (forms) of Socio-economic Exclusion

Galabuzi and Teelucksing (2010) highlight four aspects of social exclusion. The first is economic exclusion which is lack of access to means of livelihood. There is exclusion from the civil society; it involves disconnection through legal sanctions, institutional mechanisms or systematic discrimination based on race, gender, ethnicity, disability, sexual orientation or religion. Third is exclusion from social goods; failure of the society to provide for the needs of particular groups. The other is exclusion from social production, which is denial to participate actively in the society. Lastly there is geographical socio-economic exclusion.

The economic aspect of socio-economic exclusion refers to processes that hinder individuals from gaining financial resources through labour markets, credit and insurance markets, basic services such as health and housing thus causing them to be poor (Baker, 2001). There is also the political dimension of socio-economic exclusion or exclusion from the civil society which refers to individuals lacking the ability to enable them to exercise their legal freedoms and participate in decision-making. Political exclusion particularly affects the poor as they do not have the same access to education and
information which would empower them to take full advantage of their rights under the law (Baker, 2001, Galabuzi & Teelucksingh, 2010).

Besides, the other aspect of socio-economic exclusion is socio-cultural or exclusion from social goods which is linked to the isolation of specific groups through education, language and cultural practices (Baker, 2001). The forth aspect of socio-economic exclusion is the geographic component which refers to the negative effect of location externalities on individual attributes (Baker, 2001). A similar view is held by Cameron (2006) who say that socio-economic exclusion is couched in terms of ‘neighbourhoods’, ‘communities’ and ‘worst estates’. Exclusion in this aspect people are seen in places rather than the wider histories and geographies of a complex polity, culture and economy. This study therefore strived to identify the main forms of socio-economic exclusion in kibera informal settlements.

2.2.2 Causes of Socio-economic Exclusion in Slums

Social exclusion surfaces due to poverty. However, language and cultural barriers, location disadvantage or discrimination arising from disability of any kind can also play a part as well. According to UK’s social inclusion unit, social exclusion is often the outcome of people or communities suffering from a range of problems such as unemployment, low income, poor housing, crime, poor health, disability and family breakdown (Begum & Moinuddin, 2010). The above scholars give a clear social exclusion’s cycle of reinvigoration. It occurs when we have unemployment leading to low income. Then there is emergence of poor housing in slums and squatters, followed by
limited or no access to standard urban services, which eventually leads to poor health in the urban communities. All these issues lead to the emergence of excluded communities and without significant interventions the cycle keeps on repeating itself.

There are many measures of social exclusion among them the Child Social Exclusion (CSE) index, which is a geographic index of social exclusion risk for children in Australia. It combines economic and social factors that are specifically related to child outcomes. In order to maintain the consistency with other spatial data used in this report, the index is calculated at the Local Government Area (LGA). Social exclusion is a relatively new concept in examining disadvantage, where the complex and multi-dimensional nature of disadvantage is captured through an understanding that a number of elements impact upon wellbeing both now and in the future. The CSE Index covers 5 domains of disadvantage comprising of 14 indicators. The domains are socio-economic, education, connectedness, housing and access to health services (Phillips et al., 2013). In light of the above issues the study strived to establish the causes of socio-economic exclusion among the residents in Kibera slums.

2.3 Challenges of Waste Management

Waste management continues to be a big challenge globally. It is even present in developed industrial countries like USA, EU countries and Japan (Nakamura, 2007; UNEP, 2010). In Japan the major problem in waste disposal is lack of space for landfills. The Japanese terrain is rugged and landfills require relatively level land. To ease this problem land for waste disposal has been reclaimed from the sea making the cost of
waste disposal high. However before this, Nakamura (2007) reports that ten years prior to 2004, 5 million tonnes of waste was found illegally dumped.

In the USA unlike Japan most of the wastes tend to be buried in sanitary landfills due to availability of plenty and level land. The problems in USA waste disposal are seen when hazardous materials are disposed in non-hazardous landfills. This can cause environmental pollution through leachate. There is also a problem of exporting some wastes to developing countries where some of it is disposed in an environmentally unfriendly manner (Nakamura, 2007; UNEP, 2010).

Waste management also poses a problem to the developing countries where the preferred method is open dumping (UNEP, 2010). The collection, processing, transport and proper disposal of solid waste are all important aspects of waste management for public health, aesthetic and environmental reasons. Nevertheless there is a growing concern to address inadequacies of waste management in developing countries resulting from lack of organization and planning in waste management due to insufficient information about regulations and financial constraints (Al-Khatib et al., 2007). Other reasons include: lack of education opportunities and customs.

In Southern African Development Corporation (SADC) countries’, waste management is handled by municipalities which are often constrained by capital, human capabilities and institutional abilities that contribute to huge service back-logs. The waste sites can be breeding grounds for disease causing insects and rodents (World Bank, 2010). In some
countries they have focused on collection and disposal ignoring other elements such as waste minimization treatment and recycling (Karani & Jewaskiewitz, 2006).

In some African countries like Cameroon, Nigeria and Egypt globalization has been named as a cause of poor waste management practices. There have been wars and political upheavals caused by among other things the economic devastation as a result of IMF-World Bank brutal policies of Structural Adjustment Programs (Achankeng, 2003). These situations can cause disruptions in waste management. A case in point is Mogadishu, Somalia where huge heaps of garbage accumulated over the first ten years of civil war. Also, in Kinshasa, Democratic Republic of Congo, there is a time when the city registered zero waste collection (Barise, 2001 cited in Achankeng, 2003).

Equally, in many African cities authorities ignore other stakeholders in the waste management industry therefore causing a problem. Municipal authorities monopolise the waste management services yet they are ill equipped to handle the wastes (Henry et al; 2006; Achankeng, 2003). Subsequently, the waste accumulates along drainage systems resulting in flooding. The prevalence of parasites, tetanus, malaria, hookworm, cholera, and diarrhea so common in many African cities is due to unsanitary conditions caused by inappropriate waste dumping (Achankeng, 2003).

In many developing countries’ cities, waste management problems are also exacerbated by the presence of scavenging and foraging animals. The accumulated wastes attract foraging animals like dogs, cows, pigs and goats which scatter infected waste materials, spreading diseases and causing a nuisance (Gulis et al., 2004; UNEP, 2010; Medina,
The negative impacts of wastes are severe health impacts particularly on communities, pollution of surface and sub-surface water bodies due to leachate contamination not forgetting air pollution from emissions of spontaneous combustion in dumps (UNEP, 2010). Whereas the above seem to be some the causes of waste management problems in Africa the study sought to establish why the interventions being applied to ameliorate the waste management challenges are not effective in Kibera.

2.3.1 Challenges of Waste Management in Kenyan Slums

Nairobi city is home to many informal settlements like Mathare, Korogocho, Kawangware among others scattered in nine different administrative regions. The informal settlements are the consequence of both explicit government policy and decades of official indifference (UN-Habitat, 2013). In particular, informal settlements were excluded from city authority planning and budgeting processes (Mutisya & Yarime, 2011). The lack of recognition of these informal settlements and slums as residential areas makes them be denied essential services like garbage collection, improved sanitation, water supply, electricity, improved health services, education, access roads and transport (Mutisya & Yarime, 2011). In total 66% of Nairobi’s population doesn’t have any waste management services (Paffenholz, 2011).

One of the main drawbacks in waste management in Nairobi comes from lack of good governance and leadership (UN-Habitat, 2013). The political leaders are more loyal to their political parties that sponsored them than the real issues on the ground (Henry et al; 2006). The local authorities also inflate the workforce and political fallout is usually
common. There have been instances where some members of county assemblies have incited their constituents against slum upgrading programmes based on unfounded fears that the projects may influence voting patterns. A good example of this is the Mathare 4 slum upgrading project which was sponsored by the Catholic Church it failed due to political interference (Henry et al., 2006).

Evidently, the slum residents are trapped in poverty and are excluded from the rest of the society. They are also threatened with violence and insecurity (UN-Habitat, 2013). There is generally lack of empowerment and social capital (Henry et al., 2005; Mutisya and Yarime, 2011). Despite these low socio-economic conditions residents in slum areas are dissatisfied with waste collection services, are aware of the health risks associated with the problem and are willing to pay for improved services including waste collection (UNEP, 2005).

Another major challenge in waste management in Kenyan slums is the manner of disposing the waste. Most of these wastes are not separated instead there is open burning. The bulk of these wastes contain plastics, which when burnt generate harmful carcinogenic vinyl chloride monomers and dioxins. UNEP (2005) highlights a study conducted by JICA (1998) on the residents around the Dandora dumping site in Nairobi. It revealed disturbing findings including: serious complaints about smoke, smell, broken glasses, widespread and illegal dumping of wastes in various informal settlements, weak institutional framework to control dumping and the city. There has only been one official dumpsite; Dandora dumpsite which is located far from the city. Despite polluting the
neighbourhood as discussed above, waste pickers and dealers force NCC to bribe them so that they can access the dump (UNEP, 2005).

There is also an acute shortage of sanitation facilities in the informal settlements. Up to 94% of residents in informal settlements do not have access to adequate sanitation. In Mathare slums waste disposal is a major problem whereby residents live besides heaps of garbage and associated vermin (Dignitas project, 2008). The toilets in this slum are privately owned and as a result residents have to pay a fee to use them. As a result many residents resort to defecating in the open or in plastic bags, thus human waste can be found in plastic bags or out in the open on the streets of the slum. A similar situation is reported in Kibera informal settlements (Dignitas project Report, 2008; Mutisya and Yarime,, 2011; UN-Habitat 2010b).

In handling wastes it is imperative to have a workforce with the necessary technical knowhow. However, the workforce in the waste management sector in Kenyan towns is poorly trained. The local authorities are always faced with financial crisis and hardly a year passes without threats of strikes by the workers demanding past due wages and increment of wages (Henry et al., 2006). This calls for better understanding of all the challenges and possible solutions of waste management issues particularly in Kibera slum. The research found that the challenges are multifaceted that is coming from central government, county government and the slum residents who don’t sort waste at source.
2.4 Sustainable Participatory Approaches of Fostering Community Based Waste Management Practices

Sustainable systems of managing community based waste management practices are very important in ensuring environmental sustainability and also financial sustainability in handling wastes. A sustainable waste management programme is the one that integrates sanitary with social objectives, ensures a profitable project, guarantees reliable service and raises public awareness of its significance (Gertsakis and Lewis, 2003; Palczynski and Scotia, 2002). In addition, it must bring together the private, public and community-based actors and give them well defined responsibilities in the various fields, from collection to recycling waste. It must also introduce new technologies in order to generate income and jobs; and involve the poorest neighborhoods that are now untouched by urban management and lack basic services (Palczynski & Scotia, 2002).

One of the best models of sustainable waste management is best represented by the hierarchy of integrated waste management by Palczynski and Scotia (2002). It focuses on the waste management practices and their impact to the environment. The greatest impact to the environment is open dumping followed by incineration, composting, recycling, reusing and the least impact to the environment is source of wastes reduction. However, the above hierarchy seems not to be working in many Kenyan informal settlements. UN-Habitat (2010) observes that improved solid waste management systems were to contribute to the achieving of many MDGs. This is especially so in MDGs 1 and 7, on livelihoods and poverty for the former and on environment for the latter. The above can be achieved by synchronising the roles of waste collectors especially the local
communities, who also clean the environment with the financial systems whereby they are able to recycle, reuse and sell some of the wastes. MDG 1 that is eradicating extreme poverty and hunger can be achieved through the process of waste collection and recycling as it provides sustainable livelihoods to millions of people who would otherwise have no stable source of income (Medina, 2008).

In the recent years the trend in waste management has taken another approach of integrated sustainable waste management (ISWM), (Van Dijki & Oduro-Kwarteng 2007). It establishes three important dimensions namely: the stakeholders, the elements and the sustainability aspects. The stakeholders in this case consist of the local authorities, environment ministries, private collectors and communities living in the area among others. Elements are the technical aspects of waste management system. Lastly, aspects in sustainable waste management consider all of the operational, financial, social, institutional, political, legal and environmental aspects.

The above views are supported by UNEP (2010) who see that waste management practices have changed with the coming of the 21st century. In the 20th century the question was “How do we get rid of our waste efficiently with minimum damage to public health and the environment?” The focus changed in the 21st century when issues of sustainability were introduced and the question changed to “How do we handle our discarded resources in ways which do not deprive future generations of some, if not all, of their value?” The latter perspective stemmed from the realization that waste have value and that value should be harnessed by present generations and posterity.
In looking at sustainable waste management there is a need to look at the gender aspect of waste management. The success of any community based sustainable waste management strategy depends on the involvement of women (Anschütz, 1996). Women in many cultures are involved in cleaning of their households and outside their homes hence more contacts with wastes. Also, many households in many informal settlements are headed by women. They are often the initiators who operate and manage solid waste service as members of a micro-enterprises (Furedy, 1990). If recycling and resale of some wastes is initiated at the community level women may gain a lot and improve the wellbeing of their households and this will lead to achieving sustainable waste management. The above issues vindicate one of the objectives of the study which is to have effective participatory community based waste management practices in Kibera slums.

In the recent past there have been efforts to reduce waste production, recycle and reuse. The strategy has been source reduction as the most preferred, followed by recycling/reuse, composting, land filling and incineration being the least preferred (World Bank, 2010). The negative effects to the environment caused by land filling and incineration make them unsuitable choice for many countries (UNEP, 2010). In Africa, Asia and Latin America where we have some of the poorest population on earth the percentage of wastes being recycled is very little. There is need to adopt the first three options in the waste management hierarchy that is reduce, recycle/reuse and compost. This will bring about cleaner environment and economic empowerment to slum communities which will eventually eradicate socio-economic exclusion. The study therefore attempted to find
ways in which sustainable waste management practices can bring about socio-economic inclusion in Kibera.

2.5 Summary of Literature Review

The foregoing literature review shows that socio-economic exclusion occur when an individual does not have fair access to means of livelihood and is also excluded from social goods. There is exclusion from the civil society, economic exclusion, exclusion from social goods and exclusion from social production. Some people who live in cities and maybe socio-economically excluded are normally found in the slums. This study was to establish the particular causes and main forms of socio-economic exclusion existing among the residents in Kibera slums. The literature reviewed shows that challenges of waste management include lack of appropriate dumping sites, improper disposal methods, institutional inadequacies, financial constraints among others. In Kibera, waste management problems include failure of GoK, NCC and non-coordination of interventions by other stake holders like CBOs, CSOs and UN agencies. Furthermore the study was to investigate the challenges of the existing interventions in waste management by the above actors. The main challenges of waste management in Kibera slums include political interference, shortage of sanitation facilities among others. One of the ways which can effectively mitigate waste management problems and socio-economic exclusion is by adoption of participatory community based waste management practices. The study therefore addressed how the above problems can be solved. It also looked at why the current strategies applied in waste management in Kibera are not successful. Given the above information there was a need to investigate how community based sustainable participatory waste management practices can be operationalized in Kibera.
CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the research design, research variables both independent and dependent, location of study, study population, sampling design, sampling techniques and sample size, instrumentation, pilot study, data quality assurance and control, data collection methods and tools, data processing, analysis and presentation, analysis procedures and finally logistical and ethical considerations.

3.2 Research Design

Kothari (1997) describes a research design as a plan of action which a researcher uses to organize the research from conceptualization of data collection, data organization to data analysis. This research was descriptive design whereby it used a cross sectional survey. A descriptive study is the one where data is collected without changing the environment (socio-economic condition). In other words it is an observational study that demonstrates associations or relationships of the things in the environment (De Vaus, 2001; Hakim, 2005). The descriptive research design has advantages as it allows a researcher to combine both qualitative and quantitative methods in data collection. It also allows a researcher to capture information as it is an example through direct observations (Hakim, 2005). However, it has some disadvantages in issues like confidentiality where respondents might refuse to give out sensitive information that is too personal and sometimes people may give information which they think the researcher wants to hear. This was avoided by assuring the respondents of their anonymity and the data was for academic purposes.
3.3 Area of Study and Target Population

Fieldwork was carried out in Kibera informal settlements specifically in the seven sublocations of Kibera namely: Kibera, Lindi, Makina, Gatwekera, Laini Saba, Silanga and Olympic/Kianda. The research used the official 2009 Kenya population census report that gives population data in terms of sub-locations. Kibera slum is situated in Nairobi’s South Western area approximately seven Kilometres from the city centre. The slum is within Nairobi West sub-county. It is located at the following geographic coordinates, 1° 19’ 0” S, 36° 47’ 0” E. It is the largest slum in Kenya with a population of 170,078. There are a total of 62,816 households in Kibera (KNBS, 2009)

Plate 3.1: Map of Kibera

Source: Mutsiya & Yarime, 2011

The target population comprised of Kibera residents in Lindi, Makina, Silanga, Laini Saba, Gatwekera and Olympic/Kianda sub-locations. The above areas have waste management problems. Adults above 18 years and older who were heads of households
were sampled. In areas where the head of the household was not available the next most responsible adult was sampled. GoK officers like chiefs and assistant chiefs, NCC officials, UN-Habitat officers, private waste collectors, leaders of NGOs and CSOs working in Kibera were also targeted as they have an in depth knowledge on the issues under investigation.

3.4 Variables
To establish the relationship between socio-economic exclusion and community based waste management practices, a number of variables were identified for analysis.

3.4.1 Independent variables
They are indicators of socio-economic exclusion like unemployment, low income, lack of services, level of education, poor health and poor housing were considered as independent variables.

3.4.2 Dependent variables
These include unsustainable waste management practices in Kibera informal settlements. They included open dumping, open burning, non-recycling, non-reselling, lack or limited collection and lack of skills in waste management. They are explained in detail in the conceptual framework.

3.4.3 Intervening variables
Intervening variables were the sustainable waste management practices and it involved composting, minimization, recycling, reusing and reselling of wastes. It also involved governments’ policies and training in waste management. The intervening variables are the solutions to the unsustainable waste management (dependent variables).
3.5 Sampling Design

The objectives of the sampling design were to get qualitative and quantitative information which would answer the questions on socio-economic exclusion and waste management issues. The information got also provided room for statistical comparisons between various sub-locations in Kibera informal settlements. The sampling design was done in such a way that the data gathered was reliable and could be used to provide the accurate information on the ground and be used to make predictions. All the data collected by different methods was triangulated.

3.6 Sample Size and Sampling Procedure

Sampling refers to the procedure a researcher uses to identify and gather people, places or things to study. The study used the James Cochran formula to get the sample size.

An equation for determining sample size

\[ n = \frac{z^2 P(1 - P)}{d^2} \]

\[ 1 + \frac{1}{N} \left( \frac{z^2 P(1 - P)}{d^2} - 1 \right) \]

Where:
- \( n \) = sample size
- \( P \) = Population size
- \( z \) = z-score
- \( d \) = margin error for mean
Table 3.1: Sample Size for Given Precision

<table>
<thead>
<tr>
<th>Sample Size for Given Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence level</td>
</tr>
<tr>
<td><strong>z-score</strong></td>
</tr>
<tr>
<td>Precision +/- = 5%</td>
</tr>
<tr>
<td>Population Size = 170,078</td>
</tr>
<tr>
<td>Assumed P = 90%</td>
</tr>
<tr>
<td>Conservative P= 50%</td>
</tr>
</tbody>
</table>

Table 3.1 shows that the degree of variability was 50% at 95% confidence level with a z score of 1.96. The confidence level of 95% is appropriate in social sciences as it is difficult to obtain absolute information like in laboratory settings. The researcher got samples from the sub-locations of Kibera informal settlements namely Kibera, Lindi, Makina, Laini Saba, Makina, Gatwekera and Olympic/Kianda. The reasons why the study got samples from all the seven sub-locations is that the residents are demographically different in terms of ethnicity, culture, religion and politics. To ensure great accuracy the researcher derived a total of 384 respondents (Table 3.1) from Kibera’s slum population of 170,078 using James Cochran formula listed above. The researcher over sampled and by administering 400 questionnaires, the response was 393 respondents.

The slum was divided into seven sub-locations through purposive sampling, this enabled the researcher to focus on only the slum areas. Secondly, each sub-location was assigned a specific number of questionnaires. From each sub-location the research used systematic sampling method to get the respondents where every nth household was chosen to be included in the sample (Table 3.2). To avoid bias the first sample was chosen at random.
This was done by identifying a point from the furthest East of the sub location identified through the area map. The main advantage of this method is its simplicity. Table 3.2 shows the population sizes of the various Kibera sub-locations, it also gives the specific number of households per sub-location. The fifth column of the table shows the number of households to the next sample and lastly there is the sample size selected per sub-location.

**Table 3.2: Population Size and Samples according to Sub-location**

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Population</th>
<th>Households</th>
<th>No. of households to the next sample (n)</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Kibera</td>
<td>9,786</td>
<td>3,237</td>
<td>147</td>
<td>22</td>
</tr>
<tr>
<td>2 Lindi</td>
<td>35,158</td>
<td>11,551</td>
<td>146</td>
<td>79</td>
</tr>
<tr>
<td>3 Makina</td>
<td>25,242</td>
<td>7,926</td>
<td>139</td>
<td>57</td>
</tr>
<tr>
<td>4 Silanga</td>
<td>17,363</td>
<td>6,164</td>
<td>158</td>
<td>39</td>
</tr>
<tr>
<td>5 Laini Saba</td>
<td>28,182</td>
<td>18,341</td>
<td>286</td>
<td>64</td>
</tr>
<tr>
<td>6 Gatwekera</td>
<td>24,991</td>
<td>7,270</td>
<td>126</td>
<td>57</td>
</tr>
<tr>
<td>7 Olympic/Kianda</td>
<td>29,356</td>
<td>8,327</td>
<td>126</td>
<td>66</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>170,078</strong></td>
<td><strong>62,816</strong></td>
<td><strong>384</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from Kenya National Bureau of Statistics, 2009 Census

In Table 3.2 above to get the sampling interval was achieved by dividing the number of households to the sample size. In getting the interviews for key informants like GoK officers, NCC officers, chiefs, assistant chiefs, CBO leaders and waste collectors the study used purposive sampling. This is because specific information about socio-economic exclusion and community based management practices was sought from them.
3.7 Data Quality Assurance and Control

Data quality assurance and control was vital because the sample survey could be affected by two kinds of errors; that is sampling error and non sampling errors. Sampling error gives us the precision of our statistical estimates. Sampling error is calculated using the standard deviation of the sample and the greater the standard deviation the greater the sampling error. The sampling error is controlled by having an appropriate study design.

Non sampling errors arise due to various factors such as data entry errors, biased questions in a questionnaire, biased decision making, inappropriate analysis conclusions and false information provided by respondents.

To minimize the sampling errors the research assistants were trained and briefed about the questionnaires before the research began. Some of the vital issues that were stressed are that the respondents were assured of their anonymity so that the research won’t have any adverse effects on them. The lead researcher also had back up checks when the research was carried out. A pilot study was carried out prior to the main study. This was to ensure validity and reliability of data collected. The main objective of the study was to test the effectiveness of the data collection tools in yielding the required information. A sample of 10% of the intended sample was taken.

3.8 Data Collection Methods and Tools

Data collection methods were through questionnaires, interviews, focus group discussions with local residents and direct observations. Interviews from key informants
were to get qualitative data while questionnaires got mostly quantitative data. Interviews yielded data on causes and main forms of socio-economic exclusion, challenges of waste management and sustainable systems of fostering community based waste management. The interviews with key informants and focus group discussions (FGDs) were conducted face to face. Participant observations included site visits to CBOs, NGOs, recycling companies, informal recycling stations, community areas, composting facilities, incinerators, landfills and informal dumpsites in the seven sub-locations of Kibera slum. These field visits helped the researcher to be familiar with waste management practices and challenges in Kibera slum.

### 3.8.1 Questionnaire Survey

The questionnaires in the survey were designed to capture quantitative data. The respondents were recruited by stratified random sampling. This method allowed all areas in the sub-locations to have an equal chance of being sampled. Then from each stratum systematic sampling was used to select respondents at household level where questionnaires were administered. The category of respondents here were Kibera residents. The data collected was mostly quantitative about the causes and forms of socio-economic exclusion existing in Kibera slum. There were also challenges of waste management practices and the ways the residents were dealing with the challenges to address the issue of socio-economic exclusion.
3.8.2 Key Informants’ Interviews

In order to get an in depth knowledge about socio-economic exclusion and waste management in Kibera slums the research carried out semi-structured and in-depth interviews. The target respondents were Kibera slum residents, CBOs/NGOs leaders, NCC officers, local administrators, private waste collectors and UN agencies. This gave the researcher more insight into the aforementioned issues because slum dwellers and other stakeholders expressed their feelings. The research carried out a total of 56 interviews with key informants as shown in Table 3.3. This figure was arrived at through purposive and simple random sampling.

3.8.3 Focus Group Discussions

FGDs are used in research as they are useful when one to one interviews might not elicit the required response due to factors such as fear and lack of confidence. The research used three FGDs divided into men, women and the youth as each of these groups engage in waste management issues differently and they suffer from socio-economic exclusion due to different reasons. In each FGD there were between 10 and 12 interviewees selected from the various sub-locations. At least one respondent was selected per sub-location see Table 3.3.
Table 3.3: Summary of Respondents’ Category, Sampling Methods and Type of Data

<table>
<thead>
<tr>
<th>Target Population/ respondents category</th>
<th>No. of respondents</th>
<th>Locality(sub-location)</th>
<th>Method of Data Collection</th>
<th>Sampling Method</th>
<th>Type of Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kibera Slum residents</td>
<td>393</td>
<td>Kibera, Lindi, Silanga, Gatwekera, Makina, Laini Saba, Olympic/Kianda</td>
<td>Questionnaire, interviews, FGDs</td>
<td>Simple random sampling, purposive sampling, systematic sampling</td>
<td>Quantitative and qualitative</td>
</tr>
<tr>
<td>Government officials (2 Chiefs, 1 assistant chief)</td>
<td>7</td>
<td>Kibera, Laini Saba, Saring’ombe, Gatwekera</td>
<td>In-depth interviews</td>
<td>Purposive and simple random sampling</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Nairobi waste management workers</td>
<td>3</td>
<td>Kibera, Laini saba</td>
<td>In-depth interviews</td>
<td>Purposive sampling</td>
<td>Qualitative data</td>
</tr>
<tr>
<td>NGO leaders</td>
<td>11</td>
<td>Kibera, Lindi, Silanga, Gatwekera, Makina, Laini Saba, Olympic/Kianda</td>
<td>In-depth interviews</td>
<td>Purposive sampling</td>
<td>Qualitative data</td>
</tr>
<tr>
<td>CBOs and FBO leaders, community leaders</td>
<td>18</td>
<td>Kibera, Lindi, Silanga, Gatwekera, Makina, Laini Saba, Olympic/Kianda</td>
<td>Interviews</td>
<td>Purposive sampling,</td>
<td>Qualitative data</td>
</tr>
</tbody>
</table>
### Table 3.3

<table>
<thead>
<tr>
<th>Target Population/respondents category</th>
<th>No. of respondents</th>
<th>Locality(sub-location)</th>
<th>Method of Data Collection</th>
<th>Sampling Method</th>
<th>Type of Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private waste collectors and resellers</td>
<td>11</td>
<td>Kibera,Lindi, Silanga, Gatwekera, Makina ,Laini Saba, Olympic/Kianda</td>
<td>In-depth interviews</td>
<td>Purposive sampling Simple random sampling</td>
<td>Qualitative data</td>
</tr>
<tr>
<td>UN agencies and international development agencies working in Kibera</td>
<td>3</td>
<td>Kibera,Lindi, Silanga, Gatwekera, Makina ,Laini Saba, Olympic/Kianda</td>
<td>In-depth interviews</td>
<td>Purposive sampling</td>
<td>Qualitative data</td>
</tr>
<tr>
<td>FGD-Men, women and youth</td>
<td>3</td>
<td>Kibera</td>
<td>In depth interviews</td>
<td>Purposive sampling</td>
<td>Qualitative data</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>449</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3 above shows different categories of the respondents. They included Kibera residents, government officials, Nairobi County waste management workers, NGO and community leaders, FGDs for men, youth and women. It also includes interviewees from UN agencies and international development organizations.

### 3.9 Data Processing, Analysis and Presentation

This section describes how both qualitative and quantitative data were cleaned, analyzed and presented. The qualitative raw data were cleaned to get the useful data. This was done by reviewing the filled questionnaire, interview notes, observation notes and photographs. Then there was the review, transcription and translation of the audio recordings into English for further analysis. The data were then coded according to thematic areas derived from the research objectives. To get the useful information the raw data collected were aligned to the study objectives and the information that best answered
the goals of the study was retained. Quantitative data was cleaned by editing the questionnaires to remove unnecessary information that did not tally with the study objectives. Editing involved the scrutiny of all questionnaires to ensure uniformity, consistency, accuracy and actual filling, so as to ensure data from questionnaires is ready for analysis.

The quantitative data were coded and analysed using SPSS tool to establish the relationships between variables under investigation like, place of settlement, waste management practices and socio-economic exclusion. Further SPSS tool was used to examine any cross-tabulation, or associations and groupings which could emerge. Microsoft Excel was also used to compute percentages, tabulation and cross-tabulation of responses. It was also used to generate charts, perform descriptive statistics and conduct other complex statistical analyses. The researcher also used Chi-square analysis to establish the extent a given sample represented the reality. The qualitative analysis involved putting data into meaningful categories and themes so that useful information can be found. Here first transcripts were coded into specific categories. The next step was data integration, it was done through ‘classification’ which goes beyond description of data to trying to interpret and make sense of data. Then there was what Kitchin and Tate (2000) call ‘corroborating evidence’; this is where salient points were pieced together and aligned to the objectives of the study making it possible to get the emerging issues according to the study objectives.
Quantitative data were presented using descriptive statistics; frequencies and percentages. Figures, tables and graphs proved very invaluable as they presented visual data in a way which is easier to comprehend and interpret. The above quantitative methods helped discuss the findings in a narrative form and were supported by secondary data sources. Qualitative data from FGDs and key informants interviews were presented by making references to what the interviewees said about particular issues. In some instances where respondents gave answers that best captured the objectives of the study, verbatim quotations were made and italicised. The qualitative data was also very useful in strengthening quantitative findings where appropriate. Using the data collected the study got answers to the research questions or new information was gathered altogether (Kitchin & Tate 2000).

3.10 Ethical Considerations

As required by the Government of Kenya, the researcher obtained a research permit from the Ministry of Education, through the Dean of Graduate School, Kenyatta University (see Appendix 10). The respondents were briefed on the purpose and objectives of the study, need for them to participate and confidentiality assured during the questionnaire survey. The rights and dignity of participants during the study were assured and maintained throughout this study. Consent was also obtained from respondents before interviews, taking audio recording, photographs and citation of their real names in the written reports.
CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter presents the results of the study and has 4 (four) sections. The first sub-section presents the socio-economic and demographic data of the respondents. The second sub-section deals with the main forms and causes of socio-economic exclusion in Kibera informal settlements. The third sub-section discusses the main challenges and impediments to community based waste management practices in Kibera informal settlements. The fourth sub-section presents the relationship between socio-economic exclusion and community based waste management practices in Kibera informal settlements. The last sub-section discusses the sustainable participatory approaches used in fostering community based waste management practices in Kibera slum.

4.1 Background Information of Respondents

The researcher collected quantitative data from seven sub-locations that constitute Kibera informal settlements. The hypothesis being tested here is \( H_0 \) \( \text{There are no significant differences in socio-economic and demographic characteristics in the seven sub-locations of Kibera.} \). It is worth noting that socio-economic exclusion may occur due to differences in socio-demographic characteristics. The study looked at twelve socio-demographic characteristics in Kibera informal settlements. The demographic characteristics discussed include: gender, age, education levels, length of stay in the slum, average household size, marital status, economic status, ethnicity and religious affiliation.
4.1.1 Gender of the Respondents

The results showed that gender profile in Kibera is skewed towards female which is 62.6% against a male population of 37.4%. This is a contrast with the natural gender ratio which is about 50:51. The KNBS 2009 population census gives the sex ratio at almost equal men to women; 99.9: 100. The higher number of women respondents might be due to the fact that a lot of men go to work and the women are left behind to maintain the households. This can be illustrated by Makina which had the highest percentage of female respondents 76.7%.

Table: 4.1 Gender of the Respondents

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Male</th>
<th>%</th>
<th>Female</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kibera</td>
<td>12</td>
<td>54.5</td>
<td>10</td>
<td>45.5</td>
<td>22</td>
<td>100%</td>
</tr>
<tr>
<td>Lindi</td>
<td>30</td>
<td>37.5</td>
<td>50</td>
<td>62.5</td>
<td>80</td>
<td>100%</td>
</tr>
<tr>
<td>Makina</td>
<td>14</td>
<td>23.3</td>
<td>46</td>
<td>76.7</td>
<td>60</td>
<td>100%</td>
</tr>
<tr>
<td>Silanga</td>
<td>15</td>
<td>37.5</td>
<td>25</td>
<td>62.5</td>
<td>40</td>
<td>100%</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>30</td>
<td>44.0</td>
<td>38</td>
<td>56.0</td>
<td>68</td>
<td>100%</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>15</td>
<td>26.3</td>
<td>42</td>
<td>73.7</td>
<td>57</td>
<td>100%</td>
</tr>
<tr>
<td>Olympic/Kienda</td>
<td>31</td>
<td>47.0</td>
<td>35</td>
<td>53.0</td>
<td>66</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>147</strong></td>
<td><strong>37.4%</strong></td>
<td><strong>246</strong></td>
<td><strong>62.6%</strong></td>
<td><strong>393</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

\(x^2 = 16.105 \quad df = 6 \quad p = 0.01 \text{ significant}) \quad \text{p value of less than 0.05}

Table 4.1 above shows a Chi-square analysis and the results showed that p value was 0.01 showing that there were significant differences in the gender composition of the respondents in various sub-locations. On the question about whether one was the head of the household only 23% of the respondents indicated they were the heads. This suggests some of the female respondents might have been left behind by their male partners to
take care of the household. This is also supported by the information on marital status showing that a very high percentage of the respondents are married. An example is Makina where more that 90% of the respondents are married. Again a high number of female headed household could be due to rural-urban migration of young unmarried women who due to economic and social reasons end up staying in the slums (Giada, 2013). Kibera sub-location has the largest male population of 54.5% followed closely by Olympic/Kianda and Laini Saba sub-location with 47% and 44% respectively (Table 4.1).

### 4.1.2 Age Distribution of Respondents

The age distribution of the respondents shows a generally youthful population where 64.8% are aged 40 years. There are also marked age differences in various sub-locations which could have been caused by differences in socio-economic status. An example is Kibera sub-location which has a very youthful population with 59.1% of the respondents being 30 years and below. This could be caused by the fact that the sub-location is near a main road and the youth may be living in a place they feel there is easy communication to the working places which in most instances are located outside the slum. Generally, many sub-locations have many respondents falling in ages 31-39 years (Figure 4.1). There seems to be similarities in various sub-locations in regard to respondents aged 60 years and above. The percentages of respondents are generally low. The highest percentage of respondents in this category was in Gatwekera with only 3.5% while Makina had no respondents in this category.
Figure 4.1: Age Distribution of Respondents

The Figure 4.1 above had a p value of 0.00001 indicating significant differences in age distribution within the various sub-locations in Kibera. Out migration which occurs due to factors such as change of one’s socio-economic status, decreased bodily energy which is needed in many menial jobs available for slum residents may be some of the reasons why we have very low numbers of respondents in this category. It could also be attributed to natural attrition; this is a situation whereby people die due to natural causes. It might be higher in Kibera slums due to prevalence of many endemic diseases such as Malaria and gastrointestinal infections.

4.1.3 Education Levels of Respondents

The study showed that generally Kibera slum had respondents who are literate as 96% had primary school education. This could be due to the fact that some slum dwellers are
in-migrants and may have come to Kibera when they already had the qualifications. Gatwekera seems to be the sub-location with the highest number of people with secondary education which is 52.6%. In all the sub-locations very few people had no educational qualifications with the highest being Kianda/Olympic with a total of 3% respondents. The lack of qualifications in those respondents can be attributed to socio-economic mobility where a person who earns more money despite having no qualifications can move to Olympic/Kianda where houses are better.

![Education Levels of Respondents](image.png)

**Figure: 4.2 Education Levels of Respondents**

Figure 4.2 above shows that Olympic/Kianda sub-location also had the highest percentage of university graduates which was 42.4% of the total population. This can be attributed to higher economic class in Olympic estate. On doing Chi-square analysis it showed age there are significant variations in education attainment of residents within the sub-locations in Kibera slum. Chi-square analysis results showed ($x^2=66.966, df=30,$
p=0.0001) this indicated a p value of less than 0.05 indicating that there were significant differences in the education level of Kibera residents. As such any intervention in Kibera should put in consideration the fact that education attainment is differs in the seven sub-locations of Kibera.

4.1.4 Length of Stay of Respondents in Kibera Slum

Slightly more than a quarter of all respondents 26% indicated that they had lived in Kibera for a period less than 5 years. The rest 74% had been in Kibera slum for 6 years and above. This could be due to affordable housing in the slums and lack of means to move out of the slums. This also indicates that the respondents might not be socio-economically mobile.

**Table: 4.2 Length of Stay of Respondents in Kibera Slum**

<table>
<thead>
<tr>
<th>Years</th>
<th>Kibera</th>
<th>Lindi</th>
<th>Makina</th>
<th>Silanga</th>
<th>Laini Saba</th>
<th>Gatwekera</th>
<th>Olympic/Kianda</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>&lt; 5</td>
<td>7</td>
<td>32</td>
<td>9</td>
<td>11.3</td>
<td>20</td>
<td>33.3</td>
<td>15</td>
<td>37.8</td>
</tr>
<tr>
<td></td>
<td>19.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td>6</td>
<td>27</td>
<td>34</td>
<td>42.5</td>
<td>13</td>
<td>21.7</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>26.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-15</td>
<td>3</td>
<td>14</td>
<td>14</td>
<td>17.5</td>
<td>10</td>
<td>16.7</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>13.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-20</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>8.3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>13.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20+</td>
<td>3</td>
<td>14</td>
<td>19</td>
<td>23.8</td>
<td>12</td>
<td>20.5</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>16.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>60</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

x²=68.944  df=24  p= 0.00003 Significant

The information in Table 4.2 is corroborated by Ovesson (2013), who says that a lot of Kibera residents who settle temporarily end up residing for a long period in the slum due
to lack of resources. Some sub-locations have differences in the duration of the residency period for instance Silanga has the highest number of respondents 37.8%, who had been in Kibera for less than 5 years. This is contrasts to Lindi which had 11.3% in the category. In Table 4.2, Chi-square analysis shows that there are statistical differences in the length of stay in Kibera. It also seems that Olympic/ Kianda has more people residing there for long where 30% of the respondents have been in the slum for over 30 years. This might be attributed to the fact that some houses in the sub-location are well constructed with basic infrastructure like roads and services.

4.1.5 Average Household Size in Kibera Slum

The average household size in Kibera slum has the majority of the units consisting of less than five people. The results are similar to Mulcahy and Chu (2004)’s findings that indicate Kibera’s average household size as five individuals and similar to Yonemistu et al., (2015) who found 4.67. Others established it to be much lower at 3.2 individuals per household (Desgroppes & Taupin, 2012). The study established that category less than five individuals had 54.5% of the respondents it was followed by 43.3% of the respondents consisting of households with 6-10 people and the rest 2.3% had over 11 people (Table 4.3). This is similar to UN-Habitat (2010c) estimates that the average household size in Kibera is seven people.
Table 4.3 Average Household Size in Kibera Slum

<table>
<thead>
<tr>
<th>People</th>
<th>Kibera</th>
<th>Lindi</th>
<th>Makina</th>
<th>Silanga</th>
<th>Laini Saba</th>
<th>Gatwekera</th>
<th>Olympic/Kianda</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
<td>Count</td>
<td>%</td>
</tr>
<tr>
<td>&lt; 5</td>
<td>16</td>
<td>72.7</td>
<td>42</td>
<td>52.5</td>
<td>31</td>
<td>51.7</td>
<td>21</td>
<td>52.5</td>
</tr>
<tr>
<td>6-10</td>
<td>6</td>
<td>27.3</td>
<td>36</td>
<td>45</td>
<td>29</td>
<td>48.3</td>
<td>19</td>
<td>47.5</td>
</tr>
<tr>
<td>11+</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2.5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>7.4</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>60</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

\(x^2=21.131\) \(df=12\) \(p= 0.05\) Significant

Table 4.3 above shows that there are some variations of household size in some sub-locations like Kibera where the majority of the households 72.7%, consists of less than five individuals. In the household size of 6-10 persons, all sub-locations had a percentage between 27%- 50%. There are very few households with more than eleven individuals. This could be due to the relatively small size of houses in the slums. The results also showed that households with more than 11 persons constituted only 2.3% of the total population and were only present in Lindi, Laini Saba and Gatwekera sub-locations. A Chi-square analysis was done \( (x^2= 21.131, \ df= 12, \ p=0.05)\) and it confirmed that there were significant differences in the average household sizes in Kibera sub-locations in relation to wastes.

4.1.6 Marital Status of Respondents

The marital status of majority of the respondents in Kibera slum appears to be married where we have 79.4%, followed by single 12% and divorced at 8.7%. There were similarities in various sub-locations for instance in Makina 90% of the respondents are
married, similarly 89.4% in Olympic/Kianda. Singles seem to be concentrated more in Kibera sub-location (36.4%) followed by Lindi and Silanga with 21.2% and 15% respectively.

Figure: 4.3 Marital Status of Respondents

The above Figure 4.3 shows that in the divorce category there are huge contrasts within sub-locations. An example being Kibera and Makina sub-locations where none of the respondents were divorced. On the other hand Laini Saba and Gatwekera have divorce rates of 19.1% and 24.6% respectively. In the statistical test of Chi-square analysis results ($x^2=66.734$, df=12, p=0.0) showed there were significant variations in the marital status of the respondents in Kibera slum. It also means the probability of getting such data is also zero. The high rates of married respondents show that there might be a high probability that the slum may not be experiencing high incidences of dysfunctional families. Single people seem to be concentrated around Kibera sub-location with a
highest percentage of 36%. Women are involved differently than men in waste management.

4.1.7 Head of Household Status of Respondents in Kibera Slum

The results showed that a high percentage of the respondents 60.1%, were the head of households. This is important as it shows they have a say in what happens in waste management issues and joining socio-economic groups within our study area: Kibera informal settlements. There were marked variances within the sub-locations on head of household status.

Figure: 4.4 Head of Household Status of Respondents in Kibera Slum

Figure 4.4 above shows that Makina had the lowest percentage of respondents who were the head of households at 38.3%. Laini Saba and Silanga have the highest number of respondents being head of households with 72.1% and 67.5% respectively. Having 60.1% of the respondents being the head of households is crucial as the heads can make important decisions about waste management and thus they were qualified to comment
on the issues under investigation. Figure 4.4 above shows cross tabulation where ($x^2=20.998$, df=6 and $p=0.002$) there were significant differences of the head of household status within the sub-locations of Kibera slum. These differences may be attributed to the different socio-demographic characteristics within the slums.

4.1.8 Employment Status of Respondents

The respondents surveyed showed that majority of them were in employment. This ranged from 59% in Kibera sub-location to 100% in Olympic/Kianda sub-location. In total, 71% of the respondents in Kibera are employed. In general it appears that most respondents are engaged in some work.

Table: 4.4 Employment Status of Respondents

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Employed</th>
<th>Unemployed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
<td>13</td>
<td>59</td>
<td>9</td>
</tr>
<tr>
<td>Lindi</td>
<td>57</td>
<td>71</td>
<td>23</td>
</tr>
<tr>
<td>Makina</td>
<td>36</td>
<td>60</td>
<td>24</td>
</tr>
<tr>
<td>Silanga</td>
<td>24</td>
<td>60</td>
<td>16</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>49</td>
<td>72</td>
<td>19</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>35</td>
<td>61</td>
<td>22</td>
</tr>
<tr>
<td>Olympic/Kianda</td>
<td>66</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>297</strong></td>
<td><strong>71</strong></td>
<td><strong>114</strong></td>
</tr>
</tbody>
</table>

$x^2=37.950$ df=6 $p=0.001$ Significant

Chi-square test in Table 4.4 above ($x^2=37.95$, df=6, $p=0.000001$) shows significant differences in employment status within Kibera informal settlements. The high instances
of employment in Olympic/Kianda may be due to the fact that the area has a higher socio-economic status than the rest of the slum. On the other hand, lower employment status in Kibera, Makina and Gatwekera sub-locations (59%, 60% and 61% respectively) may be attributed to low income status in those areas. Generally then it can be said that above average of the respondents are employed. The various groups working with people from Kibera should be aware of the differences that occur in employment status of the residents.

4.1.9 Main Source of Income of Respondents

The study showed that 68% of the 309 respondents were salaried. That indicates that majority of the residents might be seeking work outside the slum as there are fewer salaried employment opportunities in the slums. The rest were engaged in self employment as a means of earning a livelihood. Within the sub-locations Makina and Kibera had the highest number of salaried respondents which was 86% and 84% respectively.

Figure: 4.5 Main Source of Income of Respondents
Figure 4.5 shows that there are variations in the self employed category. Gatwekera had the highest number of respondents with 43% followed closely by Olympic/Kianda with 39%. Makina and Silanga had the least percentage of respondents who were self employed having 14% and 13% respectively. Gatwekera sub-location had the highest non response rate of 22.8%. The same sub-location having the highest number of self employed (43%) shows a lot of people in that area thrive on informal income generating activities. The total of self employed people in Kibera is 27.8% showing that a big number of the population can exploit the opportunities in self employment especially by joining organisations that deal with socio-economic inclusion and waste management. The above information is supported by Chi-square tests which revealed \( \chi^2 = 76.289, \text{df}=12, p=0.0 \) that there was significant differences in the source of income among the residents in various sub-locations in Kibera. These differences are due to the differences in socio-demographic characteristics of Kibera informal settlements the differences in income also show that some kibera residents can afford to pay for waste disposal. Main source of income influences waste management for instance in Olympic/Kianda where incomes are high residents could afford to pay for garbage.

4.1.10 Household Income of Respondents

This question had a total of 390 respondents which is about 99% response rate. 62.3% of the respondents earn salaries of less than 10,000 shillings per month. This is slight variation from Mulcahy and Chu (2014) who found out that 75% of Kibera residents earn less than 10,000 shillings a month. Similarly Yonemistu et al. (2015) found that the average monthly income in Kibera slum is 12,607 shillings per month. This is quite small
considering that in many households people indicated that they are married and there are many people staying in the house.

**Figure: 4.6 Household Income of Respondents**

The above Figure 4.6 shows that the average income in Kibera is below the poverty line of 1.25 USD a day. Household incomes between 2,000 and 10000 appear to be distributed between 8.5% and 15.6%. Statistical tests in Figure 4.6 (\(\chi^2=37.204, \text{df}=30, p=0.17\)) revealed that there are no significant differences in household incomes within the sub-locations. However, there are differences within individual sub-locations for instance in Kibera sub-location the largest sector of the population 45.5% earn over 10,000 shillings per month whereas only 4.5% of the population earn 6,001-8,000 shillings. There are also similarities in sub-locations in terms earnings for instance, people earning over 10,000 shillings category were 45.5%, 45% and 43.9% for Kibera, Makina and Olympic/Kianda respectively. The issue of the differences in household incomes is vital
in determining the percentages of people in specific sub-locations who can afford certain services like garbage collection.

4.1.11 Ethnic Background of the Respondents

Kibera like many other settlements in Kenya and the world in general are centres of diverse ethnicities. The most populous ethnic group in Kibera slums is Luhya with 37.2% of the total respondents, followed by Luo with 31.8%, then Kamba, Kisii and Nubian with 9.7%, 7.1% and 5.1% respectively. This is supported by Ovesson, (2013), Crosson (2005) and APHRC(2014) who found that 80% of Kibera residents come from Western Kenya. The other major group in Kibera is the Kikuyu with 3.8% of the total respondents. The remaining 5.3% is comprised of all other ethnic groups living in Kibera. The various ethnic groups living in Kibera also seem to be concentrated in certain localities for instance 50% of all respondents in Lindi and Silanga sub-locations were Luhyas.

![Figure 4.7: Ethnic Background of the Respondents](image-url)
Figure 4.7 shows that Luo ethnic group seem to be populous in Kibera sub-location where there was 54.5% of the respondents, they are also found in large numbers in Olympic/ Kianda where we have 45.5% of the respondents. The highest concentration of Kamba people is in Laini Saba where we have 29.4% of the respondents. The rest of the groups are found in small percentages which are below 10% of the total respondents per sub-location. Farther, statistical analyses in Figure 4.5 ($x^2=1.071$, df=36, p=1.0) showed that there are no significant differences in the ethnic composition of residents in Kibera informal settlements. This is supported by Ovesson (2013), Crosson (2005) and APHRC (2014) who observed that Kibera has homogeneous ethnic populations in some villages which roughly corresponds to the sub-locations. However having a p value of 1.0 is almost impossible to get in natural sciences because it means one is a hundred percent something will occur and it is only possible under controlled natural environment conditions.

4.1.12 Socio-Religious Affiliation of Respondents

Kibera like many urban centres in Kenya has diverse religious beliefs. The study showed that 90.8% of the respondents were christian, 8.1% Muslim, 0.3% traditional African and the rest 0.8% were from other religious backgrounds.
Figure 4.8: Socio-Religious Affiliation of Respondents

Figure 4.8 shows that the distribution of Christianity seems to be relatively uniform in all the sub-locations ranging from a high of 86.4% in Kibera to 88% in Lindi. This might be due to the fact that Christianity is the dominant religion in Kenya. The slum has a substantial Muslim population as some of the people who live there like the Nubians are predominantly Muslim. Chi-square analysis in Table 4.7 ($\chi^2=27.681$, df=18, $p=0.07$) confirmed that there are no significant differences in socio-religious affiliation among residents in Kibera informal settlements. Meaning that in terms of socio-religious inclinations they reflect uniformity. Again socio-religious affiliation is associated with waste management as FBO support waste management initiatives. It was observed that in Kibera there were FBO that were dealing with waste management.

4.13 Summary of Socio-demographic Characteristics

The Table 4.5 shows the summary of demographic and socio-economic characteristics of various sub-locations in Kibera informal settlements. The study found out that all
demographic and socio-economic characteristics apart from household income, ethnic background and religious background have significant differences.

Table 4.5: Summary of Socio-demographic Characteristics

<table>
<thead>
<tr>
<th>Demographic and socio-economic characteristic</th>
<th>p value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.01</td>
<td>Significant</td>
</tr>
<tr>
<td>Age</td>
<td>0.00001</td>
<td>Significant</td>
</tr>
<tr>
<td>Education</td>
<td>0.0001</td>
<td>Significant</td>
</tr>
<tr>
<td>Length of stay in the slum</td>
<td>0.00003</td>
<td>Significant</td>
</tr>
<tr>
<td>Average household size</td>
<td>0.05</td>
<td>Significant</td>
</tr>
<tr>
<td>Marital status</td>
<td>0.0</td>
<td>Significant</td>
</tr>
<tr>
<td>Head of household status</td>
<td>0.01</td>
<td>Significant</td>
</tr>
<tr>
<td>Employment Status</td>
<td>0.000001</td>
<td>Significant</td>
</tr>
<tr>
<td>Main Source of Income</td>
<td>0.0</td>
<td>Significant</td>
</tr>
<tr>
<td>Household Income</td>
<td>0.17</td>
<td>Not significant</td>
</tr>
<tr>
<td>Ethnic Background</td>
<td>1.0</td>
<td>Not significant</td>
</tr>
<tr>
<td>Religious Affiliation</td>
<td>0.07</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

*Significant level when p<0.05

Table 4.5 shows a summary of socio-demographic characteristics. It reveals that 9 out of 12 socio-demographic characteristics of residents in Kibera informal settlements have significant differences; they are gender, age, education, length of stay in the slum, average household size, marital status, head of household status, employment status and main source of income. The other socio-demographic characteristics namely household income, ethnic background and religious affiliation do not have significant differences. Thus hypothesis 1 $H_{01}$, there are no significant differences in socio-economic and demographic characteristics in the seven sub-locations of Kibera was rejected.
4.2 Main Forms and Causes of Socio-Economic Exclusion in Kibera Informal Settlements

This sub-section deals with the first objective of this study which identifies and discusses the main forms and causes of socio-economic exclusion in Kibera informal settlements. The study uses qualitative and quantitative data derived from questionnaires, focus group discussions, structured and semi-structured interviews in enquiring whether Kibera residents are disadvantaged in accessing economic/social goods and services. The hypothesis being tested here is Ho2: The causes of socio-economic exclusion in Kibera informal settlements do not significantly differ within the seven sub-locations of Kibera.

4.2.1 Main Forms of Socio-economic Exclusion in Kibera Informal Settlements.

Socio-economic exclusion has both economic and social dimensions. The economic dimension refers to exclusion from the opportunities to earn income, the labour market, housing and the access to social assets. The social dimension refers to exclusion from decision making, social services and community and family support (Adato et al, 2004). Measurement of social exclusion move the analysis in areas such as unemployment, lack of access to healthcare, lack of education opportunities, absence of social safety nets, credit market exclusion, lack of facilities for disabled persons, marketing limitations among others (Begun and Moinuddin, 2010).

(a) Impoverishment

In looking at the forms of socio-economic exclusion in Kibera informal settlements it is important to look at the household income which can indicate the poverty levels of the slum residents. Although poverty focuses on distribution of resources, it is also one of the
leading causes of socio-economic disadvantage (Begum & Moinuddin, 2010). The United Nations categorizes people who live on less than one US Dollar per day as living below the poverty line. This translates to about 30 US dollars or about 3,000 KShs per month. The houses in Kibera are mostly multi-occupancy and on average the amount available per person is very low. About 11.8% of Kibera residents earn less than 2,000 KShs per month which is far below the poverty line. Only 37.7% of Kibera residents earn over 10,000 shillings per month (Figure 4.4).

![Figure 4.9: Monthly Payment for Garbage](image)

Figure 4.9: Monthly Payment for Garbage

Figure 4.9 shows that 52.7% of the respondents cannot afford and don’t pay for garbage collection. This is followed by 32.1% who pay less than shillings 100 and 12.2% who pay between 100-500 shillings. Only 3.1% of Kibera residents indicated that they pay more than 500 shillings per month for garbage collection. This information vindicates Galabuzi and Teelucksingh (2010) who say socially excluded urban dwellers don’t earn enough money to afford basic services. A similar view is held by Grant (2001) who agrees that members of socially excluded groups may be trapped in environmentally damaging lifestyles because of their economic and social circumstances. Chi-square results in Table
4.9 ($x^2 = 75.017, \text{df}=18, p= 0.00001$) shows there are significant differences on the ability to pay for garbage within the sub-locations. The issue of concern here is inability to pay for garbage which is an environmental related issue due to economic reasons. In other words, Kibera residents don’t pay the garbage collection fees mainly due to lack of affordability as confirmed by the respondents below.

‘‘When you take twenty bob in exchange for the garbage bag, they see as they are doing you a great favour...So from that ignorance you find that you can’t help the person and you can’t help yourself, so you just idle in ghetto and just leave the garbage to grow.’’

Kibera Youth FGD 2-10-2015

Another participant in the youth FGD revealed the following information confirming that the availability of money was a determining factor influencing socio-economic exclusion.

management of the waste need money; for instance this (part of) city council because there is no tarmac..when they come they(waste collectors) need money not garbage.Because you find the other places are tarmacked they go up to Karanja (a village in Kibera) but with this area all they care about is money.....and no garbage collection...

Kibera Youth FGD  2-10-2015

The above citation by Kibera Youth FGD shows that Nairobi City County officials are more interested in collecting garbage charges and they only do it where it is tarmacked and the residents are willing and able to pay for garbage collection. Again it was apparent that Nairobi City County excludes neighbourhoods where they felt were inaccessible and areas where there is more poverty as some residents cannot afford garbage collection fees.
(b) Labour Market Exclusion

The respondents were asked a question on whether they were salaried or self employed. The results showed that a big percentage of Kibera residents were in employment so they may not be socio-economically disadvantaged. Table 4.9 shows that 68% of the respondents are salaried and 27.8% self employed, the rest 4.2% did not give any response. It was important to bring the question in the focus group discussion. The results of the men, women and youth FGDs revealed that they were excluded from getting jobs outside Kibera as the slum has a bad reputation. This can make the people remain in the margin of labour market for a long time which is a manifestation of socio-economic exclusion (Grant, 2001; Schienstock, 1999). The views were captured from one respondent below:

*I think all of us here are hustlers...we don’t have the appropriate income... do you understand? There is that one where you wake up early and go to job; you understand? That which you are potential at least you can say.... do you understand? The first reason is lack of jobs, the second is...*(Interrupted)

Kibera Men FGD 2-10-2015

Further probing revealed that the slum residents are denied employment opportunity for being residents of Kibera informal settlements simply because people outside the slum distrust the residents as one male respondent put it below;

....you know us from Kibera when we leave early to look for job you will not be given since people have the mentality that we are chaotic all the time or....every time when there is election in this area. That kind of mentality paints Kibera bad and that has contributed thus when you go somewhere they want to know where you are from and we have a bad image....

Kibera Men FGD 2-10-2015
Table 4.8 on employment status of the Kibera residents Chi square tests revealed that $x^2=37.950$, df=6, $p=0.00$, $p <0.05$ significant. This shows that there are significant differences in employment status of the residents in various sub-locations and this causes socio-economic exclusion to the unemployed residents. The youth who cannot gain employment due to the labour market exclusion can explain why some people in Kibera are unemployed hence the differences within various sub-locations on employment status.

(c) Service Exclusion/ Exclusion from Government Services

This type of socio-economic exclusion occurs when a community is systematically left out in the provision of basic services which the government ought to provide to all its citizenry despite their socio-economic and political status. The study found out that Kibera residents are excluded from various services which ought to be provided by central and county governments. The most pronounced among them were lack of health services shown by high incidences of communicable diseases (Figure 4.10) and lack of garbage collection services. Inequalities in health services in Kibera vis a viz other areas of Nairobi County Table 4.6 are depicted by the incidences of diseases and ailments. In the study there were 745 mentions of diseases and ailments.
Diseases

Figure 4.10: Disease Incidences in Kibera due to Health Services Inequalities

Figure 4.10 above shows that malaria which was the most prevalent disease at 36.4%, typhoid 17.3%, diarrhoea 14.4%, respiratory illnesses, 9.5%, cholera 8.2%, tetanus 7.2%, lastly tapeworms and skin disorders at 5.2% and 5.1% respectively. The high incidences of diseases in the slums confirm Galabuzi and Teelucksingh (2010) views that the experience of social exclusion can translate to differential health outcomes. A similar view is supported by Gulis et al. (2004) who in their study of disease prevalence in Nairobi slums revealed that it is caused by unhygienic conditions in the slums.
Table 4.6 Lack of Municipal Garbage Collection Services

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Daily</th>
<th>Weekly</th>
<th>Fortnightly</th>
<th>Monthly</th>
<th>Never</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kibera</td>
<td>0</td>
<td>8</td>
<td>36</td>
<td>2</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Lindi</td>
<td>4</td>
<td>25</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Makina</td>
<td>5</td>
<td>8.3</td>
<td>40</td>
<td>5</td>
<td>8.3</td>
<td>6</td>
</tr>
<tr>
<td>Silanga</td>
<td>3</td>
<td>10</td>
<td>18</td>
<td>1</td>
<td>3.3</td>
<td>1</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>3</td>
<td>4.4</td>
<td>28</td>
<td>1</td>
<td>1.2</td>
<td>4</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>0</td>
<td>0</td>
<td>21</td>
<td>3</td>
<td>5.4</td>
<td>3</td>
</tr>
<tr>
<td>Olympic/Kianda</td>
<td>10</td>
<td>15.2</td>
<td>44</td>
<td>4</td>
<td>6.1</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>25</td>
<td>6.5</td>
<td>179</td>
<td>46.9</td>
<td>4.2</td>
<td>35</td>
</tr>
</tbody>
</table>

\[x^2=1.102\text{ df}=24\text{ p}=1\text{ not significant}\]

The above Table 4.6 shows that government services were unavailable in regard to municipal garbage collection. Only 6.5% of the residents indicated that there was daily collection of garbage, 46.9% weekly, 4.2% fortnightly, 9.2% monthly and 32.2% no garbage collection at all. This shows that the residents are excluded from some government services. Chi-square results \((x^2=1.102\text{ df}=24\text{ p}=1)\) showed that there were no significant differences in lack of municipal garbage collection services within the sublocations. This suggests that garbage collection service exclusion is throughout the Kibera informal settlements. These findings are similar to Paffenholz (2011) who found that Kibera lacks garbage collection services. During transect walks within the slums it was observed that garbage was strewn in many areas in fact, in other places it was lying uncollected and had attracted foraging dogs. However, p value of 1.0 shows that there is exact equality in garbage collection services in Kibera which in reality is very hard to attain.
Figure 4.11: Frequency of waste collection in Kibera informal settlements

Figure 4.11 above shows that lack of garbage collection services is an indicator of service exclusion. In Kibera informal settlements some small scale traders pay licence fees and hence they expect services. The research found that only 6.5% of the residents get daily rubbish collection. Almost half of the residents, 46.9% have weekly collections, 4.2% get fortnightly collections, 9.2% get monthly collections and a whopping 32.2% don’t get any garbage collection at all (Table 4.6 and Figure 4.11). The low collection of garbage is supported by Dafe (2009) who cited Gulyani et al. (2006) who observe that less than one in a hundred slum households in Nairobi is served by a public provided garbage collection system. Dafe (2009) goes on and observes that higher earning neighbourhoods in the Nairobi city lobby for service provision and the slum areas are ignored.
(d) Exclusion from Social Relations

The study established that some respondents felt excluded from social relations. The question here asked whether friends and relatives dislike the neighbourhood due to improperly disposed wastes. The study found out that 34.5% disagreed and 32.9% of the Kibera informal settlements strongly disagreed that they are excluded by friends and relatives for staying in Kibera. It shows that with 67.4% of the respondents disagreeing with the statement, the social bond both kin and kith are very strong despite Kibera’s socio-economic disadvantage. This might be due to the strong ethnic bonds that exist in the slums which are necessary for survival in areas where there is scarcity of economic opportunities. This view is supported by Dafe (2009) who cite Confuentes (2008 and La Ferrara (2002) whose ethnic polarization model makes ethnic groups in slums come together for mutual support.

![Figure 4.12: Friends and Relatives Disliking the Neighbourhood due to Improperly Disposed Garbage.](image-url)
Chi-square results in Figure 4.12 ($x^2=30.451$, df= 18, p=0.03) showed that there are significant differences of the exclusion from social relations in various parts of Kibera. This might be due to the fact that Kibera residents stay in neighborhoods near their kin and kith and they form important social networks to lean on when faced with problems (Dafe, 2009).

(e) Geographical Exclusion

Geographical exclusion comes about when communities are excluded in spaces that they live. This information generated from interviews with key informants and FGDs. Youths revealed that they are not given jobs when they say that they are from Kibera. This is because nobody wants to be identified with Kibera slum which has a history of crime and lawlessness. This is in tandem with Cramer (2015) who observes that spatial disadvantage can result from remoteness of a location making it physically difficult for its residents to participate in socio-economic processes. It can also result when poor urban neighbourhoods are physically separated due to issues like crime.

(f) Ethnic Exclusion

The research also established that there was socio-economic exclusion on the basis of ethnicity. It was imperative to establish whether that was a factor as ethnicity has been used as a basis for socio-economic exclusion. It is also important to know that Kibera is multi ethnic and sometimes polarised especially during electioneering period. The respondents were asked to state the reasons for not joining community organizations. There were a total of 266 respondents in that category. The results showed that 19.7% of
respondents didn’t join community organisations due to ethnic reasons. The rest 80.3% cited non-ethnic reasons for not joining community organisations.

**Figure 4.13: Reasons for Non-membership in Community Organisations**

The information in Figure 4.13 above is supported by interviews from youth FGD which shows evidence that there are cases of ethnic exclusion.

*I can say that...on my part,...at the chief’s office there is some kind of discrimination in...tribe. That tribe is the one that is recruited to conduct cleaning activities but now the other tribes are left behind we are discriminated because at that place you can’t find the Luyhas, Kikuyus, Kisiis....*

Youth FGD, Kibera 2-10-2015

Another respondent added that many groups were formed along ethnic lines thus excluding some people.

*There is a lot of ethnic division in Kibera that you will get the groups dividing themselves along tribal lines.*

Stella Sangina, Carolina for Kibera O.I 28-8-2014
The above citation reveals that the formation of CBOs and groups along ethnic lines tends to exclude people from certain communities and in the process they miss out on social and economic goods that can accrue from such an association. This usually happens during the inception of the groups when members of the same ethnic groups come together and form organizations based on their different ethnic groups. When CBOs and NGOs get funding to support their activities people from other ethnic groups miss out.

**(g) Religious Exclusion**

Religious exclusion comes about when one is not able to participate fully in the society because they belong to a different religious organization. This information was obtained from the questionnaire survey as well as from key informants during interviews and FGDs. Since the study was about looking at the relationship between socio-economic exclusion and waste management, it was important to know whether religious beliefs are an aspect of exclusion in managing wastes. Interviews from key informants revealed that religious exclusion exists in Kibera as one interviewee said below:

*...There is also a lot of tribal and religious favourism in trainings and selection of leaders...*

Stella Sangina, Carolina for Kibera O.I -28-8-2014

The above key informant explained that there was tribal and religious favoritism in the selection of leaders during trainings on waste management issues. This compromises sustainable waste management as only a certain segment in the population benefits from community based waste management activities. The key informant explained that during the selection of leaders, Kibera residents usually select people from their own religious
inclination. If they were Muslims they will select a Muslim, this tended to undermine some interventions aimed at reducing socio-economic exclusion (beadwork and making baskets from wastes) as only a particular group of people will get the benefits and the rest were excluded.

(h) Age Exclusion

The research found that the youth were socio-economically excluded on the basis of age. The exclusion was manifested where young people found it difficult to join various groups existing in Kibera slum. Age exclusion was also manifested during trainings and employment opportunities. The situation is reflected by comments from a member of youth focus group discussion below.

When it comes to joining any group socially, no. That is impossible ...there is normally some sought of discrimination, they may see you are still a youth. If it is a group for the old they say they don’t want a youth....maybe it is women group and they don’t want youths......they can’t allow us (to join their groups).

Youth FGD Kibera 2-10-2015

The above group of informants highlighted the predicaments that young people in Kibera face when joining groups which may be social, political and economical. Age in this regard becomes the gauge for socio-economic mobility or immobility. On the other hand, youths also formed groups with other youths disregarding old people who would be willing to join such a group. Whereas forming a group based on age has its own
advantages when people are excluded on matters of common interest like waste management it compromises sustainability of the whole process.

(i) **Financial Services Exclusion**

This is exclusion that comes when citizens are left out of government services in their day to day services. In the focus group discussion with women the study sought to know whether the residents of Kibera informal settlements got the services that they thought they were entitled to. The research found that in accessing local government officials like the District Officers it was a bit challenging due to bureaucracy. This was confirmed in the women FGD in Kibera as one respondent said:

*You may want to see the DO but you have to go through so many middlemen. These people will think you want money from the D.O

or you are probably taking many petty issues to him. They then ban you from seeing him even if he is around.*

Women FGD Kibera 28-7-2015

The above group of informants also shows that the slum residents have issues in accessing financial services. The middlemen try to exploit some slum residents when they want to get the services. To qualify for micro credit and other forms of financing available in the slums, the groups need to be properly registered and it is the process of registration that frustrates some residents making them feel that they have been left out in sharing the economic gains available. This goes on to show that in Kibera informal settlements, residents suffer from financial service exclusion.
4.2.2 Causes of Socio-economic Exclusion in Kibera Informal Settlements.

The causes of socio-economic exclusion were sought from the questionnaire administered to Kibera residents. The information obtained was triangulated by data from in depth interviews and FGDs conducted to key informants and residents of Kibera slum. Social exclusion is often the outcome of communities suffering from problems such as unemployment, low income, poor housing, location disadvantage, crime, poor health, disability and family breakdown (Begum & Moinuddin, 2010). This study used the Bristol Social Exclusion Matrix’s to look at the causes of socio-economic exclusion. They are listed here below.

i. Participation has been used to measure exclusion and it entails economic participation, social participation, cultural education and skills (Mathieson et al, 2008). The study looked at the respondents’ participation in some economic and civil organisations.

ii. Access to resources which includes economic resources, access to public and private services and access to social services.

iii. Quality of life. The components looked at include health and well being; living environment, crime, harm and criminalisation.

Participation in this study focused on how people are engaged in economic activities like waste reselling and recycling. It also looked at participation in social groups like NGOs, CBOs and FBOs especially the ones involved in socio-economic empowerment. Socio-economic exclusion was also looked at in terms of access to economic, public and private resources. In this regard, slum residents were assessed whether they get waste collection services, credit services and trainings from both government and private sector. Lastly,
the area was assessed by looking at the quality of life. Issues under investigation here were quality of housing, prevalence of communicable diseases especially the ones that come as a result of poor health and the quality of the environment. If any or combination of the above issues are present they may indicate socio-economic exclusion.

4.2.3 Participation Cause of Socio-economic Exclusion

Membership to a CBO was used to determine whether residents were engaging socially and economically in the community. The study showed that slightly more than half of the respondents 53.2%, were members of a CBO. There was an average and above average rate of participation in all the sub-locations of Kibera informal settlements apart from Olympic/Kianda where non membership to a CBO is a staggering 81.8% (Figure 4.14).

![Membership to CBO](image)

**Figure 4.14: Membership to CBO**

Figure 4.14 above shows that the low rate of membership to CBOs in Olympic might be residents have a higher economic and education status and may be getting their livelihoods outside the slum. This might make them feel that by joining a local CBO they might not improve their socio-economic status. Chi-square results showed ($x^2=36.161$, df=5, p= 0.00001) showed significant differences in the membership to CBOs within the
sub-locations. Despite the differences the membership to wastes CBOs was still moderate as Figure 4.14 shows. The reasons for differences in membership to CBOs may be due to economic status of residents for instance in Olympic/Kianda sub-location low membership of 18.2% may be due to high socio-economic status of the area.

**Reasons for Non-membership in CBO/NGO/FBO that Deals with Solid Wastes**

The results show that there are varying reasons for non membership in organisations that deal with wastes. The respondents were asked to indicate the reason from four choices of economic, political, ethnic and other reasons. The non-membership in these organizations could be caused by socio-economic exclusion. Up to 36.8% of the respondents cited economic reasons for non-membership, followed by political and time constraints with 18.8% in each category. Ethnic reasons were cited by 17.7% and the rest 7.9% cited other factors.

**Table 4.7: Reasons for non-membership in CBO/NGO/FBO that deals with wastes**

<table>
<thead>
<tr>
<th></th>
<th>Kibera</th>
<th>Lindi</th>
<th>Makina</th>
<th>Silanga</th>
<th>Laini Saba</th>
<th>Gatwekera</th>
<th>Olympic/Kianda</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Econ</td>
<td>11</td>
<td>55</td>
<td>14</td>
<td>41</td>
<td>18</td>
<td>53</td>
<td>9</td>
<td>37.5</td>
</tr>
<tr>
<td>Politic</td>
<td>4</td>
<td>20</td>
<td>10</td>
<td>29</td>
<td>8</td>
<td>15</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Time</td>
<td>2</td>
<td>10</td>
<td>14</td>
<td>26</td>
<td>8</td>
<td>23.5</td>
<td>4</td>
<td>16.7</td>
</tr>
<tr>
<td>Ethnic</td>
<td>3</td>
<td>15</td>
<td>5</td>
<td>15</td>
<td>4</td>
<td>11.8</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2.9</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>266</td>
</tr>
</tbody>
</table>

Chi-square results $\chi^2 = 33.994$ df=20 $p = 0.03$ significant
The results in Table 4.7 show that economic reasons for non membership in community organisations are more than fifty per cent in three sub-locations which are Kibera, Lindi and Gatwekera with 55%, 52% and 52.9% respectively. The rest of the sub-locations still had a high number of respondents who indicated economic reasons for non membership of community organisations. A total of 18.8% of the respondents indicated political reasons for not joining community organisations. It varied across the sub-locations with Lindi having the highest percentage 29.4% and Gatwekera the lowest 8.8%. Kibera being a slum which is multi ethnic has residents of different political affiliations based on ethnic lines. In the interviews some respondents indicated that some organizations are formed along political inclinations and they are not considered if they are not supporting a particular political group.

On an equal measure of 18.8% as the reason for non membership of community groups were time constraints. It varied across the slum from 4% in Lindi to 33.3% in Makina. Lack of time is an indicator of non-participation in socio-economic activities within the slum. The above information was triangulated by information from focus group discussions where some respondents indicated that they don’t have time for socio-economic activities within the slum.
Figure 4.15: Respondents Attendance to CBO/NGO/FBO Meetings

Figure 4.15 shows community participation in community meetings. One of the methods that the study used to measure participation was the attendance of community meetings. The results showed that more than half of the respondents, that is 52.7% do not attend meetings. Those who attend are slightly less than half at 47.3%. The sub-location with the highest non-attendance of community meetings was Olympic/Kianda at 77.3%, followed by Silanga, Makina and Kibera with 62.5%, 55% and 45.5% respectively. Statistically it was confirmed that there are significant differences within the sub-locations ($x^2=23.094$, df=5, $p=0.0003$) (Figure 4.13). Again, like in the previous question the people in Olympic/Kianda seem not much bothered to attend meetings. Non-participation here cannot be used to categorise the people in this sub-location as socio-economically excluded as they score highly in other categories like the education levels and income levels (Tables 4.5, Figures 4.2 and 4.5). Those two indicators of socio-
economic exclusion can enhance economic and social upward mobility without necessarily participating in the local networks.

Respondents Involvement in Decision Making in CBOs/NGOs/FBOs

The study also got information on the level of decision making in a community organisation. The respondents were to choose from four categories in the extent of their involvement in decision making on the organizations. The categories were very much, much, little and very little involvement in decision making. The highest category of very much involvement had 48.5% respondents, 33.3% indicated that they contributed much. On the other hand 11.3% indicated that they had little contribution to decision making and 6.9% contributed very little. The above information shows that participation in decision making was quite good (Figure 4.16).

Figure 4.16: Respondents Involvement in Decision Making in CBOs/NGOs/FBOs
Figure 4.16 shows that one trend that emerged is that in Olympic/Kianda sub-location we had the largest group 20%, whose involvement in decision making was very little (Figure 4.16). It shows from the results of their socio-demographic characteristics that they score highly in education and income. That might cause apathy during meetings as they might not necessarily be passionate on what is done. The respondents were given two reasons to choose as to why they were not actively participating in community organisation’s meetings. A majority of them 64.4% chose lack of technical knowhow of the subject matter being discussed. The rest 33.6% were denied opportunities to contribute.

The respondents who indicated that they didn’t understand the subject matter being discussed are almost equal in four sub-locations of Kibera, Lindi, Makina and Laini Saba where there were 61.5%, 61.1%, 61.1% and 62.5% respectively. This information is confirmed by Chi-square analysis ($x^2=17.957$, df=15, $p= 0.26$) that there are no significant differences within the sub-locations. Gatwekera and Olympic had almost equal number of 72.7% and 73.3% respectively. Mathieson et al., (2008) says that limitation of education and skills limits participation in economic and social activities. This information was collaborated during FGDs where some respondents said they didn’t know some issues in waste management.

Table 4.8 shows that about 38% of the respondents in the sub-locations of Kibera, Lindi, Makina and Laini Saba cited the reason of being denied opportunity to speak as the reason for non-participation in meetings. To be denied opportunity is an obvious cause of
socio-economic exclusion. It might be contributed by other latent reasons like ethnicity, religion, socio-economic status among others.

Table 4.8 Respondents Reasons for Non Participation in CBOs/NGOs/FBOs Meetings

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Lack of know how</th>
<th>Denied opportunity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
<td>8</td>
<td>61.5</td>
<td>5</td>
</tr>
<tr>
<td>Lindi</td>
<td>11</td>
<td>61.1</td>
<td>7</td>
</tr>
<tr>
<td>Makina</td>
<td>11</td>
<td>61.1</td>
<td>7</td>
</tr>
<tr>
<td>Silanga</td>
<td>8</td>
<td>66.7</td>
<td>4</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>5</td>
<td>62.5</td>
<td>3</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>8</td>
<td>72.7</td>
<td>3</td>
</tr>
<tr>
<td>Olympic/Kianda</td>
<td>22</td>
<td>73.3</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>64.4</td>
<td>37</td>
</tr>
</tbody>
</table>

\[ x^2 = 1.436 \text{ df}=5 \text{ } p= 0.92 \text{ not significant} \]

Table 4.8 above shows salient findings that the rate of those who indicated the reasons for non participation of meetings as lack of technical knowhow (61%) and being denied an opportunity to speak (38%), both categories corresponds roughly in all sub-locations in the slum. The information was confirmed by Chi-square analysis that showed that \( (x^2=1.436, \text{ df}=5, \text{ p}= 0.920335) \) there were no significant differences in non-participation to CBOs/NGOs and FBOs meetings.

**Respondents in the Management Teams of CBOs/NGOs/FBOs.**

The study investigated whether respondents were in the management teams of their CBOs/NGOs and FBOs. This is because being in the management of the organizations
means that respondents are able to make decisions hence not excluded. The results showed that 50.3% of the respondents are involved in management of their organizations.

![Figure 4.17: Respondents who are in the Management Team of CBOs/NGOs/FBOs](image)

The results in Figure 4.17 above shows that the number of respondents in the management teams of community organizations varied across the sub-locations with Kibera sub-location having the highest percentage 86.4%, followed by Makina 57.4%, Laini Saba 55.9%, Lindi 53.7%, Silanga 50%. The rest of the sub-locations had lower participation with Gatwekera and Olympic/Kianda having 36.8% and 26.2% respectively. Low participation in management can be caused by exclusion due to socio-economic reasons like ethnicity and low incomes.

**Reasons for Non-inclusion in the Management of CBOs/NGOs/FBOs**

In looking at residents who are in the management teams of their community organisations 50.3% of the respondents indicated that they were involved in the management whereas 49.7% indicated that they were not in the management. This shows a good representation is taking part in the running of the organisation. Although the overall trends showed an almost equal number of people in management and non
management, individual sub-locations had marked differences. In Kibera sub-location for instance, 86.4% were involved in managing their organisations unlike in Olympic/Kianda where only 26.2% were involved in decision making. Kibera sub-location might be having high rates of people who are in the management teams of their CBOs/NGO/FBOs because of location advantage. The sub-location is situated where there are many government offices and many NGOs are also based there. People who live in the surroundings might be in a position to know what is going on within their communities and demand inclusion in decision making.

Table 4.9 Reasons for Non-inclusion in the Management of CBOs/NGOs/FBOs

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Economic</th>
<th>Education</th>
<th>Social</th>
<th>Political</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Kibera</td>
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<td>37.5</td>
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<tr>
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<tr>
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<td>Olympic</td>
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<td>Total</td>
<td>52</td>
<td>43.3</td>
<td>26</td>
<td>21.7</td>
<td>26</td>
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</tbody>
</table>

4.9 (x²= 75.017, df=18, p= 0.00)

Table 4.9 shows the various reasons for non inclusion in the management of CBOs/NGOs and FBOs. The leading reason was economic where 43.3% of the Kibera respondents cited it as to why they are not included in the management. There were varying differences in the slum sub-locations for instance Silanga had the highest number of respondents who choose economic factor as the reason for non inclusion whereas Lindi
had the lowest 31.6%. People might not participate in the management of their community organisations if they earn very little. They might use their time in looking for sources of income somewhere else in the meantime they become excluded and their opinions don’t get to be implemented.

Education and social reasons each had 21.7% respondents. Across the sub-locations there were differences among the respondents who cited education as a reason for exclusion from management. Again, across the sub-locations 10-20% of the respondents indicated that education was the reason why they were excluded in decision making. It is only in the sub-locations of Laini Saba and Olympic/ Kianda where 37.5% and 30.8% indicated education as a reason for non-inclusion in the management. In many instances people with little or no education are sometimes excluded from management as they are thought of not being useful in contribution. It also happens that they might lack the ways and channels to assert themselves as the same means for expression requires some level of education attainment.

On social reasons there are marked differences on those who cited it as non inclusion in the management of CBOs/NGOs/FBOs. A good example is in Lindi which had 47.4%, Gatwekera 4.8% and Laini Saba 0%. Social reasons are many and in slums like Kibera the population is socially heterogeneous. There is high likelihood that residents will isolate people who are not of their social class.
4.2.4 Unemployment as a Cause of Socio-economic Exclusion

The study sought to find out whether unemployment was a cause of socio-economic exclusion in Kibera informal settlements. This information was obtained from the question on whether people were employed or not. Also, information was obtained from key interviews and FGDs. The results showed that 29% of Kibera residents were unemployed. Research has shown that unemployment can cause socio-economic exclusion and socio-economic exclusion can cause unemployment especially when it occurs over a long period of time (Riga, 2007; Atkinson, 1998). Table 4.5 on employment status of Kibera residents’ as well as chi-square tests revealed that \( x^2 = 37.950 \), df=6, \( p = 0.000001 \), \( p < 0.05 \) is significant, meaning that there are significant differences within the slum areas on employment status of the residents.

The differences in the employment status are clear in areas like Olympic/Kianda sub-locations where none of the residents were unemployed. Laini Saba and Lindi also had low numbers of unemployed people at 28% and 29% respectively. To address these variations in employment there is need to come with sub-location specific interventions that will look at resources available locally and get the best possible solutions. In this study, the findings suggested that Kibera residents can create self employment by recycling and reselling of wastes. They can also offer waste collection and transportation services for the residents who are willing and can afford to pay.
4.2.5 Low Income as Cause of Socio-economic Exclusion

The study sought to find out whether low income was a cause of socio-economic exclusion. The results showed that Kibera residents generally earn low incomes, (see Figure 4.5) actually 62.3% earn less than 10,000/= shillings per month. This income by Kenyan standards is actually very low considering 45.6% of Kibera households have more than six persons. This translates to about 1,600/= Kenyan shillings per person per calendar month. Low incomes can make people not afford the basic needs and as a result they have social and economic disadvantages.

The research also sought information from key informants whether low income was making Kibera residents socio-economically excluded and they responded in the affirmative. In other reports like SEU (2014) they also note that low income causes poverty especially in some groups like women, youth and children further alienating them from the mainstream society. Chi-square results for Table 4.10 (x² = 37.204, df=30, p=0.17) showed no significant differences on low income within the sub-locations. Generally incomes are low throughout Kibera thus the interventions for improving the income levels for the residents should be rolled throughout Kibera.

4.2.6 Crime and Location Disadvantage as Cause of Socio-economic Exclusion

Interviews with key informants and FGDs revealed that crime is a cause of socio-economic exclusion. This happens due to prevalence of crime in Kibera slum; youths are viewed as the main culprits, as a result they are left out in many community engagements like waste management and other jobs available. Although crime is seen to cause socio-economic exclusion in terms of class, ethnicity and age, some scholars like Begum and
Moinuddin (2010) also argue that the process is cyclical whereby crime causes socio-economic exclusion and socio-economic exclusion causes crime. In FGD with the youth they indicated that they are usually not given jobs outside Kibera slum as they are seen as criminals/petty offenders. The youths are also not allowed to access some areas in the slum to collect wastes for resale or recycling as they are seen as ‘scouting’ for criminals who would come latter and rob the residents as one CBO youth leader informed the researcher:-

It is because we are the majority here and we think the youth are really neglected and discriminated against in society.

We were viewed as thieves and untrustworthy but these days we have managed to fit in society and am happy for that.

Simon Sikote  Ghetto Youth Focus Foundation  O.I. 29-7-2014

The above information shows that crime and victimization of youths in Kibera informal settlements have made the young people to have limited participation in the socio-economic life. This in return entrenches them more into poverty. Crime has been seen to be fuelled by community deprivation and income inequalities (SEU, 2014) a phenomenon that is rife in Kibera.

4.2.7 Poor Housing as a Cause Socio-economic Exclusion

The research found out that poor housing was cause of socio-economic exclusion. This information was gathered using photography and participant observation during transect walks. Most of the houses were made using simple construction materials like mud walls,
polythene bag walls, old and torn corrugated iron sheets and generally lacking basic facilities for a decent housing (Plate 4.1).

![Image of poor housing in Kibera](image)

**Plate 4.1: Poor Housing in Kibera**  
Date: 10/16/2014, Researcher

In the transect walks conducted in various sub-locations of Kibera it was observed that there was water clogging in the doorways and paths between shanties, garbage was littered on the roads and foot paths between houses and in many instances foul smell was evident in many Kibera slum neighbourhoods. This affordable low cost housing reinforces Begum and Moinuddin (2010) views that low-income housing often gives low-income renters an added exclusion from a choice of home location, which in turn significantly reduces their income earning prospects, reinforcing poverty and financial insecurity, and causes multiple disadvantages (socio-economic exclusion).

### 4.3 The Main Challenges and Impediments to Current Strategies Applied in Enhancement of Community Based Waste Management Practices In Kibera

The second objective discusses the main challenges and impediments to the current strategies applied in enhancement of community based waste management practices in Kibera informal settlements. It involved getting information from the questionnaire on
the major challenges of waste management practices and the factors that impede the strategies put in place to address waste management issues in Kibera informal settlements. The sections presented in this sub chapter include the residents experiencing problems due to wastes, nature of wastes produced in Kibera, challenges of domestic and wild animals foraging in Kibera, challenges of waste water, challenges of ailments, economic challenges and governance as well as leadership challenges.

### 4.3.1 Kibera Residents Experiencing Problems Due to Wastes.

The study sought to find out the percentage of residents experiencing problems due to wastes. The information was got from the questionnaire survey and the results are listed in Table 4.10 below.

**Table 4.10 Kibera Residents Experiencing Problems Due to Wastes**

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
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<td>90.9</td>
<td>2</td>
</tr>
<tr>
<td>Lindi</td>
<td>77</td>
<td>96.3</td>
<td>3</td>
</tr>
<tr>
<td>Makina</td>
<td>36</td>
<td>60</td>
<td>24</td>
</tr>
<tr>
<td>Silanga</td>
<td>27</td>
<td>67.5</td>
<td>13</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>52</td>
<td>76.5</td>
<td>16</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>52</td>
<td>91.2</td>
<td>5</td>
</tr>
<tr>
<td>Olympic/Kianda</td>
<td>46</td>
<td>69.7</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>310</td>
<td>78.9</td>
<td>83</td>
</tr>
</tbody>
</table>

\[(x^2 = 19.783, \ df = 6, \ p = 0.003, \text{ Not significant})\]

The results (Table 4.10) showed that generally a big percentage of the respondents had experienced some problems due to wastes. Table 4.10 shows a Chi-square analysis where \((x^2=19.783, \ df=6, \ p \text{ value is } 0.003)\) there was no statistical differences within the
sub-locations of the residents who were experiencing problems due to wastes. On average 78.9%, of Kibera respondents had experienced some problems due to wastes. This information is supported by Dafe (2009) who observed that less than 0.9% of Kibera residents receive garbage collection services. The most populous sub-location Makina had the highest percentage of respondents experiencing problems due to wastes which was 96.3%. This was closely followed by Gatwekera and Kibera sub-locations where an also most equal percentage of respondents, 91.2% and 90.9% respectively indicated that they had encountered some problems due to wastes. However, some sub-locations like Makina the percentage of those who had experienced problems was much lower at 60%. Statistically there are no marked differences in the various sub-locations.

4.3.2 Nature of Wastes Produced in Kibera Households

The study sought to know the nature of wastes produced in Kibera. This is important because having knowledge on the quantities and nature of wastes produced will enhance the waste management strategies. The respondents were to choose from paper, organic waste, polythene bags, waste water, metals and glass. In total there were 990 counts as some households produced several types of wastes (Figure 4.18). The study found out that polythene bags were the leading type of waste produced in Kibera at 29.4%. This was closely followed by waste water at 26%, organic wastes at 20%. Papers and glasses are being produced at an equal rate of 10.2%. 

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Figure 4.18: Nature of Wastes Produced in Kibera Households

Figure 4.18 above shows that the percentage of waste produced in Kibera. The findings are almost similar to (Henry et al., 2006) who found out that low income areas of Nairobi produce 16% of paper wastes. However, their findings on glass wastes produced were 2% which contrasts with this research finding of 10.2%. Lastly, the research found out that waste metals amounted to only 4.2%. This again corresponds to Henry et al. (2006) who found metals produced in low income areas of Nairobi amounted to 1%. The low production of metals as wastes might be due to low usage of metallic products and high resale and reuse of metal products in the Kibera slum as it was observed during the research.

4.3.3 Solid Wastes Negatively Affecting Kibera Neighbourhoods

The study sought to find out if the solid wastes were negatively affecting Kibera informal settlements neighbourhoods. The findings were that household wastes were the leading at 52.9%, followed closely by organic wastes at 51.4%, then 43.8% indicated negative experiences due to polythene bags and 36.4% due to papers. Only 21.1% indicated
glasses and a partly 8.7% metals (Figure 4.19). It shows that household wastes, organic wastes and polythene bags are the wastes that cause problems in Kibera informal settlements. The findings above corresponds well to Peters (1998) findings that 50% of wastes produced in Nairobi households consists of organic wastes. He adds that the waste is more problematic as it is not a choice for waste scavengers who prefer plastics and metallic wastes for reselling.

![Figure 4.19: Solid Wastes Negatively Affecting Kibera Neighborhoods](image)

The results in Figure 4.19 above showed that 36.4% of the Kibera respondents were negatively affected by waste papers. The situation was worse in Lindi, Gatwekera and Kibera sub-location, where 57.5%, 42% and 40.9% stated that waste papers was a problem. On the other hand, in sub-locations such as Makina and Olympic/ Kianda the problem of waste papers was relatively lower at 18.3% and 22.7% respectively. This
information concurs with Hiltuten (2010) who observes that paper wastes are an issue in Kibera. This could be due to unequal waste collection service distribution within the slum. A good example is in Kibera sub-location where garbage collection trucks operate on the main road and do not access the interior areas of the sub-location.

The Kibera residents claiming to have problems with wastes were about half of the population at 51.4%. This information is supported by Mutiysia and Yarime (2011) who state that 75% of all wastes in Kibera are organic and Hiltuten (2010) as well as Nthambi (2013) who observe that organic wastes are produced in the large quantities in relation to others wastes in Kibera. The problem was more pronounced in sub-locations such as Gatwekera and Lindi where 70.2% and 65% of the respondents indicated that they had problems with organic wastes. The problem was less severe in Makina and Olympic/Kianda where only 23.3% and 36.4% indicated that they had problems with organic wastes. This could be attributed to the fact that recycling and collection of household waste varies across the sub-locations of Kibera informal settlements.

According to the study findings, 43.8% of the residents in Kibera informal settlements said that they had problems with polythene bags. Although this problem affected less than half of the respondents it was more severe in Kibera, Lindi, Laini Saba and Gatwekera sub-locations where 63.6%, 61.3%, 62.5% and 63.2% indicated that they had problem with polythene bags. The above was confirmed by the researcher through observation as indicated in Plate 4.2.
Plate 4.2: Plastic Bags Strewn by the Railway Side in Laini Saba Sub-location.
Date:10/16/2014, Researcher

Plate 4.2 above shows that polythene bags were observed strewn on the roadsides, drainage lines, open fields and along the railway line. This could be due to lack of disposal sites, lack of recycling and lack of garbage collection services. There was a big contrast in the above scenario at Olympic/Kianda sub-location where only 6% of the population said that they had experienced problems with polythene papers. This could be due to socio-economic differences which are higher in the sub-location. The residents can also afford to pay for garbage collection unlike in other sub-locations where many residents said they cannot afford 20 shillings per week for garbage collection services. Flying toilets which are common in Kibera also contribute to polythene bag wastes (Lusambili, 2011).

Household waste also affected slightly more than half of the population at 52.9%. Kibera and Olympic/Kianda sub-location had the lowest number of respondents affected by household wastes at 40.9% and 37.9% respectively. Over four sub-locations had more than half of their residents being affected by household wastes. The differences in the
above can be attributed to differences in waste provision services within the sublocations. These results are similar to Nthambi (2013) who indicates that household wastes are produced in large quantities in Kibera informal settlements. This production of household wastes shows the potential of these wastes being converted into more useful forms like compost manure.

The results showed that metal wastes are very rare in Kibera, only 8.7% of the population indicated that they had problem with metals. This is almost similar to results by Nthambi (2013) who indicated that metals constituted 11% of Kibera wastes. Apart from Lindi sub-location where 16.3% of the respondents had experienced problems with metal wastes the other sub-locations had less than 10.5% of the respondents indicating that they had problem with metal wastes. This could be due to the fact that people in the slum may not be consuming goods like foods packed in metallic containers. Another issue is that the people might be reusing metals more as they are valuable.

Glass wastes are generally low in Kibera informal settlements. Slightly less than a quarter of the residents 21.1% indicated that they were experiencing problems due to glasses. The problem is more pronounced in Gatwekera and Kibera sub-locations where 38.6% and 31.8% of the respondents indicated having problems with glasses. Makina on the other hand had only 8.3% of its residents being negatively affected by glass wastes. Glasses can be problematic especially when they are broken and Nthambi (2013) notes that in Kibera broken glasses constitute of 7.6% of the total wastes. The low level of
negative effects due to glass wastes might be due to high reuse rates of glasses especially glass bottles for domestic purposes and in industrial purposes for packaging drinks.

4.3.4 Perception of Negative Experiences Due to Improperly Disposed Wastes

The study also sought to establish people’s negative experiences due to improperly disposed wastes. Nearly three quarters of Kibera residents 72.6%, said they had experienced negative effects due to improperly disposed wastes. Another 18.7% said they had experienced little negative effects and a partly 8.7% had experienced very little negative effects due to wastes (Figure 4.20). It is apparent from the above information that the majority of the residents in Kibera are being negatively affected by wastes in one way or the other.

Figure 4.20: Perceptions of Negative Experiences Due to Improperly Disposed Waste

Figure 4.20 shows that in general many people had negative experiences in Kibera due to wastes, which are in tandem with Kagiri (2008) who observes that people have negative
experiences in Kibera due to poor sanitation. The bad experiences included bad smells, foraging animals, blocked drainage among others.

![Plate 4.3: Dumping of Waste in Kibera](image)

Plate 4.3: Dumping of Waste in Kibera  
Date: 10/16/2014, Researcher

The results from Plate 4.3 above shows how wastes are dumped along the railway line in Laini Saba sub-location. It causes difficulties to people walking along the railway line. The most acute problem caused by dumping is blocking the railway line forcing the railway corporation to employ people who remove the waste from the rail and dispose it in the shanties adjacent to the railway line and river. This lowers the aesthetic quality of the area making people to dislike the neighbourhood.

The respondents were asked to mention which negative experiences they had due to improperly disposed wastes. They were to choose from bad smells, loss of aesthetics, rodents (rats), insects (flies) and flooded foot paths. Results in Figure 4.21 showed that
bad smells was leading in all sub-locations with 74.8%, followed by flies 52.9%, rats 44.3%, loss of aesthetics 38.4% and lastly flooded footpaths 30%. The above issues have also been found to affect Kibera residents by Kagiri (2008) and Lusambili (2011).

**Figure 4.21: Respondents Negative Experiences due to Improperly Disposed Wastes**

Figure 4.21 shows that in six out of seven sub-locations, bad smell is a major concern with up to 86% of the respondents reporting it in Gatwekera. Similarly, flies were reported by more than any other category in Kibera sub-location at 86.4%. Bad smells are a major negative experience in Kibera according to the research findings, as 74.8% of the residents in Kibera indicated that they have experienced bad smells. There were varying differences with residents experiencing bad smells, for instance, in Laini Saba and Gatwekera sub-locations, 83.8% and 86% experience bad smells compared to 56% in
Olympic/Kianda sub-location. It seems that in a sub-location like Olympic/Kianda where the waste collection is better the issue of bad smells is not very pronounced. The bad smells might be due to improperly disposed wastes especially the organic wastes as Karanja and Ng’ang’a (2008) as well as Kagiri (2008) observed. The smells make the area unappealing to many people although people of limited economic means have limited alternatives when it comes to place of residence.

The study found that 38.4% of Kibera residents indicated that they had experienced loss of aesthetics in their neighbourhoods. This number indicates that loss of aesthetics was not a very serious issue in Kibera. A further look within sub-locations indicated that loss of aesthetics was more severe in Gatwekera sub-location with 63.2% of respondents indicating that they had encountered the problem. In all the other sub-locations they had less than 43.8% of the respondents indicating the problem. In areas like Olympic/Kianda with better waste disposal methods only 27.3% of the residents indicated that they had experienced loss of aesthetics.
Plate 4.4: Dumping of Waste Outside Houses in Kibera Date: 10/16/2014, Researcher

Plate 4.4 above shows how aesthetic value of the land has been lost due to indiscriminate dumping of garbage. These results are similar to Paffenholz (2011) who observed that Kibera and Nairobi neighbourhoods’ slums are littered with wastes. The problem is compounded by lack of regular collection and scavenging animals like dogs that scatter the wastes.

In the category of rodents, 44.3% of the respondents indicated that they had experienced the problem of rats. The problem was more severe in Gatwekera sub-location with 73.7%, followed by Kibera 59%, Lindi 45% and Laini Saba 41.2%. The sub-locations of Silanga, Makina and Olympic/Kianda had 32.5%, 28.3% and 27.3% respectively. The problem of rats is usually more pronounced in areas where mechanisms of waste
management are not efficient. Rats have also been found to be vectors of diseases like Leprosy in Kibera (Halliday et al., 2013).

The results showed that the problem of flies was affecting more than half of the respondents at 52.9%. Three sub-locations were most affected by the problem and they are Kibera, Gatwekera and Lindi with 86.4%, 75.4% and 72.5% respectively. The problem is less severe in Makina and Olympic/Kianda sub-locations with 33.3% and 28.8% respectively. The problem of flies is associated with improperly disposed wastes and has negative effects like the spread of some communicable diseases like Cholera and Dysentery. Some studies done in Kibera like Lusambili (2011), shows that houseflies are attracted to Kibera by, among other things, the flying toilets.

The study found that about a third of Kibera residents, 30.3% had experienced the problem of flooded footpaths due to improperly disposed wastes. The problem seemed more pronounced in Gatwekera with 50.9%, followed by Lindi 37.9%, Silanga 37.5%, Laini Saba 35.3%, Kibera 31.8%, Makina 18.3% and Olympic/Kianda 16.7%. Plate 4.5 shows flooded footpaths where waste water has been channelled due to lack of drainage systems in Kibera. Even during sunny days, water was observed to be flowing where people walked.
Flooded footpaths like the one on plate 4.5 shows neglect of road maintenance and can also be caused by clogged drains and non existence and non functioning drainage systems. It is also a clear sign of failure in water and sewerage service provision in Kibera informal settlement. A similar view is noted by UN-Habitat (2013) report. A physical observation in the study area also revealed that flooded footpaths made walking in the paths difficult and children had the risk of getting infections by playing in the dirty water.

The results showed that 20.9% of Kibera residents had witnessed clogging due to garbage. The problem varied in various sub-locations with Laini Saba and Kibera sub-locations having the highest incidences that are 30.9% and 27.3% respectively. Lindi and Kibera sub-locations had the lowest rate of incidences at 16.3% and 15.2% respectively.
Table 4.11 Clogging Due to Garbage

<table>
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<tr>
<th>Sub-location</th>
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<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
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<td>Makina</td>
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<td>Silanga</td>
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<td>Laini Saba</td>
<td>21</td>
<td>30.9</td>
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<td>Gatwekera</td>
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<td>Olympic</td>
<td>10</td>
<td>15.2</td>
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<tr>
<td>Total</td>
<td>82</td>
<td>20.9</td>
<td>311</td>
</tr>
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</table>

The results in Table 4.11 shows that Clogging due to garbage creates other problems like vermin, creation of breeding ground for mosquitoes and bad smells. The pictures below show the situation in Kibera due to clogging (Plates 4.4, 4.6, 4.7 and 4.8). The above information is in tandem with UN-Habitat (2013) view that Kenyan slums Kibera included lack basic urban services like drainage leading to pollution.

Plate 4.6: Wastes Causing Clogging in Kibera

Date:10/16/2014, Researcher
Plate 4.6 above shows sections of drainage system in Kibera that had clogged due to dumping of domestic wastes. During interviews with key informants, some mentioned that flooding occurs in the area due to clogging of drainage. Again a close examination of the waste in the drains observed that it was composed of decomposable papers, polythene bags, metals and kitchen wastes, among others. It was also noted that some of the wastes had decomposed and were emitting a powerful obnoxious odour which was very unpleasant. This information corresponded with what the key informants had indicated that waste in Kibera block of drains and cause unpleasant smell.

Plate 4.7: Household Wastes and Waste Water in Kibera  Date 10/16/2016, Researcher

Plate 4.7 shows garbage dropped in existing drains. The clogging of drainage witnessed in residential houses due to illegal dumping. Even in areas where the houses had cemented floors the problem of handling garbage was still acute. On interviewing some residents they claimed that people dump garbage at night and they could do very little to ameliorate the situation. The residents claimed that NCG does not help them in clearing
the garbage. During interviews with key informants some claimed that by clearing the dumped wastes it prompted more illegal dumping. Residents also claimed that the waste caused ailments such as diarrhoea as it was adjacent to the houses. Other residents indicated that the wastes encouraged vermin like rats and they were living in fear of catching diseases caused by rats. A similar situation was observed in plate 4.8.

Plate 4.8: Household Wastes in Kibera  Date: 10/16/2014, Researcher

Plate 4.8 above shows clogging that was witnessed in residential areas. A key issue that emerged during interviews is that even residents dump wastes adjacent to their houses as they could not afford to pay for garbage collection services. The composition of the garbage in some of the instances included vegetables and food remains showing that it was being generated within residential areas. These are the kind of wastes that could be composted but such interventions were lacking in the Kibera households. The clogging in Plate 4.8 also caused bad odour from the decaying vegetable matter making the air in
the neighbourhood very unpleasant. The sight was also an eyesore thus damaging the aesthetic value of the streets.

4.3.5 Challenge of Domestic Animals Foraging in Kibera Informal Settlements

Respondents were asked whether they had witnessed domestic animals foraging in Kibera. In all categories asked respondents indicated the presence of the animals in the following order; dogs 81.7%, pigs 21.6%, goats 5.1% and cows 1.5% (Table 4.12). A study by Guendel (2002) reports that 17% of Nairobi residents kept livestock as part of urban farming. The study goes on to say that urban dwellers in Kenya kept livestock as an adaptation strategy due to hard economic conditions.

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Dogs</th>
<th>Pigs</th>
<th>Goats</th>
<th>Cows</th>
<th>Total</th>
</tr>
</thead>
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<td></td>
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<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Kibera</td>
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<td>22.7</td>
<td>1</td>
</tr>
<tr>
<td>Lindi</td>
<td>70</td>
<td>87.5</td>
<td>12</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Makina</td>
<td>45</td>
<td>75</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Silanga</td>
<td>33</td>
<td>82.5</td>
<td>9</td>
<td>22.5</td>
<td>2</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>54</td>
<td>79.4</td>
<td>20</td>
<td>29.4</td>
<td>6</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>51</td>
<td>89.5</td>
<td>24</td>
<td>42</td>
<td>6</td>
</tr>
<tr>
<td>Olympic</td>
<td>49</td>
<td>72.4</td>
<td>12</td>
<td>18.2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>321</td>
<td>81.7</td>
<td>85</td>
<td>21.6</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 4.12 above shows the presence of foraging domestic animals in Kibera. As witnessed from this study, animals cause waste management problems in Kenyan urban areas as Guendel (2002) and Halliday et al., (2013) go on to say that the animals like
Dogs constrain waste management exacerbating the existing human waste disposal problems. This is felt especially in the city slums where animals cause contamination of water resources which threaten public health in the specific slums and the whole city as well.

Figure 4.22: Domestic Animals Foraging in Kibera

Figure 4.20 above shows a visual evidence of the domestic animals foraging in Kibera. They are discussed hereafter starting from dogs, pigs, goats and lastly cows. In the category of dogs an overwhelming 81.7% of the respondents indicated that they had witnessed foraging dogs (Plate 4.9). There were slight variations in the incidences across the sub-locations, for example in Gatwekera, Silanga and Kibera it was 89.5%, 87.5% and 86.4% respectively. In Makina and Olympic/Kianda sub-locations 75% and 74.2% indicated that they had witnessed foraging dogs. The presence of dogs shows that some diseases such as rabies can spread fast within Kibera informal settlements. The dogs which are found in large populations in Kibera (Halliday et al., 2013) also open the bags
which are left in collection points farther exacerbating the risk of spreading gastro intestinal diseases.

Plate 4.9: Foraging Dogs in Kibera

The above Plate 4.9 shows dogs foraging in improperly disposed garbage along Kibera Drive. The dogs pose a major health hazard as they can transmit various diseases like rabies. The dogs also expose the residents to other communicable diseases like cholera, typhoid, dysentery and other gastro-intestinal infections (Halliday et al., 2011). Interestingly, upon further interrogation from key informants like Nairobi City County workers in Kibera slum they revealed that the locals are actually the dog owners and they resist authorities’ effort to kill the dogs. The Kibera residents who own the dogs attack public health officials when they come either to poison the dogs or to collect the carcasses after poisoning. In such a scenario, the environmental and public health officers enlist the help of local administration police officers further complicating the process of getting rid of stray dogs as one environmental officer put it:
Yes you will find them in those areas we dump waste (dogs)....

There are even home owned dogs in the dumping sites and other big birds... We report to the department of public health who come with the police and give them drugs that kill them then they take them away... They pose a great danger to the children who hang and play around the dump sites and women who go there to recycle the waste. They can bring diseases through their bites and waste.

Female NCC waste management worker- 4-9-2014

The above citation shows that stray dogs are a major challenge in undermining waste management efforts in Kibera and some residents are actually a major impediment to the current strategies being employed in enhancement of community based waste management practices in Kibera informal settlement. To avoid the problem of foraging dogs there is need for coordination between police, public health officials, county government officials and Kibera slum residents.

Moreover, results from the study showed that 21.6% of the respondents had witnessed pigs foraging in the neighbourhood. The problem was more pronounced in Gatwekera with 42% indicating that they had witnessed pigs foraging. Makina had the lowest incidences at 5%. In some sub-locations like Silanga and Kibera, the incidences were almost at par at 22.5% and 22.7%. The presence of pigs can cause health related problems like the spread of tapeworms and hookworms. The pig problem in urban areas stems from the fact that the animals are reared by squatters who don’t own any land (FAO, 2012) and they leave them to roam and forage in the neighbourhood. Pigs have
been reported to offend some Muslims in other contexts but despite having a sizeable number of Muslims in Kibera this problem was not reported. This may be due to the fact that Gatwekera where there is high concentration of pigs the number of Muslims is low.

The results indicated that only 5.1% of Kibera informal settlements had witnessed goats foraging in the area. The problem varied within the sub-locations. For instance in Gatwekera it had the highest rate at 11.8% followed by Laini Saba with 8.9%. In some sub-locations like Lindi and Makina only 1.3% and 1.7% indicated the problem. The percentage of goat keeping seems lower and this is supported by Foeken and Mwangi (1998) who note that goat keeping in Nairobi stood at 18%. There was only a partly 1.5% of Kibera residents who indicated that they had witnessed cows foraging in the neighbourhood. In Kibera, Lindi and Makina sub-locations there were no reported incidences. The above is in contrast with Olympic/Kianda where 4.8% of the residents indicated that they had witnessed cows foraging.

4.3.6 Challenge of Wild Animals Foraging in the Kibera Informal Settlements

Also the study aimed at finding out which wild animals were foraging in Kibera informal settlements. This was done by asking residents to indicate the wild animals they had seen foraging in their neighbourhood. The researcher also conducted transect walks across the slum observing the presence of any wild animal and taking photographs where necessary. Wild animals compromise the strategies employed in enhancing sustainable solid waste management. The results showed that rats were leading where 75.3%, indicated they had
seen them, followed by Marabou Stork, Pied Crow and Vultures at 10.2%, 9.8% and 7.1% respectively (Table 4.13).

Table 4.13 Wild Animals Foraging in the Kibera Informal Settlements

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Rats</th>
<th>Marabou Stork</th>
<th>Pied crow</th>
<th>Vultures</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Kibera</td>
<td>16</td>
<td>72.7</td>
<td>1</td>
<td>4.5</td>
<td>3</td>
</tr>
<tr>
<td>Lindi</td>
<td>63</td>
<td>78.8</td>
<td>9</td>
<td>11.3</td>
<td>6</td>
</tr>
<tr>
<td>Makina</td>
<td>40</td>
<td>66.7</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Silanga</td>
<td>26</td>
<td>65</td>
<td>6</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>55</td>
<td>80.9</td>
<td>6</td>
<td>8.8</td>
<td>6</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>51</td>
<td>89.5</td>
<td>6</td>
<td>10.5</td>
<td>7</td>
</tr>
<tr>
<td>Olympic</td>
<td>45</td>
<td>68.2</td>
<td>9</td>
<td>13.6</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>296</strong></td>
<td><strong>75.3</strong></td>
<td><strong>40</strong></td>
<td><strong>10.2</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

Results in Table 4.13 indicated that 75.3% of Kibera residents had experienced the challenge of rats in their neighbourhood. The problem was more acute in Gatwekera sub-location with 89.5%, followed by Laini Saba and Lindi with 80.9% and 78.8% respectively. Silanga and Makina had rat incidences of 65% and 66.7% respectively. Although the latter sub-locations had lowest rates of rats incidences it still shows that rats menace is rife in Kibera. The rats can be a reflection of improper waste management practices and they can aid in spread of some diseases like leprosy (Halliday et al., 2013). A total of 10.2% of Kibera residents indicated that they had witnessed Marabou Stork foraging in their neighbourhood. The incidences varied within the sub-locations with
Silanga and Olympic/Kianda having the highest incidences at 15% and 13.6%. Makina and Kibera sub-location had the lowest incidences at 5% and 4.5% respectively. Marabou Stork indicates the presence of particular wastes. Their presence can be a danger to air traffic especially at Wilson airport which is not far from Kibera informal settlements. If the birds gets a breeding ground near Kibera they can even endanger air traffic even in Jomo Kenyatta International Airport which is about 20 kilometres from the slum.

The highest incidences of pied crow were indicated in Kibera and Gatwekera sub-locations with 13.6% and 12.3%. Olympic/Kianda had the lowest incidence at 4.5%. Pied crow also indicate the presence of improperly disposed wastes as they are scavenging birds. Apart from aiding in the spread of some diseases they make irritating noise which can be a nuisance. The incidences of vultures were reported by 7.1% of Kibera residents. Those incidences of vultures were relatively similar and low in Kibera sub-locations apart from Silanga where it was 20%. The presence of vultures indicates a specific type of waste being generated in an area like meat wastes near abattoirs since they are scavengers. Meat wastes can also spread other parasites like hookworms and tapeworms.

4.3.7 Challenges of Waste Water

As for problems associated with waste water, the study found that 69% of Kibera residents dispose their waste water in an open ditch. Only 31% of the residents have access to sewer lines. The problem of disposing waste water in open ditches is more pronounced in Laini Saba, Lindi and Gatwekera sub-locations with 89.7%, 86.3% and 80.7% respectively. Makina and Olympic/Kianda had the lowest incidences of disposing
waste water in open ditches with 43.3% and 36.4% respectively. The two sub-locations had also the highest number of respondents disposing their waste water into sewer lines at 56.7% and 63.6% respectively.

Figure 4.23: Waste Water Disposal Method

The results in Figure 4.23 show that there is unequal water and sanitation services provision in Kibera informal settlements. The lack of sewer lines can be attributed to other problems like the presence of gastro intestinal diseases and malaria among others. The disposal of waste water in open ditches shows the non adoption of waste water management methods, consequently there is also flooding of footpaths, bad smells, flies and loss of aesthetics. Further problem of waste water shows that Kibera slum residents have not adopted sustainable waste water management like urban gardening. In a study in Kibera slum Pascal and Mwende (2009) found that majority of Kibera urban farmers lack water to irrigate their sack gardens.
The findings in Figure 4.24 showed that about a quarter of Kibera residents 24.9% had negative experiences due to flooded footpaths. The problem varied across the sublocations for instance in Gatwekera 40.4% had experienced the problem compared to 17.5% and 12.1% residents in Silanga and Olympic/Kianda respectively. Flooded footpaths show improper management of waste water and lack of basic sewerage facilities.

Additionally, the findings showed that 23.4% of Kibera residents had experienced problems of clogged drains caused by waste water (Figure 4.20, Plate 4.8). The problem was more severe in Gatwekera with 47.4% of residents, followed by Laini Saba with 35.3%. In some sublocations the problem was less severe like in Lindi and Olympic/Kianda where we had 12.5% and 10.6% respectively. In Olympic/Kianda sub-
location the low presence of clogged drains can be attributed to the fact that most of the houses there are properly constructed; that is they are not shanties. This no doubt indicates that with proper houses and connection to sewer lines the problem of clogged drains can be eliminated.

Plate 4.10: Clogged Drain in Lindi Sub-location     Date: 16/10/2014, Researcher

The clogged drain in Plate 4.10 shows clearly that houses border the clogged drain. The effects of clogged drains are discussed below and include foul smells and mosquitoes. The results showed that 56% of Kibera residents were experiencing foul smell due to waste water. This was particularly so in Laini Saba and Gatwekera sub-locations where 76.5% and 75.4% indicated having experienced foul smell. In some sub-locations like Kibera, Lindi and Silanga they compared well with 54.5%, 55% and 55% of their residents experiencing foul smells. Olympic/Kianda and Makina had the lowest incidences of foul smells with 36.4% and 38.3% respectively. The above findings confirms similar findings by Karanja and Ng’ang’a (2008) who found a similar situation in Kibera.

The problem of mosquitoes was found to be widespread in Kibera. According to the study, 72.5% of Kibera residents had experienced mosquito bites due to waste water. This
was particularly so in Kibera sub-location with 90.9% followed closely by Olympic/Kianda with 83.3% of the respondents. Generally, the incidences of mosquito bites were high as Silanga had the lowest at 60% which is well above average. The above information shows that there is high likelihood of Kibera informal settlement having diseases like Malaria spread by mosquitoes. A view supported by the findings of UN-Habitat (2008). High incidences of mosquitoes can also be linked to high infant mortality rates in the slums.

4.3.8 Challenge of Ailments in Kibera Informal Settlements

The study looked at the ailments that are caused by unsustainable waste management in Kibera informal settlements. The residents indicated the ailments they had suffered in the last two years (Figure 4.25).

![Figure 4.25: Challenge of Ailments in Kibera Informal Settlements](image)

The research also sought to find out the challenge of ailments in Kibera informal settlements. The results showed that 32.8% of Kibera residents had suffered from typhoid in the last two years. Gatwekera was leading with 59.6% followed by Kibera with 45.5%.
The lowest incidences were in Makina, Olympic/Kianda and Silanga with 20%, 21.2% and 22.5% respectively. The prevalence of diseases like typhoid show failure in waste management coupled with lack of access to water and sanitation services (UN-Habitat, 2008). Similarly Schroeder (2014) observes that high rates of typhoid fever have been found in urban slums of Karachi Pakistan, Kolkata India and Dhaka Bangladesh.

Plate 4.11: Waste Disposal in a River in Laini Saba Sub-location Date:10/16/2014
Researcher

Plate 4.11 above shows that a small percentage 7.4% of Kibera residents indicated that they had suffered asthmatic attack in the last two years. In five sub-locations of Kibera, Lindi, Silanga, Laini Saba and Gatwekera, the problem ranged from 7.4% to 12.3%. Asthmatic attack can result due to foul smell and open burning of wastes something which is rife in Kibera. Poor waste management methods like open dumping and open burning cause air pollution which leads to respiratory diseases, a view supported by D-Waste (2014) who observed that poor waste management in Nairobi slums like in Dandora dump site causes myriad respiratory ailments. People who have asthmatic
conditions can also have health problems if they are living in Kibera. This is due to open burning of wastes and foul smell emanating from uncollected decaying wastes which was observed by the researcher during transect walks.

The results indicated that 9.9% of Kibera residents had suffered from tapeworms or hookworms/Ascaris/Trichuris. There were varied differences in the sub-locations for instance, in Gatwekera 24.6% of the residents indicated that they had suffered from tapeworms or hookworms whereas in Makina sub-location no incidences were reported. Tapeworm affect residents if they eat improperly cooked meat products or contaminated water from the water bodies due to lack of proper sanitation. Other works like Lusambili (2011) confirms this by observing that in Kibera intestinal worms are common due to the presence of flying toilets. On the other hand, Schroeder (2014) indicates that there is even a higher presence of Ascaris/Trichuris or Hookworm where 40.7% of the children had hookworms in a study done in Kibera informal settlements.

A total of 27.2% of Kibera residents indicated that they had suffered from diarrhoea in the last two years. In two sub-locations Gatwekera and Kibera, the incidences were relatively higher than average at 54.4% and 59.1% respectively. In three sub-locations of Makina, Laini Saba and Olympic/Kianda the incidences of diarrhoea were much lower at 18.3%, 17.6% and 15.2% respectively. Others studies like those by Karanja and Ng’ang’a (2008) and UN-Habitat (2008), found that in Kibera poor environmental sanitation increase waterborne diseases like diarrhoea. The presence of high rates of diarrhea in
Kibera can be due to the conditions that exist such as poverty, poor waste management, poor sanitation and crowding a view also expressed by Schroeder (2014).

The results revealed that on average 13.5% residents of Kibera had contracted tetanus in the last two years. Generally in all the sub-locations the incidences were low apart from Gatwekera that had an unusually high rate of residents indicating that they had suffered from the disease at 61.4%. The rest of the sub-locations ranged from zero percent in Makina and 9.1% in Kibera sub-location. Tetanus a disease caused by a bacterium that thrives on the soil might be more prevalent in Gatwekera sub-location due to its filthy paths exposed to the residents. Having high incidences of the disease in some areas like Gatwekera calls for the actors in the health sector to stock antibiotics in the nearby health facilities so that residents can be treated in case they are injured since they are exposed to contaminated soil. The payments should also be subsided so that the residents can afford the treatment.

A total of 9.4% of Kibera residents indicated that they had suffered from skin disorders in the last two years. The incidences are relatively low with Gatwekera leading with 19.3% followed by Kibera and Silanga with 13.6% and 12.5% respectively. Makina sub-location did not have any incidences of skin infections. During transect walks the researcher also observed that the paths had waste water which can spread skin diseases. A report by D-Waste (2014) says that dermatological disorders have been reported in Nairobi slums due to presence of improperly disposed wastes.
The findings also showed that cholera had affected 15.5% of Kibera residents in the last two years. The incidences varied according to the sub-locations, for example Gatwekera and Silanga had the highest rates at 30% and 20% respectively. This was closely followed by Kibera and Lindi with 18.2% and 17.5% respectively. Olympic/Kienda sub-location had the lowest incidences of cholera at 3%. The presence of cholera shows problems in water and sanitation provision and the presence of improperly disposed garbage, foraging animals and vermin in the right combination. The above information is corroborated by UN-Habitat (2008) who observe that cholera, a waterborne disease is common in Kibera due to poor sanitation and epidemics have been occurring in greater frequencies. A similar view is held by Schroeder (2014) who supports that the incidences of cholera in African slums increased due to overcrowding, poor waste management and insufficient water and sanitation services.

The results indicated that a total of 69% of Kibera residents had suffered from malaria in the last two years. It appeared that Gatwekera and Lindi were the most affected with 93% and 81.3% respectively. Silanga, Laini Saba and Olympic/Kienda were the least affected by incidences of malaria with 55%, 55% and 54.5% respectively. The high incidences of malaria show the presence of breeding grounds for mosquito which is usually stagnant water. It further indicates that there might be lack of sewer lines in Kibera and improper disposal of waste water. Other studies like Lusambili (2011) have also indicated that malaria is a problem in Kibera due to poor sanitation. The high incidences of poverty in Kibera can make residents more susceptible to malaria as most of them cannot afford mosquito nets and other mosquito repellent chemicals.
The findings further reveal that 18.1% of Kibera residents had suffered from respiratory ailments. The most affected sub-locations were Gatwekera and Laini Saba with 54.4% and 29.4% respectively. The incidences of respiratory ailments were less severe in Olympic/Kianda with 1.5%. The high incidences of respiratory ailments in some sub-locations might show the economic differences between residents. These ailments like Tuberculosis (TB) and influenza can occur due to overcrowding and close human contact which occurs due to rapid urbanization something common in the slums of Africa (Schroeder, 2014). He adds that high prevalence of HIV and poor healthcare infrastructure in slums like Kibera can exacerbate the presence of Tuberculosis.

4.3.9 Economic Challenges

Figure 4.26 shows a link between incomes and the method of waste disposal. The research found out that low income in Kibera informal settlements is linked with the method of waste disposal. Only people earning more than Kenyan shillings 10,000/= have access to sewer lines. As for the rest their most preferred method of waste water disposal was open ditches. It seems that people with a higher income in Kibera were staying in areas where houses are connected to sewer lines. This shows that poverty is a major challenge in waste management in Kibera.
Figure 4.26: Waste Disposal Method Disaggregated Against Income

The results in Figure 4.26 above showed a strong linkage between household income and waste disposal method. Majority of the residents who earned over 10,000 shillings per month, over 80% had access to sewer lines. The rest were disposing their waste water into open ditches. This shows that people with higher disposable income are able to afford the few houses in Kibera connected to sewer lines. The findings revealed that of the people who earned less than 8,000 shillings per month only 10% had access to sewer lines. Residents earning between 2001 and 4000 shillings only 1% had access to sewer lines. Again it shows that people earning less money were staying where houses are not served by sewerage systems. The economic challenges were also seen in the affordability of garbage collection services. The results showed that 52.7% of Kibera residents never paid any garbage collection fees and only 3.1% of the residents paid over 500 shillings.
This shows that poverty is a big challenge in enhancing sustainable waste management in Kibera.

4.3.10 Governance and Leadership Challenges

The results showed that there is governance and leadership challenges which impede community based waste management practices in Kibera. This information came out during interviews with key informants who are involved in waste management in Kibera slum. It should be noted that Kibera slum is built on ‘illegally’ acquired land. This makes the official government policy not to recognise the slum areas and by extension they are not eligible for most government services. If the government provides services to these areas it will be seen as legalizing irregularity. There is also very high population in Kibera making enforcement of waste management laws a nightmare coupled with political interference where political leaders incite Kibera slum dwellers against the interventions being implemented by the government. This information is captured from an interview with a Nairobi County Government employee below:-

...first is lack of a clear set up. These are informal settlements and the word informal means no policies or it means an illegality... because when you settle in a land which is not yours whatever you call yourself-squatters, that’s an illegality...like now this land belongs to the government but people have settled on every inch of it so there is not a place for even a vehicle to pass or water pipe...and the first one is lack of law and order. Because when you talk of how to make them organized the M.P...for example comes and revokes everything you have done. To you those are human beings who should be helped...so you want them to access the amenities. But for the [M.P] when people are enlightened, for him he loses.

Environmental Officer- Nairobi County Government  O.I    17-12-2014
The above citation is in tandem with Henry et al. (2005) who observe that political interference compromises waste management in Kenyan slums. Similar views were given by UN-Habitat, (2013) which observed that poor governance compromises waste management in Kibera slums. The residents are excluded because these areas are not official residential areas and thus exempted in the town planning services.

4.4 The Nexus between Socio-Economic Exclusion and Solid Waste Management Practices in Kibera

The third objective discusses the link between socio-economic exclusion and unsustainable waste management practices in Kibera informal settlements. The information in this section presents the results for the relationship between payment for garbage and impoverishment, service exclusion and unsustainable solid waste management, exclusion from social networks and unsustainable solid waste management. Lastly, it looks at socio-economic exclusion and waste sorting, solid wastes recycling and faecal waste management. Research has shown that socio-economic exclusion and unsustainable waste management practices are related. This occurs when people are excluded socio-economically they fail to engage in practices that promote environmentally friendly behaviour.

4.4.1 Monthly Payment for Garbage and Impoverishment

To understand the link between socio-economic exclusion and unsustainable solid waste management the research looked at how impoverishment, a form of socio-economic exclusion is related to garbage collection.
Table 4.14 Monthly Payment for Garbage

<table>
<thead>
<tr>
<th>Monthly payments</th>
<th>Count</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>207</td>
<td>52.7%</td>
</tr>
<tr>
<td>&lt;100</td>
<td>126</td>
<td>32.1%</td>
</tr>
<tr>
<td>100-500</td>
<td>48</td>
<td>12.2%</td>
</tr>
<tr>
<td>Over 500</td>
<td>12</td>
<td>3.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>393</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The results in Table 4.14 were crystal clear that there is a link between socio-economic exclusion and ability to pay for garbage collection whereby 52.7% of Kibera residents didn’t pay any money for garbage collection. The rest of the residents (32.1%) paid less than KShs 100, 12.2% paid between KShs 100-500 and only 3.1% paid over KShs 500 (Table 4.14). In Kibera people receive minimal garbage collection services and having a large percentage of the population not able to afford garbage collection services worsened the solid waste management problems resulting to unsustainable waste management where people disposed their solid wastes along the railway line, foot paths, river or any open space in Kibera as shown in Plate 4.11. Similarly interviews with key informants revealed that garbage could not be collected in Kibera as residents couldn’t afford the garbage collection fees.

4.4.2 Service Exclusion and Sustainable Solid Waste Management

The research also looked at the link between service exclusion and sustainable solid waste management. The results shows about a third of Kibera residents 32.2% do not receive any garbage collection services. The rest were as follows, 9.2% monthly, 4.2%
fortnightly, 46.9% weekly and only 6.5% received daily collection. The results indicate that over 93% of the garbage in Kibera stayed for a week without being collected (Table 4.15). This poses a major problem as our key informants informed the researcher that the garbage usually attracts foraging animals like dogs (Plate 4.12).

Table 4.15 Frequency of Waste Collection in the Neighbourhood

<table>
<thead>
<tr>
<th></th>
<th>Kibera</th>
<th>Lindi</th>
<th>Makina</th>
<th>Silanga</th>
<th>Laini Saba</th>
<th>Gatwekera</th>
<th>Olympic/Kianda</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Daily</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>5</td>
<td>10</td>
<td>44</td>
<td>15.2</td>
<td>25</td>
</tr>
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<td></td>
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<td></td>
<td>6.5</td>
</tr>
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<td>Weekly</td>
<td>8</td>
<td>20</td>
<td>40</td>
<td>66.7</td>
<td>28</td>
<td>44</td>
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<td></td>
<td>46.9</td>
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<td>2 weeks</td>
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<td>0</td>
<td>0</td>
<td>5</td>
<td>3.3</td>
<td>4</td>
<td>6.1%</td>
<td>16</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>4.2</td>
</tr>
<tr>
<td>Monthly</td>
<td>0</td>
<td>17</td>
<td>6</td>
<td>10</td>
<td>3.3</td>
<td>4</td>
<td>6.1%</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.2</td>
</tr>
<tr>
<td>Never</td>
<td>12</td>
<td>39</td>
<td>48.8</td>
<td>6.7</td>
<td>23.3</td>
<td>47.1</td>
<td>6.1%</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32.2</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>100</td>
<td>80</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>382</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.15 shows widespread lack of garbage collection. The uncollected garbage attracts vermin like rats and houseflies posing a big health hazard to the residents. As witnessed by the researcher during transect walks the rotten garbage emit foul smell in the neighbourhoods making the area unattractive. Another problem associated with low collection of solid wastes is that the waste is disposed without being put in the recommended polythene bags. The wastes becomes more problematic during the rainy
season as it is washed in the sever lines and blocks footpaths. This makes some areas impassable and very unfriendly increasing exclusion.

Plate 4.12: Infrequent Collection of Garbage along Kibera Drive Attracts Foraging Dogs
Date: 10/16/2014, Researcher

In areas where there was a big time lapse before collecting garbage like one week or even two weeks, even areas where the garbage was put in appropriate bin bags; they attracted dogs like it was witnessed during transect walks in Kibera (Plate 4.12). The foraging dogs scattered the garbage increasing the likelihood of diseases and soiling the footpaths where the garbage is kept. The findings are consistent with Halliday et al., (2013) that there is a large population of stray dogs in Kibera.

(a) Nairobi City County Waste Collection in Kibera

The results of the study showed that only 21.4% of Kibera residents received waste collection from NCC. The findings also showed that waste collection by NCC was skewed towards some sub-locations like Olympic/Kianda and Makina where collection rates were 42.4% and 41.7% respectively. On the other hand, some sub-locations like
Lindi, Kibera, Gatwekera and Laini Saba received collection at the rates of 6.3%, 9.1%, 10.5% and 11.7% respectively.

![Nairobi City County Waste Collection](image)

**Figure 4.27: Nairobi City County waste collection**

The results from Figure 4.27 show that the NCC is excluding some sub-locations while concentrating their services in some places. This research has also shown that in the sub-locations where there is least solid waste collection there are serious solid waste management issues. There is need for the community members and private actors in solid waste management to concentrate their efforts in the sub-locations of Kibera, Lindi, Silanga, Laini Saba and Gatwekera as these areas have been left out by NCC in solid waste collection. In so doing, the community members will earn more income and create employment opportunities as well as promote sustainable solid waste management.
In many instances there seems to be service exclusion in Kibera informal settlements. Plate 4.13 above shows that Nairobi City County garbage collection vehicles operate in areas with paved roads like Kibera Drive. The morphology of Kibera in some areas is steepy, hilly and muddy during the rainy season and cannot be accessed (Hiltuten, 2010). Whereas some areas seem to be covered by garbage collection services the reality on the ground is that the narrow lanes between houses make them impassable and thus are left out in solid waste collection. The NCC can also pay their workers to transport the wastes to designated collection points using practical means like wheelbarrows which can navigate the narrow paths and lanes of Kibera.

(b) Non Nairobi County Government Waste Collectors

The research found out that non Nairobi County government waste collectors were largely categorised into two. On one hand is CBOs which amounted to 84.8%, the rest...
15.2% were private companies. Those results show that Kibera residents were more in community based waste management. In various sub-locations there are more CBOs dealing with wastes collection like, Kibera, Lindi, Makina, Laini Saba and Gatwekera, the percentages were 80%, 90.5%, 84%, 87.5% and 92% respectively. In Olympic/Kianda sub-location only 30.3% indicated that there was waste collection by CBOs, in fact 69.7% indicated that waste collection was done by private companies. The reason for that might be due to high economic status of people who live in Olympic/Kianda (Table 4.16).

Table 4.16 Non Nairobi County Government Waste Collectors

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>CBOs</th>
<th>Private companies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
<td>4</td>
<td>80%</td>
<td>1</td>
</tr>
<tr>
<td>Lindi</td>
<td>38</td>
<td>90.5%</td>
<td>4</td>
</tr>
<tr>
<td>Makina</td>
<td>21</td>
<td>84%</td>
<td>4</td>
</tr>
<tr>
<td>Silanga</td>
<td>7</td>
<td>63.6%</td>
<td>4</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>21</td>
<td>87.5%</td>
<td>3</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>23</td>
<td>92%</td>
<td>2</td>
</tr>
<tr>
<td>Olympic</td>
<td>20</td>
<td>30.3%</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>134</strong></td>
<td><strong>84.8%</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

Table 4.16 shows that CBOs play an important role in garbage collection in Kibera. The unavailability of NCG waste collection services in Kibera informal settlements seems to
have necessitated the emergence of CBOs and private companies to fill the gaps in solid waste management (Plate 4.14). Whereas the people in Kibera can be said to be excluded in waste collection services, the exclusion has given rise to other actors like the ones mentioned above who have played a role in enhancing to some extent the economic and social situation of Kibera residents thus reducing socio-economic exclusion.

Plate 4.14: The Researcher with Community Waste Collectors Who Fill in the Gap Left by NCG. Date 10/16/2014, Researcher

The Plate 14 shows some non Nairobi City County waste collectors. It is a project funded by private companies working with UN agencies in the support of local communities in Kibera to earn a living and at the same time engage in sustainable waste management practices. In this specific case, they engage in evacuation and safe disposal of wastes. Such initiatives require substantial amounts of capital, so partnerships between
community members, private sector, UN agencies and international development organisations come in handy. The community is empowered to earn money, gain employment at the same time clean their environment by improving the sanitation of the neighbourhoods. In utilising the services of exhauster in Plate 4.14 Kibera community had become active participants rather than passive recipients of development aid.

**Table 4.17: Residency of the Waste Collector**

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Respondent’s Sub-location</th>
<th>Outside respondents sub-location</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
<td>11</td>
<td>84.6</td>
<td>1</td>
</tr>
<tr>
<td>Lindi</td>
<td>44</td>
<td>68.8</td>
<td>20</td>
</tr>
<tr>
<td>Makina</td>
<td>18</td>
<td>81.8</td>
<td>4</td>
</tr>
<tr>
<td>Silanga</td>
<td>12</td>
<td>75</td>
<td>4</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>29</td>
<td>67.4</td>
<td>14</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>27</td>
<td>71.1</td>
<td>10</td>
</tr>
<tr>
<td>Olympic</td>
<td>34</td>
<td>89.5</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>175</td>
<td>75.4</td>
<td>57</td>
</tr>
</tbody>
</table>

The respondents were asked where the waste collector in their neighbourhood resided (Table 4.17). The results showed that 75.4% of the waste collectors resided within their sub-locations. In some areas like Olympic/Kianda, Kibera and Makina they had high percentages of local waste collectors at 89.5%, 84.6% and 81.8% respectively. This shows that some residents are making use of the gaps in waste collection services and making money.
4.4.3 Exclusion from Social Networks and Sustainable Solid Waste Management

The research investigated whether exclusion from social networks, friends and relatives had a relationship with unsustainable solid waste management. The results showed that 32.6% agreed that friends and relatives dislike their neighbourhoods due to improperly disposed garbage. Although the respondents who agreed with the statement are about a third of Kibera residents, that is still a significant percentage. If there is unsustainable solid waste management many people would be put off in visiting such an area due to issues like fear of catching diseases whether real or imagined, foul smell and physical inaccessibility.

Plate 4.15: Garbage Strewn along the Railway Line in Kibera is an Eyesore

Date: 10/16/2014, Researcher

During transect walks in Kibera slum (Plate 4.15) the researcher found garbage strewn over some paths and it was very difficult to navigate through due to soggy garbage and the smells emanating from the garbage was awful. That would definitely put off some people who would be willing to visit. Lack of visitors and friends from outside Kibera informal settlements would cut off social capital networks which are vital in enhancing socio-economic inclusion.
4.4.4 Socio-economic Exclusion and Waste Sorting in the Household

The study also sought to find out whether solid wastes were sorted in the households. Sorting of wastes is vital as it eases the reselling and recycling of wastes. It also increases wastes value as there is no contamination. The results showed that 69.5% of the Kibera residents never sorted their wastes. Another 18.6% did sorting sometimes and 12% always sorted their wastes (Figure 4.28).

![Solid Wastes Sorting in the Household](image)

**Figure 4.28: Solid Wastes Sorting in the Household**

There are some sub-locations according to Figure 4.28 where waste sorting is very low, for instance, those who always sorted their wastes in Gatwekera and Lindi sub-locations were only 1.8% and 2.5% respectively. When wastes are not sorted at source it has low value and people cannot make a lot of money from it, thus if the people are socio-economically excluded, they cannot effectively use the solid wastes from their households to end the exclusion.
4.4.5 Socio-economic Exclusion and Solid Wastes and Waste Water Recycling

The study investigated the practice of solid wastes recycling in the households. The residents were asked to state the frequency of recycling. They were given three options to select from and that is (a) Always, (b) Sometimes and (c) Never. The results showed that only 6.6% of the residents always recycled their wastes, 19.8% sometimes and a massive 73.5% never recycled their wastes. There were variations in recycling wastes within the sub-locations, for instance in Kibera, Gatwekera and Laini Saba sub-locations 90.9%, 87.7% and 86.8% respectively never recycled their wastes (Figure 4.29).

The above information shows that the residents are not getting any benefits that can accrue from recycling wastes. They fail to use recyclables like plastics, bottles, tins and organic wastes. This research had already shown that Kibera residents are economically excluded, by the residents not recycling some wastes they ended up using more money to buy items which they could have avoided thus failing to exploit the chances that exists in sustainably managing their solid wastes to bring socio-economic inclusion.

Figure 4.29: Practice of Solid Waste Recycling
Information derived from Figure 4.29 revealed that those who did waste recycling and reselling were doing very well economically and socially. This information was got from key informants who had lived in Kibera for more than 10 years and were reselling wastes. Although many indicated that dealing with wastes was actually not very profitable that they were looked down upon and seen as scavengers and people of low social status, they admitted that returns were good. This information is captured from two key informants below,

_The thing is they can satisfy themselves (youth who are excluded and unemployed) because even me, I have told you it is 20 years (dealing with wastes) I have brought up kids, until now they are adults. One has a wife, another has his home and working just because of this job._

Danson Kinuthia  O.I Laini Saba Kibera  15-12-2014

_I have two kids that I take to school. One in form 4 the other in form 3._

Ken Gachie  O.I  Electronic Waste Dealer Kibera  15-12-2014

Many informants like the one in the citation above informed the researcher that they were doing very well financially even educating children up to colleges and universities by selling wastes. Most of them run businesses whereby they employed people to collect and sort the wastes (Plate 4.16). The informants informed the researcher that they had been in the business of waste recycling and reselling for a long time. That showed that the work has sustainability and was paying for those who had embraced it. The youths who felt that they were excluded from the labour market should actually seize that opportunity and embrace the business of waste reselling and recycling.
Plate 4.16 shows that sorting of wastes enabled the dealers earn income and employ other people. The situation in Kibera showed that a lot of wastes lay uncollected so there are many gaps to be filled and this can create employment opportunities for many people. The gaps are in collection, sorting, reselling or recycling. Observations in waste collection centres revealed that in some waste collection centres as many as five people were employed to sort. The challenge that the waste sorters informed the researcher they face is discrimination as dealers in wastes are seen as scavengers and many people have esteem issues and they don’t want to be associated with wastes.

The study sought to know whether Kibera residents were practising waste water recycling. The presence of waste water exacerbates the situation of solid wastes and
produces foul smells and makes many footpaths impassable. The study found out that only 21.6% of Kibera residents practise waste water recycling (Figure 4.30).

Figure 4.30: Practice of Waste Water Recycling

Figure 4.30 above shows that the practice of waste water recycling varied across the sub-locations with Kibera and Gatwekera sub-locations having zero percent of the residents doing waste water recycling. Lindi and Laini Saba had 17.5%, Laini Saba 11.8%, Makina 31.7% and Olympic/Kianda had the highest of 56.1%. The presence of high percentage of waste water recycling in Olympic/Kianda can perhaps be attributed to higher socio-economic status in the sub-location.

4.4.6 Socio-economic Exclusion and Faecal Waste Management

The study sought to find out the average number of people who use a toilet. The word toilet here meant both indoor toilets and pit latrines. The people using a toilet were categorised into five groups: less than 20, 21-50, 51-100, 100-200 and over 200 people (Figure 4.31). This question sought to establish whether many people were using a single
toilet which leads to open defecation and in the Kibera informal settlements it comes in form of ‘flying toilets’.

![Figure 4.31: Number of People who Use Toilet in the Neighbourhood](image)

Figure 4.31 shows that there can be likelihood of open defecation as many people don’t have access to toilets. Open defecation exacerbates solid waste problems and increases social exclusion as people avoid areas where there is open faecal matter. The study found that 53.9% of the population shared a toilet with less than 20 people, 18.6% shared with 21-50 people, 8.4% with 51-100 people, 4.6% with 101-200 people and 14.6% with more than 200 people. The results show that 42.1% of residents share toilets with more than a 20 people, this is a high number and there is probability of open defecation. If open defecation occurs in the slums, there is a probability of increased incidences of gastrointestinal diseases and parasites like typhoid, cholera, diarrhoea and parasites like hookworms.
The residents were also asked to indicate the distance to the nearest toilet. This information is important as distances over 50 metres compromises faecal waste management and people are likely to practise open defecation. The residents were asked to choose from distances in 6 categories to the nearest toilet. The categories were less than 25m, 26-50m, 51-75m, 76-80m, over 100m and no toilet.

Figure 4.32: Distance to the Nearest Toilet

Figure 4.32 above shows that 59.3% had toilets in a distance of less than 25m and 16.5% had toilets in a distance of 26-50m. That shows that 75.8% had toilets in the recommended distances. However, the rest 24.2% of the population is still a large number considering that Kibera is a very densely populated settlement. The last category had 7.1% of the population with no access to toilets at all (Figure 4.32). If the distance to the nearest toilet is more than 50 metres there is a risk of open defecation and in this case shows about 25% of Kibera residents are prone to open defecation. These results can explain why there are high incidences of flying toilets in Kibera.
4.4.7 Sustainable and Unsustainable Waste Management Routes in Kibera Informal Settlements

The waste management routes in Kibera can be summed up in Figure 4.33, where there is the sustainable route leading to socio-economic inclusion and unsustainable route characterised by illegal dumping, lack of sorting/recycling, lack of collection, among other things, leading to a myriad of socio-economic and environmental problems which can entrench socio-economic exclusion.

Figure 4.33: Sustainable and Unsustainable Waste Management Routes in Kibera Informal Settlements

Figure 4.33 illustrates the dual routes that waste management practices take in Kibera informal settlements. On one hand we have the sustainable route while on the other we have the unsustainable route. In each route the end result may be either enhanced socio-
economic inclusion or exclusion. In the sustainable route which is rare, the waste is collected by the Nairobi City County it is then taken to dumping and recycling centres outside Kibera. In the recycling centres the waste produce sustainable effects like income generation through reselling, composting, bead work, making briquettes and mats; among others. There is also a fairly established sustainable route where community organizations and individual waste collectors ‘scavengers’ get wastes from the slum households and dumpsites then take to individual waste resellers and recycling centres where the waste is added value and in the long run generates income which enhances socio-economic inclusion.

On the other hand, there is the unsustainable route which is rife in Kibera informal settlements. There is lack of collection and open dumping of wastes. This results in myriad unsustainable effects like clogged drains, foul smells, flooding and blocked footpaths, blocked railway tracks, foraging domestic animals and wild animals. These factors aid in the spread of communicable diseases like typhoid, diarrhoea and malaria. They also make the neighbourhood very unattractive for settlement save for people with limited economic means. As a result, people suffer from diseases and are entrenched more into poverty leading to socio-economic exclusion.

4.5 Sustainable Participatory Approaches of Fostering Community Based Solid Waste Management Practices in Kibera Informal Settlements

The fourth objective discusses sustainable participatory approaches of fostering community based solid waste management practices in Kibera informal settlements. The
null hypothesis being tested here \( H_0: \text{The involvement of Kibera residents in sustainable community based waste management practices does not significantly vary in the seven sub-locations.} \)

In doing so, the research sought to find out the extent to which Kibera residents are involved in sustainable community based waste management practices. The research investigated the variations in Kibera residents’ involvement in community based waste management practices by looking at issues like urban gardening awareness, waste composting, awareness of briquettes making, membership to organizations dealing with wastes, decision making in organizations dealing with wastes and training in sustainable community based waste management practices. The levels of involvement in various sustainable participatory approaches in CBWMPs were tested using chi-square.

**4.5.1 Urban Gardening Awareness in Kibera**

The research found that 30.4% of Kibera residents are very aware of urban gardening, 42.1% were aware, 6.9% were slightly aware and about a fifth of the respondents were not aware of what urban gardening is (Figure 4.34). This shows that urban gardening awareness is high for those people who were willing to adopt the practice. This contrasts with Gallaher et al. (2015) who found that 13% and 7% of Kibera urban farmers and non-farmers had experience of urban gardening. The awareness varied among the various sub-locations. For instance, in Kibera sub-location the people who were very aware of urban gardening were 50%. This can be attributed to the presence of urban gardening projects in the area like STARA Bio Centre shown in Plate 4.17.
Figure 4.34: Urban Gardening Awareness in Kibera

Figure 4.34 above shows that in Olympic/Kianda sub-location 50% of the residents were not aware of urban gardening. Again that can be linked to the lack of urban gardening projects in the sub-location. On doing further statistical tests by Chi-analysis the following results were obtained $\chi^2 = 76.871$, df=18, $p=0.00001$. It shows that there are significant differences of the number of people aware of urban gardening across Kibera. This can be attributed to the fact that organizations practising urban gardening are concentrated in some sub-locations for instance STARA is in Kibera sub-location which perhaps sensitizes people. Hence 80% of the people are aware of urban gardening.

Plate 4.17: Urban Gardening at STARA Bio Centre, Kibera Date: 10/16/2014
Plate 4.17 shows that urban gardening can be done in Kibera and vegetables like Kale ‘Sukuma wiki’ were observed to be under cultivation. It was also witnessed that there was sugarcane which was flourishing. Other vegetables like spinach can be grown. Kibera residents can learn from the project and use their limited space to produce vegetables for domestic consumption and even for selling.

4.5.2 Waste Composting Awareness in Kibera

One of the paramount issues in sustainable waste management is composting. It is value addition to wastes that makes wastes useful to crop farmers in form of organic fertilizer. The research sought to know whether Kibera residents were aware of composting. This was done by plotting the results in a 4 point Likert scale (Figure 4.35): 1= Very aware, 2=Aware, 3= Slightly aware and 4= Not aware. The results about awareness were supposed to be Very aware, Aware, Slightly aware and Not aware. The research found that 30.5% of Kibera residents were very aware of composting, 37.4% were aware, 7.4% slightly aware and almost a quarter of the residents, 24.6% were not aware. Having a quarter of residents not aware of composting, shows that there are still opportunities that the residents can exploit to better their economic and social well-being by being trained on composting. With technical know how they can practise composting and consequently increase their incomes. They can also learn about composting from the centre and use it to sell compost manure. The manure can be sold in the surrounding peri-urban areas of counties such as Kiambu and Kajiado.
Figure 4.35 shows that the total number of people who are aware of composting is 70.2% which is a good percentage. These findings are in tandem with Peters (1998) views that community development opportunities can be enhanced when people practice composting. Chi-square analysis revealed the following $x^2=17.637$, df=18, $p=0.479796$, $p>0.05$ not significant, indicating that there are no significant differences on the people who are aware of composting in Kibera. This show that with the right support the residents can earn income from composting as a high percentage are already aware of composting. Apparently the biggest proportion of wastes is organic.

4.5.3 Awareness of Households Making Charcoal Briquettes from Wastes

The research found that 80.9% of Kibera residents were not aware of making charcoal briquettes from wastes, only 19.1% of the respondents indicated that they were aware (Figure 4.36). Awareness of making briquettes is important in enhancing community based charcoal briquetting (Njenga et al, 2013). Research has shown that briquettes are cheaper than charcoal, they are more environmental friendly and they burn longer than
charcoal. If the residents were aware of making briquettes they can earn more money by selling them and others can save money by making briquettes for domestic use.

Figure 4.36: Awareness of Households Making Charcoal Briquettes from Wastes

The results in figure 4.36 show that Kibera residents were not getting benefits accrued from making briquettes. Thus they miss the roles that briquettes can play in Kibera slum by bringing social inclusion of unemployed youths and women by providing them with an opportunity to raise their income and participate in waste management in their neighbourhoods (Njenga et al., 2013). If Kibera residents adopt community-based charcoal briquetting, they will be able to benefit from 88 tonnes of charcoal dust produced daily in Kibera which ends up in water drainage systems or garbage heaps. Chi-square tests revealed that $x^2=9.925$, df=6, p=0.127846, p>0.05, that no significant differences on the people who are aware of making charcoal briquettes. As such, there should be awareness programmes across all sub-locations in Kibera as they can save money if they make charcoal briquettes from charcoal wastes and ashes which pollute some parts of Kibera.
4.5.4 Households Generating Income from Solid Wastes

The research found that only 9.9% of the residents were making income from wastes. A whopping 90.1% were not making any income from wastes (Figure 4.37). This shows that Kibera residents are not taking advantage of the opportunities that are in the waste management cycle like sorting, transportation, recycling, reselling, reusing, value addition among others. The above results show that Kibera residents are failing to participate in income generating waste management approaches.

Figure 4.37: Households Generating Income from Solid Wastes

Figure 4.37 above shows that majority of Kibera residents are not generating income from wastes. Further statistical tests revealed $x^2 = 7.337$, df=6, p=0.29, p>0.05 not significant, that there are no significant differences on the Kibera residents generating income from wastes. The percentages of people generating income from wastes in Kibera are very low therefore it calls for action from all stakeholders of waste management in Kibera. The actors in waste management including the central government, NCG, NGOs,
CBOs among others should sensitise the community on the importance of earning income from wastes. They should also put more pilot projects where community members can learn more about earning income from wastes.

4.5.5 Individual Selling and Recycling of Wastes

The study also sought to know how income from wastes is earned. This information is vital as it showed which strategies were working in Kibera. The main issue was to find out community participatory approaches in waste management. The research found that individual selling of wastes was minimal with only 8.4% of waste dealers practising it. The rest 91.6% were engaged in some communal or group management of wastes.

![Figure 4.38: Individual Selling and Recycling of Wastes](image)

The above Figure 4.38 shows that many people in Kibera don’t do individual selling of wastes. Whereas there is a high percentage of group/communal engagement in commercial waste management, the total number of Kibera residents engaging in commercial waste management is still low. It is only in Olympic/Kianda and Lindi sub-
locations where the percentage of people individually selling wastes was high at 21.2% and 13.8% respectively. Chi-square results showed $\chi^2=25.707$, $df=6$, $p=0.0003$, meaning that there were significant differences with how individual people practise waste reselling and recycling. The differences may be due to factors like personal experiences, level of education and economic status.

4.5.6 Membership of Informal Waste Selling and Recycling Organization

The research found out that only 7.1% of the people dealing with wastes were doing so in a formal organization. This shows that the people dealing with wastes had engaged in organizations that were registered. This is important information more so because effective waste management requires sustainable organization which can be guaranteed in a formal organization as there are checks and balances.

![Figure 4.39: Membership of Informal Waste Selling/ Recycling Organization](image)

Figure 4.39 shows that in some sub-locations like Silanga and Gatwekera there were no people in informal organizations whereas in Olympic/Kianda there were 18.2%.
Statistical tests through Chi-square analysis revealed $x^2=22.207$, df=6, $p=0.001$ $p<0.05$ significant, showing significant differences in the various sub-locations on the residents who were members of informal waste selling organizations. The residents need to be sensitised to join formal organizations so that they can access benefits like loans and group trainings.

4.5.8 Membership to Formal Waste Selling/ and Recycling Organization.

The number of individuals involved in waste selling and recycling was established. Out of these respondents the researcher sought to know those who had joined formal waste selling and recycling organizations. Results showed that only 6.6% were registered in formal organizations. Although in the informal settlements there is a lot of informality, being a member of a formal organization can make ones business more successful as they can gain many benefits like micro finance loans and government funding as well as training.

![Figure 4.40: Membership to Formal Waste Selling/ Recycling Organization](image-url)

**Figure 4.40: Membership to Formal Waste Selling/ Recycling Organization**
The results in Figure 4.40 showed that there were marked variations in membership to these organizations across Kibera informal settlements. For instance, in the sub-locations of Kibera and Silanga there was no one in a formal organization dealing with wastes. This situation can compromise the benefits that the respondents can get for being members in formal organization thus compromising community based waste management. Further still, statistical analysis chi-square results $x^2=14.932$, df=6, $p=0.02$, $p<0.05$ significant, revealed significant differences confirming the differences depicted in Figure 4.40.

4.5.9 Membership to a CBO that Deals with Wastes

The study found that 11.5% of Kibera residents were members of a CBO that deals with wastes. The sub-locations of Makina, Laini Saba and Gatwekera had 19.1%, 13.3% and 12.3% of respondents were members in CBOs that deal with wastes. The sub-locations of Silanga and Kibera had the lowest percentages of respondents who were members of CBOs that deal with wastes at 4.8% and 5% respectively.

**Table 4.18: Membership to a CBO that Deals with Wastes**

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>%</td>
<td>Count</td>
</tr>
<tr>
<td>Kibera</td>
<td>1</td>
<td>4.8</td>
<td>21</td>
</tr>
<tr>
<td>Lindi</td>
<td>8</td>
<td>10</td>
<td>72</td>
</tr>
<tr>
<td>Makina</td>
<td>8</td>
<td>13.3</td>
<td>52</td>
</tr>
<tr>
<td>Silanga</td>
<td>2</td>
<td>5</td>
<td>38</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>13</td>
<td>19.1</td>
<td>55</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>7</td>
<td>12.3</td>
<td>50</td>
</tr>
<tr>
<td>Olympic/Kianda</td>
<td>6</td>
<td>9</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>45</strong></td>
<td><strong>11.5</strong></td>
<td><strong>348</strong></td>
</tr>
</tbody>
</table>

$x^2=7.395$, df=6, p=0.29 Not significant
The information on Table 4.18 above revealed that $x^2=7.395$, df=6, p=0.29, p>0.05 is not significant, this shows there were no statistical differences on the number of people who were members of a CBO that deals with wastes. The low percentage shows that strategies geared towards encouraging Kibera residents to join such CBOs should be done in all the sub-locations.

**4.5.10 Membership Contribution in Decision Making in a Waste Based CBO**

The findings of the study indicated that only 11.5% of Kibera residents are members of a CBO that deals with wastes. This shows that there are deficits in dealing with wastes. Kibera residents ought to make more effort in creating and joining CBOs that deal with wastes. There were some variations in the sub-locations of Kibera. For instance, Laini Saba had the highest percentage (19.1%) of residents being members of CBO that deals with wastes, followed by Makina 13.3%, Gatwekera 12.3% and Olympic/Kianda 9%.

**Table 4.19 Membership Contribution in Decision Making in a Waste CBO**

<table>
<thead>
<tr>
<th>Sub-location</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td></td>
<td>Count</td>
<td></td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>Kibera</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>100</td>
<td>22</td>
<td>100</td>
</tr>
<tr>
<td>Lindi</td>
<td>6</td>
<td>75</td>
<td>2</td>
<td>25</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Makina</td>
<td>4</td>
<td>50</td>
<td>4</td>
<td>50</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Silanga</td>
<td>2</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Laini Saba</td>
<td>10</td>
<td>76.9</td>
<td>3</td>
<td>23.1</td>
<td>68</td>
<td>100</td>
</tr>
<tr>
<td>Gatwekera</td>
<td>6</td>
<td>85.7</td>
<td>1</td>
<td>14.3</td>
<td>57</td>
<td>100</td>
</tr>
<tr>
<td>Olympic/Kianda</td>
<td>6</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>66</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td><strong>75.5</strong></td>
<td><strong>11</strong></td>
<td><strong>24.5</strong></td>
<td><strong>393</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 4.19 shows that Kibera sub-location had no resident dealing with wastes at zero percent. The results showed that 75.5% of Kibera residents are involved in decision
making in CBOs that deal with wastes. In sub-locations like Silanga and Olympic/Kianda all the residents interviewed (100%) indicated that they contribute to decision making process in their respective CBOs. Participation in decision making process is important in enhancing sustainable waste management.

4.5.11 Training in Sustainable Community-Based Waste Management Practices

The findings showed that 23% of Kibera residents had received some training in sustainable community based waste management. Laini Saba and Olympic/Kianda had the highest residents trained in sustainable community based waste management at 26.5% and 28.8% respectively. Lindi and Makina had an almost equal number of trained residents at 18.8% and 18.3%. Kibera and Silanga sub-locations had a lower number of trained persons at 9.1% and 12.5% respectively.

Figure 4.41: Training in Sustainable Community Based Waste Management Practices

The Chi-square results from Figure 4.41 revealed significant differences on the number of people trained in sustainable community-based waste management practices ($x^2=12.649$, df=6, p=0.05, p<0.05 Significant). This shows that there is need to focus on
the sub-locations where people haven’t been trained on CBWMP. The trainings should be done by the various organizations working in Kibera including central government, NCG, NGOs, CBOs, FBOs and international development organisations.

4.5.12 Respondents Trained in CBWMP by Nairobi County Government

The results of the study showed that of the 90 respondents trained in community based waste management practices, 32.2% had been trained by Nairobi City County government. This shows that the Nairobi County Government is not doing enough in enhancing sustainable waste management. In the various sub-locations there were variations on whether they had been trained in CBWMP by NCC.

![Figure 4.42: Respondents Trained in CBWMP by Nairobi County Government](image)

The results in Figure 4.42 show that in Kibera sub-location, there were only two respondents and they indicated they were trained by NCC. In other sub-locations of
Olympic/Kianda and Laini Saba they had the highest number of respondents trained in CBWMP by NCC at 42.1% and 38.9% respectively (Figure 4.42). Although Chi-square test revealed no significant statistical difference some sub-locations like Kibera seems to be covered well by county government trainings. This could be due to the fact that the sub-location is at the entrance of the informal settlement. The NCG should also reach deep inside the slum and cover the areas where their training is not widespread like Makina, Silanga, Lindi and Gatwekera sub-locations.

4.5.13 Respondents Trained in CBWMP by NGO

The findings in Figure 4.43 show that only 18.7% of the respondents had been trained in CBWMP by NGOs. This is in contrast to Gallaher et al., (2015) who found out that 86% of Kibera residents had been trained in urban gardening by Solidarities; an international NGO. Whereas NGOs play a big role in improving the livelihoods of slum residents there seems that their participation in training is limited. This is more so in some sub-locations like Kibera and Silanga where no person indicated that they had been trained in CBWMP by an NGO. Olympic/Kianda registered the highest number of residents trained in CBWMP by NGO at 31.6%, followed by Makina and Laini Saba at 27.3% and 22.2% respectively.

In areas where NGOs were active in promoting CBWMP like the case with Umande Trust, there were other benefits that community members got from the training like governance, hygiene and business management as indicated below during an interview with one of the key informants from a waste management NGO in Kibera.
We train them on how to start businesses that can help them be independent. We also have loans that are accessible to anyone and we also create a platform where they are able to interact with their leaders and they are able to make their needs and demands....Our work is building and transferring them to them (Bio-centres). We train them in various things. In a group you will find a management and supervision committee plus the members now. In the training, governance, business and financial training is done. There is also a WASH component that trains on water sanitation and hygiene issues. Our role is supervisory and we also solve conflicts...

Josiah Omotto  O.I Umande Trust  28-7-2014

The above citation from a key informant revealed that NGOs also provided microfinance, conflict resolution and advocacy to youths because creating socio-economic inclusion and alleviating waste management problems requires multifaceted solutions. Conflict resolution was also cited as an important issue to avoid disputes where finances were involved. To pre-empt conflicts in financial matters, some NGOs adopted a cashless mode of payment.

Figure 4.43: Respondents Trained in CBWMP by NGO
Figure 4.43 reveals Chi-square results of $x^2=5.876$, df=6, $p=0.44$, $p>0.05$, is not significant, that shows there are no significant statistical differences in the respondents trained in CBWMP by NGO. Some sub-locations like Silanga and Kibera had no person trained in CBWMP so there is need to focus on those sub-locations. Kibera sub-location seems not to have issues as all the respondents had been trained by the Nairobi County Government. This might be due to the sub-location’s close proximity to government offices. So the NGOs efforts should focus more in Laini Saba, Silanga and Gatwekera sub-locations.

4.5.14 Respondents Trained in CBWMP by FBO

The results indicated that only 11.1% of the respondents had been trained by an FBO. These findings don’t contrast much with Gallaher et al. (2015) who found out that FBOs trained less than 5% of Kibera residents in urban gardening. The presence of FBO training seems to be concentrated in Silanga sub-location where 60% of the respondents had been trained by an FBO, followed by Lindi and Makina where there were 20% and 18.2% respectively.

![Figure 4.44: Respondents Trained in CBWMP by FBO](image-url)
Figure 4.44 shows that an almost equal number of respondents trained by an FBO was at Gatwekera and Olympic/Kianda at 5% and 5.3% respectively. In Kibera and Laini Saba sub-location no respondent indicated that they had been trained in CBWMP by an FBO (Figure 4.44). Chi-square results $x^2=17.771$, df=6, p=0.006831, showed significant differences on the people trained in CBWMP by FBOs. This may be due to the fact that FBO cater for people of specific religious inclinations and Kibera is segregated along religious affiliation. FBOs should have extended their trainings on CBWMP in the areas where they are not significantly felt like Laini Saba, Kibera, Gatwekera, Olympic/Kianda, Makina and Lindi sub-locations.

4.5.15 Respondents Trained in CBWMP by CBO

The results showed that 41.1% of the respondents had been trained in CBWMP by a CBO. This shows that CBOs are contributing a lot in enhancing sustainable waste management practices in Kibera informal settlements. In Kibera sub-location no respondent indicated that he/she has been trained by a CBO. In Lindi, Silanga and Gatwekera sub-locations those who had been trained in CBWMP by a CBO were 66.7%, 60% and 60% respectively.

![Figure 4.45: Respondents Trained in CBWMP by CBO](image-url)
Figure 4.45 shows that Makina and Olympic/ Kianda sub-locations had a relatively lower number of people trained in CBWMP by a CBO at 27.3% and 27.8% respectively.

In the study, it was found out there were many CBOs working in Kibera and involved CBWM issues among them Sarang’ombe Women Group, Women in Unity, Purifying Waters, Starshine, Haki, Group Loans and Savings (GL &S), Ghetto Youth Focus Foundation(GYFF), Institute for Development and Welfare Services (IDEWES), Kibera Mashimoni Youth Group, Wise Ladies (WL), Youth Development Forum (YDF), Youth Reform Self Help Group (YRSHG), Kujitegemea and Kibera Mashimoni Youth for Change (KMYFC). During key informants interviews many suggested it was easy to reach the community since they worked in their localities with people they know.

During an interview with a key informant representing JICA-NCC project, the respondent informed the researcher that NGOs don’t collect wastes but CBOs do as reported below;

*We have realized that NGO’s are not involved in collecting waste and so we are focused with the CBO’s... from the households, we want them to support these CBO’s by giving them their waste so we are trying to create awareness to them.*

Margaret Kariuki  JICA-NCC  O.I  7/11/2014

The informant said that they were dealing with established CBOs to make sure that the groups that they were partnering with didn’t come out for simple financial gains but for genuine need to solve waste management issues and earn a living as well. Chi-square results on the other hand revealed significant differences on the people trained in CBWMP by CBO ($x^2=14.476$, df=6, $p=0.02$, $p< 0.05$ significant). Results show the
differences might be caused by having other actors in place for instance in Kibera sub-location people have been trained by NCG. There should be proper coordination between various actors to prevent duplication of duties and also ensure that some residents do not miss out.

4.5.16 Respondents Trained in CBWMP by other Organizations

The research also sought to find out the members who had been trained in CBWMP by other organizations. Only 4.4% indicated were trained in this category (Figure 4.46). In Kibera, Lindi, Silanga and Olympic/Kianda sub-locations there were no respondents trained in CBWMP by other organizations. While Laini saba, Makina and Gatwekera registered 11.1%, 9.1% and 5% respectively.

![Bar chart showing the percentage of respondents trained in CBWMP by other organizations for different sub-locations.]

Figure 4.46: Respondents Trained in CBWMP by other Organizations

The role of other organizations in CBWMP training in Kibera slum cannot be over emphasized. These other organizations include international development organizations like JICA and UN agencies like UN-Habitat. During this study it was found out that JICA had rolled out a project by the name of ‘Project for Capacity Development of Solid Waste
Management of Nairobi City’ (Awareness Raising Component) in conjunction with the NCC. The project time line is from March 2012-March 2016 with a broad objective of expanding waste collection and transportation services in Nairobi City by offering technical capacity to Nairobi County Government staff. The project also aims at specifically strengthening the Nairobi County government’s waste collection capacity by increasing the level of involvements of CBOs in solid waste collection and transportation.

JICA’s main aim is to bring CBOs leaders on board then get to CBO members for consensus building on the model to adopt.

The Nairobi County Government has also been working with UN agencies in promoting matters of CBWMP. Whereas the Kibera residents might not be aware of such efforts our key informants in the United Nations/Nairobi County Government coordination office informed the researcher that many UN agencies key among them UN-Habitat, UNDP, UNEP and UNESCO offer NCC technical assistance in issues of urban planning. The UN gives NCC technical experts from other countries to help them in the development of tools and measures that can help in the realization of specific objectives in a given time. In most instances UN agencies pilot a project in a certain area. A case in point is Kibera slums in Silanga where they are working on a pilot project to revitalize the area.

(Key Informant-UN/NCC coordination office 19-12-2014)

The research also found out that UN-Habitat has been playing a key role in CBWMP in Kibera informal settlements since the year 2000. The work of UN-Habitat in Kibera according to our informant is mostly ‘normative’. This work (normative) is very different
from supplying human settlements but it entails influencing how best human settlements can be delivered in Kibera and Kenya in general. UN-Habitat in Kibera are interested in several issues like urban planning so that there can be sustainable urbanization. They are also interested in legislation especially the issues that affect urban governance. Lastly, they are involved in issues of urban services like housing, transport and water which urban dwellers require for their livelihoods.

UN-Habitat has also been involved in urban housing where they strive to have optimal utilization of housing. This is coupled by training and capacity building. Although UN-Habitat is involved in these issues of urban basic services like solid and liquid wastes management, they only complement what the government is doing as our key informant told us:-

*It is important to appreciate one point, that the development of this country is the responsibility of the national government and the national government then agrees with bilateral and multilateral development partners on the scope of the kind of support that would be necessary to achieve.*

Dr. Grace Lubaale O.I UN-Habitat 14-1-2015

The issues addressed by UN-Habitat in places like Kibera borrows from success stories from other regions of the world. They have drawn from the experiences of other regions in developing countries cities like in Mogadishu-Somalia and Cairo-Egypt. There are also lessons to borrow from faecal sludge management in Kathmandu Valley, Nepal. These experiences are piloted in places like Kibera followed by transfer of technology to get the desired effects.
The research also found out that UN agencies face various challenges in promoting sustainable CBWMP in Kibera slum. Our informant from the UN/NCC coordination office informed us that there are hundreds of organizations in Kibera dealing with waste management and socio-economic issues and their efforts are not harmonized. This creates duplication of duties which can be avoided if there was better coordination between the various organizations. The above information was captured below during interviews with key informants:

        Kibera is a unique area. It has unique features, as much as we have a 100 plus NGOs working in that particular area. Those organizations have not been speaking as one. That is one of the reasons, they are fragmented, everybody is working on their own and that’s why we cannot see an impact in Kibera.

Humphrey Otieno- O.I   UN/NCC Coordination Office    19-12-2014

The key informant from UN-Habitat informed the researcher that some of the challenges they encounter include working with municipalities that are underfunded, population pressure and political interference. The ‘normative’ work of UN-Habitat also faces challenges as they only demonstrate what is best but they don’t buy the tools. That means the government can adopt what they show case or ignore it. That information is captured by an excerpt of one of the interviews with a key informant from UN-Habitat:

        ...even if you find out that the vaccuator may work or the exhauster we do not supply. Our business is not to buy and give tools in Kibera but to demonstrate so that the relevant government authorities may then go and do that.

Dr. G. L. O.I   UN-Habitat                14-1-2015
The chi-square results revealed that there was no significant differences in the number of people in Kibera trained in CBWMP by other organisations ($\chi^2=4.364$, df=6, $p=0.63$, Not significant $p>0.05$). The community may be not be aware of the efforts done by other organizations like UN-Agencies as what they do is normative work as already discussed.

**Table 4.20: Summary Chi-square Results of Sustainable Participatory Approaches in CBWMPs**

<table>
<thead>
<tr>
<th>Sustainable CBWMP</th>
<th>p value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Urban gardening awareness</td>
<td>0.00001</td>
<td>Significant</td>
</tr>
<tr>
<td>2 Waste composting awareness</td>
<td>0.48</td>
<td>Not significant</td>
</tr>
<tr>
<td>3 Awareness of households making briquettes</td>
<td>0.13</td>
<td>Not significant</td>
</tr>
<tr>
<td>4 Households generating income - wastes</td>
<td>0.29</td>
<td>Not significant</td>
</tr>
<tr>
<td>5 Individual reselling of wastes</td>
<td>0.0003</td>
<td>Significant</td>
</tr>
<tr>
<td>6 Membership to informal waste reselling organization</td>
<td>0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>7 Membership to formal waste reselling organization</td>
<td>0.02</td>
<td>Significant</td>
</tr>
<tr>
<td>8 Membership to CBO that deals with wastes</td>
<td>0.29</td>
<td>Not significant</td>
</tr>
<tr>
<td>9 Training in sustainable CBWMP</td>
<td>0.05</td>
<td>Significant</td>
</tr>
<tr>
<td>10 Training in CBWMP by NCG</td>
<td>0.26</td>
<td>Not significant</td>
</tr>
<tr>
<td>11 Training in CBWMP by NGO</td>
<td>0.44</td>
<td>Not significant</td>
</tr>
<tr>
<td>12 Training in CBWMP by FBO</td>
<td>0.007</td>
<td>Significant</td>
</tr>
<tr>
<td>13 Training in CBWMP by CBO</td>
<td>0.02</td>
<td>Significant</td>
</tr>
<tr>
<td>14 Training in CBWMP by Others</td>
<td>0.63</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

*Significant level when $p<0.05$

Table 4.20 shows a summary of statistical tests through chi-square analysis. The tests revealed significant differences in some CBWMP like urban garden awareness, individual reselling of wastes, membership to informal/formal waste reselling organizations and training in CBWMP. There were specific trainings in CBWMP that showed significant differences within the slum and they included trainings by FBOs and
CBOs. These significant differences can be attributed to the diversity of the slum in terms of demographic, social, political and economic status. Other issues under investigation like waste composting awareness, awareness of households making briquettes, households generating income from wastes, membership to CBO that deal with wastes and training in CBWMP by NCG, NGO and other organizations didn’t have significant differences within the slums. Generally very few people seemed to have engaged in the CBWMP in Kibera informal settlements. There results from Table 4.20 shows there were significant differences in the involvement of Kibera residents in sustainable community based waste management practices in the seven sub-locations of Kibera. Thus hypothesis 3 \( H_0 \) the involvement of Kibera residents in sustainable community based waste management practices does not significantly vary in the seven sub locations was rejected.

**Summary**

The findings from social demographic characteristics of Kibera informal settlements have shown that only household income, ethnic background, and religious affiliation do not have significant differences within the seven sub-locations. It was also established that the main forms of socio-economic exclusion include impoverishment, labour market, government services and financial exclusion. The causes of socio-economic exclusion include lack of participation in social activities, unemployment, low income, crime and geographical disadvantage.

The results have shown that 78.9\% of Kibera residents experience problem due to wastes. Household wastes, organic wastes and polythene bags are the leading types of solid wastes negatively affecting the residents. As a result the wastes produce foul smells
attracting flies and rodents like rats. The challenge of solid and liquid waste management has also attracted foraging dogs it has been coupled by improper disposal of waste water causing diseases like malaria, typhoid, dermatological conditions, tapeworms/hookworms and diarrhoea. The above issues are caused by among other things lack of finances, governance and leadership challenges and lack of efficient waste solid waste and waste water management systems. It was also evident that there is a link between socio-economic exclusion and sustainable waste management. If Kibera residents practice sustainable waste management there can be socio-economic inclusion. This can be done by recycling, reusing and reselling of waste.

The findings have also shown that over 70% Kibera residents are aware of some CBWMP like urban gardening and composting but 80% are not aware of anyone making charcoal briquettes. The community is also rarely engaged in CBWMP as only 10% of the residents are engaged. Training in CBWMP seems to be done more by CBOs, the other organizations contribution is minimal. These organizations like NCG, NGOs, FBOs and UN-Agencies should do more and fill in the gap left by CBOs. The next chapter presents summary of the main findings, conclusions, recommendations and suggestions for further research.
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Main Findings

The summary of the findings are based on the specific objectives of this research. The study found out that some social demographic characteristics are similar in some sub-locations in Kibera informal settlements. In other instances, some demographic characteristics are varied across Kibera informal settlements.

The study sought to find out the main forms and causes of socio-economic exclusion in Kibera informal settlements. It was observed that the main forms of socio-economic exclusion in Kibera were impoverishment, government services exclusion, religious exclusion, age exclusion and exclusion from financial services. The respondents indicated that they didn’t earn enough money due to being associated with Kibera slum and others had difficulties in obtaining loans. The respondents also indicated that they were left out of government services due to ethnicity. Others, especially the youth felt they were excluded due to age, ethnicity and religion. However, there were forms of exclusion where people had mixed feelings for instance in labour market exclusion. The questionnaire survey indicated that people were not excluded from the labour market but during interviews they indicated they were. Similarly, exclusions from social relations and political is there but minimal.

The study also established that the leading cause of socio-economic exclusion was lack of participation. This was due to a number of factors the most prominent being economic reasons, followed by political then time constraints and lastly ethnic reasons. Crime was
also cited as a cause of socio-economic exclusion where youth were constrained in carrying out waste management practices in some slum neighbourhoods. There was also unemployment where by the residents couldn’t integrate in the community due to lack of jobs leading to poverty. Poor housing is also a cause of socio-economic exclusion and it was observed during transect walks. It was noted that the causes of socio-economic exclusion varied within the sub-locations.

This research also aimed at evaluating the main challenges and impediments to the current strategies applied in enhancement of community based waste management practices in Kibera. The study revealed that the main wastes produced in Kibera consisted of polythene bags, waste water, organic wastes, papers, glasses and metals in the order of occurrence. More than half of the respondents indicated that household wastes and organic wastes were affecting them negatively. There were other solid wastes causing nuisance in Kibera and they included polythene bags, papers, glasses and metals in descending order. Majority of the respondents cited dogs and pigs as the domestic animals that were affecting them due to improperly disposed solid wastes. On the hand, rats were cited overwhelmingly under the category of wild animals that had affected Kibera residents negatively. The presence of scavenging birds like pied crow and Marabou Stork was limited. House flies and mosquitoes were also cited as a major concern by the residents. As a result, there were high incidences of communicable diseases like malaria, diarrhoea and typhoid. This situation was exacerbated by financial, governance and leadership challenges.
The focus of the study was also to assess the relationship between socio-economic exclusion and unsustainable solid waste management practices in Kibera. The study found out that socio-economic exclusion was linked to community based waste management problems especially through poverty and lack of technical knowhow. It was also observed that waste management problems had caused environmental and social decay in Kibera. Resulting in the residents being excluded from many issues like financial and government services.

The ultimate aim of the study was to identify and discuss sustainable participatory approaches of fostering community based solid waste management practices in Kibera. The study established that indeed, only a small percentage (23%) had been trained in CBWMP. Majority of the residents had been trained in CBWMP by CBOs but there are other actors like NGOs, FBOs, and other organizations. There are various CBWMP like making briquettes and composting in Kibera but the community have not fully embraced the practices. Olympic/Kianda sub location was managing its waste sustainably and could be a good example to others.

5.2 Conclusions

1. The study aimed at investigating the main forms and causes of socio-economic exclusion among residents of Kibera informal settlements. The research shows that the main forms of socio-economic exclusion in Kibera informal settlements include: exclusion from financial services, exclusion from government services, impoverishment and age. Lack of participation especially in community based
waste management approaches is the leading cause of socio-economic exclusion. The lack of participation is caused by economic, education, social and political reasons. Other causes of socio-economic exclusion include ethnicity, unemployment crime and location disadvantage.

2. The research also sought to evaluate the main challenges and impediments to the current strategies applied in enhancement of community based waste management practices in Kibera. It is evident that waste management problems exists in Kibera causing myriad problems like clogging of drainages, communicable diseases like malaria, diarrhoea and gastro intestinal infections. Dogs were observed to be causing the biggest menace in Kibera but their owners protect them from elimination by authorities. Waste water is also a big impediment to waste management in Kibera as it causes flooding of footpaths and encourage diseases carrying vectors like rats, mosquitoes and houseflies. In addition waste water makes the garbage soggy creating powerful bad odour that pollutes the neighbourhood. There are also governance and leadership challenges where political actors unduly influence the operations in the slum thus compromising waste management in Kibera.

3. The research sought to establish the relationship between socio-economic exclusion and solid waste management practices in Kibera informal settlements. The study concluded that socio-economic exclusion is linked to unsustainable solid waste management practices as neighbourhoods are excluded from garbage
collection services by the county government. The situation is exacerbated by lack of enough sanitary facilities making people defecate in the open spaces. This makes some areas to be seen as the worst human habitats ever. Sustainable solid waste management practices like sorting and recycling can make the community earn more thus increasing economic and social capital. Lastly, if solid wastes took a sustainable route it will eventually lead to socio-economic inclusion.

4. Lastly, the study aimed at identifying and discussing sustainable participatory approaches used in fostering community based solid waste management practices in Kibera. The study concluded that CBWMPs are being carried out more by CBOs, the local and county governments plus other organizations. It was noted that all should put more effort in enhancing sustainable waste management practices. There are also a lot of strengths and opportunities in CBWMP that various actors in waste management in Kibera like Nairobi county government, NGOs, CBOs and the residents should adopt. The strengths and opportunities include the fact that a lot of solid wastes remain unsorted and there is low reselling and recycling. These actors should deal with weaknesses of CBWMP especially lack of participation. There should also be efforts to mitigate the ever constant threats to CBWMP chief among them ethnic and political strife in Kibera informal settlements.
5.3 Recommendations

The recommendations are guided by the specific objectives, main findings and conclusions. It was established that socio-economic exclusion exists in Kibera in form of exclusion from financial and government services, age and participation exclusion. Waste management challenges were noted in Kibera including lack of collection, clogging of drainages, communicable diseases, scavenging animals and governance. Indeed, the research established a clear link between socio-economic exclusion and waste management as excluded areas tend to have unsustainable waste management. Lastly, CBWMP should be encouraged and empower the various organizations working in the sector. It is against the above background that the study recommends the following measures in order to reduce socio-economic exclusion and unsustainable waste management practices in Kibera informal settlements.

1. Kibera informal settlement has various differences within the sub-locations, there is need to have sub-location specific interventions to address socio-economic exclusion and waste management issues. Some sub-locations like Olympic/Kianda don’t have acute waste management issues like Gatwekera and Laini Saba which also have low incomes.

2. More organizations like self help groups (SHG), CBOs, FBOs, NGOs and government agencies should train people in community based waste management practices as very few have training in the above practices. These organizations have presence in all areas of Kibera and as such they can deliver their services more easily and efficiently because Kibera residents identify with them.
3. There should be more county/central governments’ inputs in promoting community based waste management in Kibera. The governments’ input in promoting socio-economic inclusion and sustainable waste management was observed to be minimal, as such, the government should allocate more funds in training, capacity building and infrastructural development in Kibera slum.

4. The organisations working in community based waste management practices for instance an NGO named Carolina for Kibera should strive to have their operations felt beyond their areas of operation. Carolina is only felt in Olympic/Kianda. These organizations (NGOs, CBOs and FBOs) should roll their operations all over Kibera slum and avoid excluding some villages. This can be done by mobilising more resources so that slum residents from the other sub-locations of Kibera can benefit from their services.

5. Other organisations working in community based waste management practices should fill the gap that SHGs, NGOs, CBOs, FBOs and government agencies have left and train the residents as in CBWMP. These organisations include UN agencies and international development organizations like JICA. They should be involved more in training the residents through demonstrations ‘normative’ work and the residents will implement what has been tested elsewhere and worked.

6. Railway workers should transport the wastes away from Kibera and avoid dumping it in the river. They should hire NEMA registered solid waste handlers who should take the wastes dumped along the railway line to designated dumping sites. They should also make concerted effort to prevent Kibera residents from dumping on the railway line either by monitoring or sensitizing the residents on
the dangers of dumping garbage on the railway tracks. There should also be sites for wastes through planning.

7. There should be more collaboration and cooperation between the governments, both national and county with international development agencies and UN agencies in promoting CBWMP and reducing socio-economic exclusion in the Kibera informal settlements. This cooperation should allow vertical participation of Kibera residents and stakeholders to avoid failure of the projects initiated.

5.4 Suggestions for Further Research

The research was not able to cover many issues outside the objectives of the study. The following topics have been suggested for further investigation.

i. The emerging trend of waste handlers’ use of drugs and substances in undermining sustainable community based waste management in Kibera informal settlements.

ii. An investigation of religious and ethnic factors in enhancing socio-economic exclusion in Kibera informal settlements.

iii. The role of franchise companies in handling solid wastes in Nairobi informal settlements.
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Appendix 1: Introduction Letter to Respondent

Simon W. Mburu
Dept of Environmental Studies & Community Development,
Kenyatta University
P.O Box 43844-00100
Nairobi.
Tel +254 (2)-8710901-19
(ext. 57-220)
Dear respondent,

I am a PhD student at Kenyatta University Registration number N85/24608/2010 I’m carrying out a study on the relationship between socio-economic exclusion and community based solid waste management practices in Kibera informal settlements as part of my research project. I would like to kindly request you to fill this questionnaire so that I can collect useful data for my study.

Your cooperation is highly appreciated when filling this questionnaire.

-------------------------

Simon W. Mburu
Appendix 2: Study Information Sheet

To the respondent

Re: Study Information Sheet

Dear Sir/Madam

I am a PhD student at Kenyatta University Registration number N85/24608/2010. I’m carrying out a study on the relationship between socio-economic exclusion and community based solid waste management practices in Kibera informal settlements as part of my research project. I would like to request whether you would be interested in a questionnaire survey.

The objectives of the study are to investigate the causes and main forms of socio-economic exclusion among the residents in Kibera; to evaluate the main challenges and impediments to the current strategies applied in enhancement of community based waste management practices in Kibera; to assess the relationship between socio-economic exclusion and unsustainable solid waste management practices in Kibera; and to identify and discuss sustainable participatory approaches of fostering community based solid waste management practices in Kibera.

You were chosen through sampling of the individuals who live in the slum. The filling of this questionnaire was tale about 15-25 minutes. The information collected is strictly CONFIDENTIAL and ANONYMOUS and was only be used for the purposes of this research.

Simon W. Mburu – Researcher
Appendix 3: Household Questionnaire

Notes and instructions
i) Answer all questions objectively and accurately as possible.
ii) Please tick (✓) in the box provided at the right hand side of each answer
iii) In open ended questions please be brief and concise

Date…………………………… Sub Location………………………

Section A: Demographic and Socio-economic Data

1. Please indicate your gender
   (a) Male [ ]    (b) Female [ ]

2. Please indicate your age
   (a) 18-30 [ ]    (b) 31-39 [ ]    (c) 40-49 [ ]    (d) 50-59 [ ]    (e) 60 and above [ ]

3. Please indicate your highest level of education
   (a) None [ ]
   (b) Adult Education [ ]
   (c) Primary [ ]
   (d) Secondary [ ]
   (e) Post Secondary [ ]
   (f) University [ ]

4. Please indicate the sub-location of your residence?
   (a) Kibera [ ]    (b) Lindi [ ]    (c) Makina [ ]    (d) Silanga [ ]
   (e) Laini Saba [ ]    (f) Gatwekera [ ]    (g) Olympic/Kianda [ ]

5. How long have you lived in the sub-location?
   (a) Less than 5 Years [ ]    (b) 6-10 Years [ ]    (c) 11-15 Years [ ]
   (d) 16-20 Years [ ]    (e) Over 20 years [ ]    (f) No Comments [ ]

6. How many people live in your household?
   (a) Less than 5 [ ]    (b) 6-10 [ ]    (c) Over 10 [ ]    (d) No Comments [ ]

.....................................
7. What is your marital status?
   (a) Married [ ]   (b) Divorced [ ]   (c) Single [ ]

8. Are you the head of your household?
   (a) Yes [ ]   (b) No [ ]

9. Are you employed?
   (a) Yes [ ]   (b) No [ ]

10. What is your main source of income?
    (a) Employed/salaried [ ]   (b) Self employed [ ]

11. How much is your monthly household income (KShs)?
    (a) Less than 2,000 [ ]
    (b) 2001-4,000 [ ]
    (c) 4001-6000 [ ]
    (d) 6001-8000 [ ]
    (e) 8001-10,000 [ ]
    (f) 10,000 and over [ ]

12. Please state your ethnic background.
    ........................................

13. Please indicate your religion.
    (a) Christian [ ]
    (b) Muslim [ ]
    (c) Traditional African religion [ ]
    (d) Any other (Please specify)-------------------------
    ---------------------------------------------------

Section B: Main Forms and Causes of Socio-Economic Exclusion

14. Are you a member of a CBO?
    (a) Yes [ ]   (b) No [ ]

15. Which of the following does your CBO/NGO/FBO deal with?
    (a) Economic Empowerment [ ]
    (b) Political Empowerment [ ]
    (c) Social Empowerment [ ]

16. Do you have a problem with wastes?
    (a) Yes [ ]   (b) No [ ]

17. From question 15 what prevents you from joining a CBO/NGO/FBO?
18. Which ones? Explain..................................

19. Do you attend meetings of the CBOs/NGOs/FBOs mentioned in question 16 & 17 above?
   (a) Yes [ ]    (b) No [ ]

20. If you attend meetings in question 19 above, do you participate in decision making and sharing of ideas?
   (a) Very Much [ ] (b) Much [ ] (c) Little [ ] (d) Very Little [ ]

21. What makes you not participate in meetings?
   (a) Lack of technical knowhow of the subject matter [ ]
   (b) Being denied a chance to air views [ ]

22. Do you belong to the management of your CBO/NGO/FBO?
   (a) Yes [ ]    (b) No [ ]

23. From question 22 above what prevents you from holding leadership position?
   (a) Educational reasons (State).................
   (b) Economic reasons (State)..................
   (c) Political reasons (State)..................
   (d) Social reasons (State)..................

Section C: Waste Management Issues

24. Which of the following wastes do you produce in your house? Tick the one(s) that applies to you.
   (a) Paper [ ]    (b) Organic waste [ ]    (c) Polythene bags [ ]
   (d) Water [ ]    (e) Household waste [ ]    (f) Metals [ ](g) Glasses [ ]

25. Which types of solid wastes have negatively affected your neighbourhood?
   (a) Papers[ ] (b) Organic waste[ ]    (c) Polythene bags [ ]
   (d) Household waste [ ]    (e) Metals [ ]    (f) Glasses [ ]

26. Have you experienced negative effects due to improperly disposed wastes?
   (a) Very much [ ]
27. Which of the following issue(s) have you witnessed in your neighbourhood because of improperly disposed wastes?
   (a) Bad smells  
   (b) Loss of aesthetics in the neighbourhood  
   (c) Rodents (rats)  
   (d) Insects (Flies)  
   (e) Flooded footpaths

28. Have your house ever flooded due to clogging caused by garbage?
   (a) Yes  
   (b) No

29. Which of these domestic animals have you seen foraging wastes in your neighbourhood?
   (a) Dogs  
   (b) Pigs  
   (c) Goats  
   (d) Cows

30. On a scale of 1-4 which of the above animals do you think you had the worst experience with in your locality due to wastes? 1 is the highest and 4 is the lowest.
   (a) Dogs  
   (b) Pigs  
   (c) Goats  
   (d) Cows

31. Which of the following wild animals have you seen foraging wastes in your neighbourhood?
   (a) Rats  
   (b) Vultures  
   (c) Marabou stork  
   (d) Pied crow

32. On a scale of 1-4 which of the above animals do you think you had the worst experience with in your locality due to wastes? 1 is the highest and 4 is the lowest.
   (a) Rats  
   (b) Vultures  
   (c) Marabou stork  
   (d) Pied crow

33. Which of the following ailments have you suffered in the last 2 years?
   (i) Typhoid  
   (ii) Asthma attack  
   (iii) Tapeworms/ Hook worms  
   (iv) Diarrhoea  
   (v) Tetanus  
   (vi) Skin disorders  
   (vii) Cholera  
   (viii) Malaria  
   (ix) Respiratory ailments

34. How much do you pay for waste collection every month?
   (a) None  
   (b) Less than Kshs 100
35. How often is waste collected from your neighbourhood?
   (a) Daily [ ]  (b) Weekly [ ]  (c) Fortnightly [ ]  (d) Monthly [ ]  (e) Never [ ]

36. Does the Nairobi County Government collect waste from your neighbourhood?
   (a) Yes [ ]  (b) No [ ]

37. If your answer to question 36 above is NO, who collects the waste?
   (a) Community Based Organisation [ ]  (b) Private Company [ ]  (c) No collection [ ]

38. If your answer to question 36 above is YES, indicate how.

   ----------------------------------------------------------------------------------------------------------------------------------

39. Is the waste collector in question 38 above from the sub-location that you reside?
   (a) Yes [ ]  (b) No [ ]

40. Do friends and relatives dislike your neighbourhood because of improperly disposed wastes?
   (a) Strongly agree [ ]  (b) Agree [ ]  (c) Disagree [ ]  (d) Strongly disagree [ ]

41. Do you sort solid waste in your house?
   (a) Always [ ]  (b) Sometimes [ ]  (c) Never [ ]

42. How often do you carry out solid waste recycling?
   (a) Always [ ]  (b) Sometimes [ ]  (c) Never [ ]

43. Do you recycle waste water?
   (a) Yes [ ]  (b) No [ ]

44. Where do you dispose waste water?
   (a) Recycle [ ]  (b) Open ditch [ ]  (c) Sewer line [ ]
45. Which of the following have you encountered because of waste water?
   (a) Flooded foot paths [ ]  (b) Clogged drains [ ]  
   (c) Foul smell [ ]  (d) Mosquitoes [ ]

46. How far is your house to the nearest toilet/ latrine?
   (a) Less than 25 metres [ ]  (b) 26-50 metres [ ]  (c) 51-75 metres [ ]
   (d) 76-100 metres [ ]  (e) Over 100 metres [ ]  (f) No latrine/toilets [ ]

47. About how many people use the latrine that you use in your neighbourhood?
   (a) Less than 20 [ ]  (b) 21-50 [ ]  (c) 51-100 [ ]
   (d) 100-200 [ ]  (e) Over 200 [ ]

Section C: Sustainable Waste Management Practices

48. Are you aware of urban-gardening?
   (a) Very aware [ ]  (b) Aware [ ]  (c) Slightly aware [ ]  (d) Not aware [ ]

49. Are you aware of waste composting?
   (a) Very aware [ ]  (b) Aware [ ]  (c) Slightly aware [ ]  (d) Not aware [ ]

50. Are you aware of residents in Kibera who make charcoal from waste papers?
   (a) Yes [ ]  (b) No [ ]

51. Does your household get any income from wastes?
   (a) Yes [ ]  (b) No [ ]

52. If your answer in the above question is YES, state how much money per month
    ........................................

53. How is income from waste earned?
   (a) Individually [ ]  (b) Being a member of informal waste collectors [ ]
   (c) Being a member of formal waste collecting/ reselling organisation [ ]

Section D: Sustainable Participatory Approaches of Fostering Community Based Waste Management Practices in Kibera.

54. Are you a member of any Community Based Waste Collection Organization?
   (a) Yes [ ]  (b) No [ ]

55. If your answer to question 54 is YES, do you fully participate in the decision
    making on sharing of income in your organization?
   (a) Yes [ ]  (b) No [ ]
56. If your answer to question 54 is NO, what makes you not join a community waste collection, reusing and selling organization? Specify.

57. Are you aware of any impediments in joining a community based waste collection, reusing, and selling organization?

58. How can you overcome such impediments in question 58 above?

59. Have you ever received any training in sustainable community based waste management practices?
   (a) Yes [ ]         (b) No [ ]

60. If your answer to question 60 above YES, who trained you?
   (a) Nairobi City Council [ ]  (b) Non Governmental Organisation [ ]
   (c) Faith Based Organisation [ ]  (d) Community Based Organisation [ ]
   (e) Other(Specify)___________________________.

Thank you very much for taking your time to fill this questionnaire and the information provided was be kept strictly confidential.
Appendix 4: Letter of Introduction for Interviews and Focus Group Discussions

Simon W. Mburu
Dept of Environmental Studies & Community Development, Kenyatta University
P.O Box 43844-00100 Nairobi.
Tel +254 (2)-8710901-19 (ext. 57-220)
Dear Sir, Madam

REQUEST FOR INTERVIEW
I am a PhD student at Kenyatta University Registration number N85/24608/2010 I’m carrying out a study on the relationship between socio-economic exclusion and community based solid waste management in Kibera informal settlements as part of my research project. As stakeholder in the waste sector, your views and comments are important in this study and I would be grateful if you could grant me an interview. I would like to assure you that the information you provide in the interview was be treated confidentially and anonymously and was be used solely for the purpose of this research. If you are able to honour this request, please indicate (on the appointment slip enclosed) your preferred date, time and venue for the interview. Kindly return the slip in the self-addressed and stamped envelop that is enclosed. You can also notify me the above information through the telephone number or email addresses provided below.

Please find attached a copy of the interview guide for the discussion. Thank you in advance.

Simon W Mburu

Contacts:
Phone: 0714-355 459
E-mail: spmburus@yahoo.com, mburu.simon@ku.ac.ke

Appointment for interview

Name of officer: ..................................Organisation......................................

Position/rank:....................................Contact Tel. No: ..........................

Preferred date for interview:......................Time:..............Venue:...........
Appendix 5: Interview Schedule for Community Leaders in Kibera

1. Causes and main forms of non consideration/limitations in access to government services and facilities.
   (a) Do Kibera residents have limitations in access to social, economic and political services?
   (b) If yes explain the causes of the exclusion? Where? By who and why?
   (c) How are the local communities hindered in participation in waste management?

2. The main challenges of solid waste management in Kibera.
   (a) What are the main challenges of waste management in Kibera?
   (b) Can you identify long term, middle term and short term waste management challenges?
   (c) What are the causes of the waste management challenges mentioned above?

3. Relationship between non consideration to government services and facilities and solid waste management in Kibera.
   (a) Do you know of any relationship between waste management and social disadvantage?
   (b) How does the relationship above occur?
   (c) Is it possible to manage wastes in a way that people can participate more in governance, economics and social issues in the community?
   (d) How? In regard to the above question.

4. Impediments to the current strategies applied in enhancement of solid waste management practices in Kibera.
   (a) Who is leading the current strategies of waste management?
   (b) Are the impediments to the current strategies institutional or at individual level?
   (c) In question 4 (c) above explain how?
   (d) How can the current strategies be improved?
   (e) Are there any education/ awareness carried out in the local community of how to overcome the impediments to the current strategies?

5. Sustainable systems of fostering community based solid waste management practices in Kibera.
   (a) Is composting done in the slums? Any organic fertilizer produced?
   (b) Is recycling, reuse and reduction technologies done? By who?
   (c) Is waste water recycled for urban gardening? Explain
   (d) Are there any community groups selling wastes?
   (e) Are there any cooperatives in selling of wastes?
   (f) What measures have been taken to enhance the sustainability of waste management?
   (g) Are there any CBOs doing incineration and heating water in the area?
Appendix 6: Interview Schedule for Key Informants

CBOs /NGOs/UN-Agencies Working in Sustainable Waste Management.

1. How many years have you /your organization worked in Kibera?

2. Which waste recycling methods do you use?

3. Do you engage in any of the following? Composting, Biogas production from wastes Reselling of wastes Community cleaning initiatives

4. Why did you choose the above activities as your project thematic issue?

5. Which of the following groups do you work with in the community? Men Youth Women Children All people in the community

6. What is the reason for choosing the group(s) above?

7. Which strategies have you employed to have Kibera residents more socially and economically independent?

8. Have sustainable methods of waste management benefited Kibera residents? How?

9. What are the main economic, political and social hindrances in implementing your strategies in Kibera?
Appendix 7: Interview Guide for Key Informants- Government Officials

in Kibera Informal Settlements.

1. Are residents in Kibera discriminated or disadvantaged in accessing economic, social and political services? What are the causes of this discrimination or disadvantage?

2. How are the authorities tackling the social and economic limitations in Kibera’s informal settlements?

3. How have the local authorities ensured that funds such as CDF, Youth Enterprise Development Fund and Women Enterprise Fund are utilized in enhancing sustainable waste management practices that generate income?

4. How do your institutions support micro enterprise in waste reselling and recycling?

5. What are the major hindrances to the community involvement in sustainable waste management?

6. How do the authorities deal with foraging wild animals especially birds?

7. How do authorities deal with foraging domestic animals?

8. What are the steps being taken by the local authorities in the devolved governance in Kenya to address the waste issues in Kibera?

9. What are the authorities doing to eliminate the impediments to community based waste management practices?
Appendix 8: Interview Schedule, Focus Group Discussions for Kibera Residents.

The general outlay of the interview was as follows. There were six bold categories and each in category specific information was be sought.

1. Causes and main forms of social and economic disadvantages/ discrimination.
   (a) Are you aware of the causes of discrimination and disadvantages in accessing social, economic and political goods Kibera? If yes explain.
   (b) Do you participate in community waste management? Any limitations to participation? If yes which ones?
   (c) Were you born in Kibera? (to establish continuity of exclusion).

2. The main challenges of solid waste management in Kibera.
   (a) Which challenges do you face in waste management?
   (b) Are the challenges long term, middle term or short term?
   (c) Causes the waste management challenges?

3. Relationship between discrimination and disadvantage solid waste management in Kibera.
   (a) Do poor waste management practices cause social discrimination and disadvantage?
   (b) Does lack of employment opportunities, social networks affect waste management practices?
   (c) How the relationship above occurs?
   (d) Is it possible to manage wastes in a way that it can lead to inclusion?
   (e) How? In regard to the above question.

4. Impediments to the current strategies applied in enhancement of solid waste management practice in Kibera.
   (a) Are the strategies being employed institutional, personal?
   (b) Are the impediments to the current strategies institutional? If yes how?
   (c) How can the current strategies be improved?
   (d) Any education/ awareness carried out to the local community of how to overcome the impediments to the current strategies.

5. Sustainable systems of fostering community based solid waste management practices in Kibera.
   (a) Is composting done in the slums? Any organic fertilizer produced?
   (b) If composting is done. Are there any checks for hazardous inorganic wastes?
   (c) Is recycling, reuse and reduction technologies done? By who?
   (d) Is waste water recycled for urban gardening?
   (e) How can recycling be done?
   (f) Are you members of any community group or cooperative in waste selling?
   (g) If YES why?
   (h) If NO why?
Appendix 9: List of Participants in Youth Focus Group Discussion

1. Eric Kevati
2. Jacob Maina
3. John Oyondi
4. Kris Mutuku
5. Jomnic Rawu
6. Henry
7. Kevin Matata
8. Erico
9. Junior Bayano
10. Wiky
11. Charles Kamau
12. Alnealy Lorenzo
13. Pauline Avira
### Appendix 10: Observation Schedule

<table>
<thead>
<tr>
<th>S. No</th>
<th>Issue</th>
<th>Comments/description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Uncollected garbage</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Clogged drains</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Foraging animals</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Open sewers</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Recycling centres</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bio-centres</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Presence of waste in rivers/dams</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Foul smell from wastes</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 11: Research Authorization

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

OUR REF: N85/24608/10
DATE: 29th May, 2014

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. SIMON W. MBURU REG. NO. N85/24608/10

I write to introduce Mr. Mburu who is a Postgraduate Student of this University. He is registered for Ph.D. Degree programme in the Department of Environmental Studies & Community Development in the School of Environmental Studies.

Mr. Mburu intends to conduct research for a proposal entitled, “The Relationship between Socio-Economic Exclusion and Community Based Waste Management Practices in Kibera Informal Settlement, Nairobi County”.

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

DN/cao