

UTILIZATION AND SUSTAINABILITY OF WATER AND
SANITATION SERVICES IN KIBERA SLUMS OF NAIROBI, KENYA

BY

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sustainability of*



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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or any other award.

Signed  Date 9/10/08

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This thesis has been submitted with our approval as University supervisors

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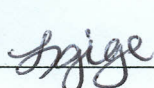
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DEDICATION

To my husband, John Kebaso, for inspiration, professional input, financial and moral support in ensuring that am empowered, to my children Allyne-Zack Kebaso and Mariana for their endurance and my sister Janet for her invaluable support.

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ABSTRACT

The study was a survey of factors influencing the utilization and sustainability of water and sanitation services in Kibera. This research study used both cartographic and geographic information techniques to examine the spatial pattern of sanitation delivery facilities in Kibera slum of Nairobi. The research study aimed at assessing the socio-demographic characteristics, level of knowledge and attitude towards utilization, availability and accessibility of sanitation facilities. A total of 169 respondents were interviewed from Kibera slums, by means of structured and semi-structured questionnaires, observations and in depth interviews were done to elicit a better understanding of the factors and their effects on the utilization of sanitation facilities in the slum areas. Data were analyzed quantitatively and qualitatively to address the objectives of the survey. Statistical Package for Social Sciences (SPSS) was used to analyze quantitative data. Descriptive statistical of means, frequencies and percentages were used to describe and summarize data. Cox regression analysis was performed on the data. Tables, pie charts, and graphs were used to present results. Qualitative data was analyzed using NUDIST package. The results from the study indicate a very strong relationship between, cost of using latrine from the respondent's house, time taken walking to the latrine and the satisfaction the respondents get from the latrine services. These results explain that utilization of these facilities is highly affected by these factors. In an urban

population where most people live below poverty level these facilities are not sustainable with these high significances ($P=0.012$, $P=0.026$)

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ACRONYMS AND ABBREVIATIONS

| | |
|----------|---|
| CBOs | Community Based Organizations |
| UNDP | United Nations Development programmes |
| KICOSHEP | Kibera Community Self Help Programme |
| MDGs | Millennium Development Goals |
| PPAs | Participatory Poverty Assessment |
| WHO | World Health Organization |
| UNICEF | United Nations Children Fund |
| WDR | World Development Report |
| KWAHO | Kenya Water for Health Organization |
| NAPWA | National Association of People Living with AIDS |
| DSS | Demographic Surveillance Systems |
| HIPC | Heavily Indebted Poor Countries |
| IDIs | In Depth Interviews |

CHAPTER ONE

1.0 INTRODUCTION

Africa is currently undergoing an urban population explosion. Despite slow economic progress since the 1970s, African cities have experienced the fastest population growth rates in the world. As a result, African urban economies have been unable to meet the needs of rapid urbanization amidst deteriorating economies. More than 60% of Nairobi population is living in slums, with Kibera holding almost half of these populations. This has posed enormous challenges to health and civil order. Many organizations and Community Based Organizations (CBOs) have taken advantage of the escalation of these problems to come up with intervention projects to address issues of sanitation problems in the urban informal settlements. Little has been done to ensure that these facilities are utilized by the local people.

Development work is largely reflected by the large number of projects and programs in a variety of areas. It normally depends on an effective partnership between project planners and the local community (Nichol, 1991). Social survey research helps in shaping projects to fit the community's own view of its needs.

1.1 BACKGROUND INFORMATION

Slum dwellers constitute the majority of Nairobi's population: an estimated 60 per cent of the city's populations of roughly 3 million live in informal settlements. Kibera slum is one of the oldest and largest slums in Kenya and Africa. Kibera is ranked the largest slum in Eastern and Central Africa. The settlement is the biggest slum in Nairobi and the second largest in Africa after Soweto in South Africa (UNDP, 2004).

It is estimated to be 235 square hectares in size. The name Kibera was derived from Nubian word (Kibra), which means forest. Initially the area was covered by a large forest, hence the original name of Kibra. The majority of the residents live below the poverty line. Kibera's basic utilities and sanitary infrastructure are sparse, the estate is disease ridden and crime is rampant. For some of the residents, the neighboring Ngong' forest provides a source of income from the harvesting of various products including firewood, poles and medicinal plants.

Kibera initially grew as a village housing of the Nubian soldiers of the demobilized arms of British East Africa at the end of the Second World War, in 1947 (UNDP, 2004). Subsequently, as rural-to-urban migration increased, many people moved into the area where they put up temporary structures to live in. Gradually, the initial inhabitants gained various forms of rights to the land and began building mud-and-wattle structures for renting. There is a tendency for people to live in sections of the slum in ethnic groupings, sometimes called villages although there are no identifiable boundaries. At the moment there are 13 recognized villages in total (UNPD, 2004). Situated southwest of the city center, Kibera comprises 13 sprawling slum villages, namely Makina, Mashimoni, Line Saba, Silanga, Kambi Mhuru, Gatwikera, Kianda, Lindi, Kisumu Ndogo, Soweto. It has an estimated population of about 1,000,000 residents (UNDP 2004). The population comprises all the ethnic groups in Kenya and one Sudanese tribe, which is the Nubians.

The railway line to Kisumu passes through the long axis of the slum in an approximately South-East to North-West direction and to the South is the Nairobi dam. As in other slum areas, poverty is widespread in Kibera. Most residents are

employed either in the informal sector or in low paying jobs in the industrial area and in the city. The informal sector predominates, including petty business, open-air garages, hawking of various wares, and the informal manufacturing of small articles by artisans known as Jua Kali (Swahili word for 'under the hot sun', because most work is in the open air).

Kibera has only two health centers i.e. Kibera community Self help Programme health center and AMREF Kibera Community Health Center (UNDP, 2004). These two health centers are not able to sufficiently cater for all the residents of Kibera forcing some to seek services outside Kibera. Water and sanitation are not any better in Kibera as residents use the “flying toilet” for their biological calls of nature. Different projects have been started to curb the situation by providing toilet facilities. The residents have poor access to water points or sometimes are forced to pay for them at a cost they cannot afford. There have been projects in the area to bring water close to the residents at affordable price or sometimes free. This research sought to establish factors that influence the utilization of the water and sanitation services in Kibera and to assess the sustainability of the facilities in the area.

1.2 Statement of the Problem

There are many projects in Kibera on water and sanitation but little effect can be seen on the lives of residents. The residents complain of lack of proper sanitation in the community with some people still using “flying toilets” and others disposing their human waste on trenches. Sanitation is almost non-existent, as most landlords have not built pit latrines. The poor sanitation, coupled with the proliferation of roadside

food stalls, has often led to serious disease outbreaks. Since the dwellings are so closely spaced, epidemics spread fast.

When residents use the polythenes to dispose off their waste by throwing them on roof tops, possess a high risk of them contracting water borne diseases and other diseases which are a health hazard. This is so because when it rains some of them use the rain water in the house for different purposes including drinking and cooking. Many of the projects have been completed and some are still being implemented, the question still remains: What determines the utilization of these services? In order to attain environmental sustainability the issue of sustainable sanitation has to be addressed seriously. Lack of proper sanitation gave initiatives to organizations like AMREF and UNICEF among others to design projects to curb the situation. Community based organizations and community self help groups have also come up with projects to ensure that Kibera has improved sanitation and access to clean water. These services are there but still the issue of the commonly known 'flying toilets' is rampant and human waste can still be found on the roads and trenches of dirty water in these areas with the residents oblivious of the danger of this. This research aimed at assessing the utilization, and sustainability of water and sanitation services available in Kibera slum.

1.4 Objectives of the research

1. Determine the socio-demographic factors of Kibera residents.
2. Explain socio-economic factors influencing utilization of water and sanitation Services in Kibera.
3. Discuss the cultural factors affecting the utilization and sustainability of water

and Sanitation services in Kibera.

4. Determine sustainability of water and sanitation services in Kibera.

1.3 Research questions

1. What are the factors that influence utilization of the water and sanitation services in Kibera?
2. How sustainable are these water and sanitation facilities?
3. What is the impact of water and sanitation projects in Kibera?
4. Why do cultural beliefs still have a part to play in utilization and sustainability of water and sanitation facilities?

1.6 Limitations of the Study

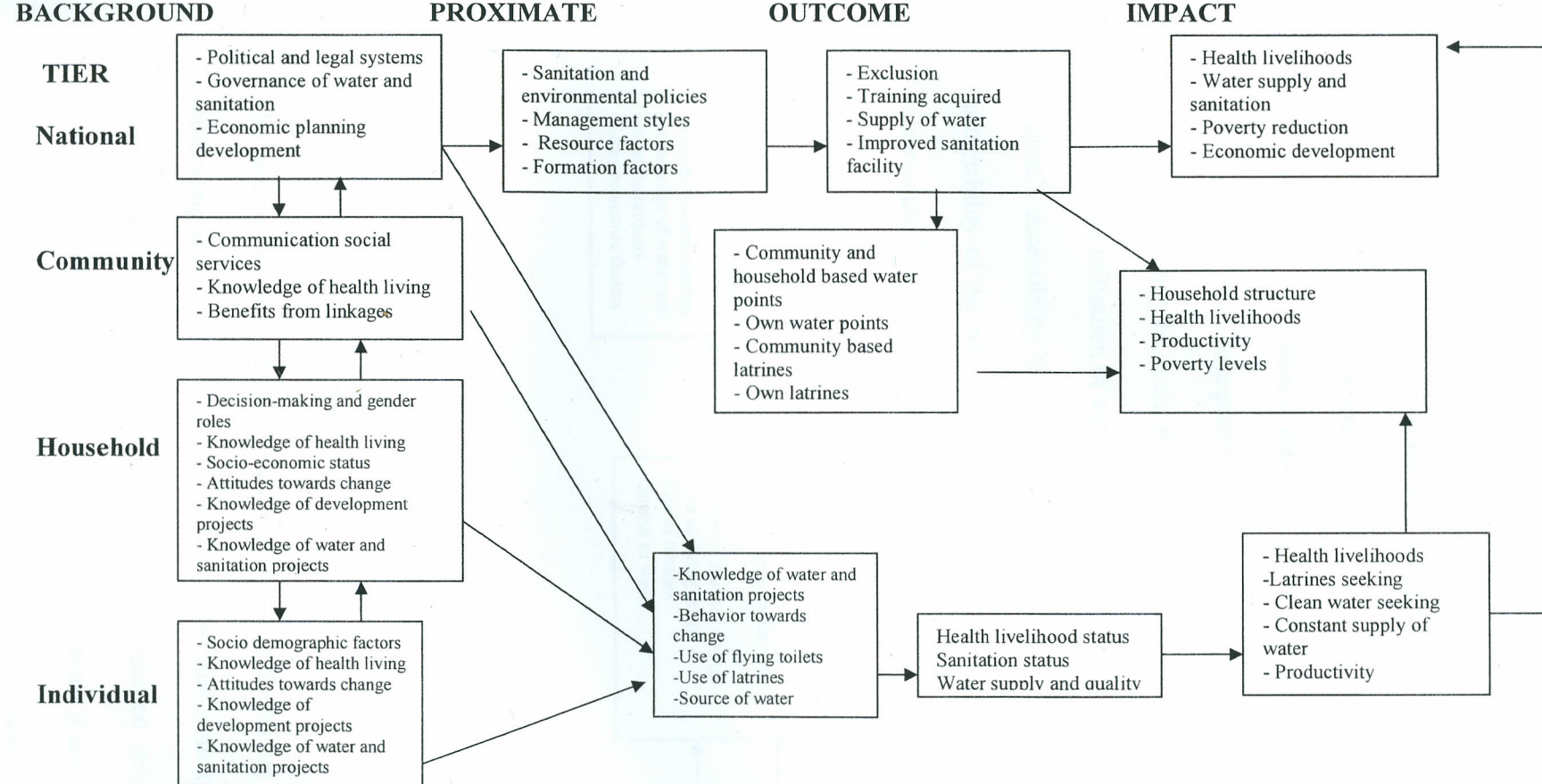
1. Financial constraints limited the geographical scope that was covered.
2. Time constraints limited the number of respondents that were interviewed

1.7 Theoretical framework

Theoretically, the social and economic context of the implications of water and sanitation projects can be viewed as a combination of background and proximate factors that operate within the multi tiers of social organization (Madise *et al.*, 2003). The framework demonstrates the wide-ranging social and economic effects of water and sanitation projects as determinants of environmental sustainability and poverty reduction. This framework has been applied in assessing the social and economic context of HIV/AIDS in resource-poor countries in a study being conducted by African Population and Research Centre in Kenya and other African countries. Figure

1.1 shows the complex relationships between background and proximate factors and the outcome and impact of water and sanitation projects.





Adapted from: Madise *et al.*, (2003)

Figure 1.1: Theoretical Framework showing factors affecting water and sanitation projects

1.8 Conceptual Framework

Conceptually, the determinants of the utilization and sustainability of water and sanitation projects can be viewed as a combination of background and proximate factors that operate within the multi tiers of social organization. The organization exerting influence, produce a complex picture that no single research project could address adequately. Consequently, the proposed research focused on the following themes; identifying the socio demographic, knowledge, and socio-economic factors that influence utilization of water and sanitation services in Kibera; assess the Kibera resident's accessibility to clean water and improved sanitation; and analyzing the sustainability of the water and sanitation projects in Kibera. The illustration below indicates the frame work of these themes.

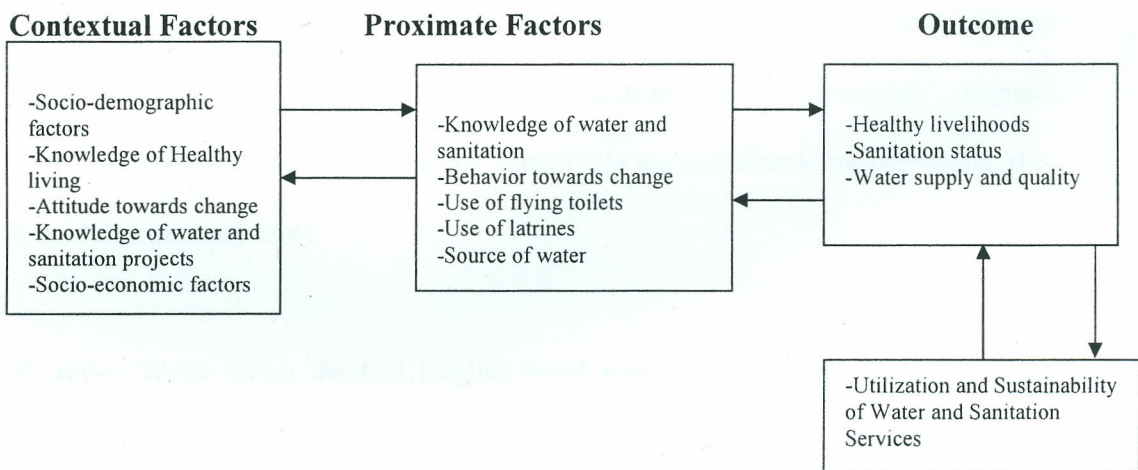


Figure 1.4 Conceptual Framework

1.9 Significance of the research

The research will provide the policy makers with information on the various factors influencing utilization and sustainability of water and sanitation services for better planning and implementation of sustainable sanitation projects in the informal settlements. With the relevant policy recommendations if acted upon and the current policies amended will help change the lives of the residents of Kibera in the area of

water and sanitation. By so doing the residents will be able to have access to better and sustainable sanitation facilities and continuous flow of water for their use. Also the research is aimed at starting a project on community mobilization to ensure that the residents from Kibera are well aware of these projects and view them as their own for better sustainability of the water and sanitation projects for enhanced development.

1.10 Definition of Terms

Flying Toilets— This is local slang referring to when one empties his/her human waste into a polythene bag and throws it away.

Sanitation— Maintaining clean, hygienic conditions that help prevent disease through services such as garbage collection and wastewater disposal (www.unesco.org/education/tlsf/theme_c/mod13/www.worldbank.org/depweb/english/modules/glossary.htm).

Water— Water (from the Old English word *wæter*) is a colorless, tasteless, and odorless substance that is essential to all known forms of life and is known also as the most universal solvent (en.wikipedia.org/wiki/Water).

Water and Sanitation: - wastewater and rainwater collection, transportation, and treatment techniques used together by a populated area, industrial site, or private parcel before discharge into the natural environment. Sanitation includes the disposal of sludge resulting from the wastewater treatment process.

CHAPTER TWO: LITERATURE REVIEW

2.1: General assessment on water and sanitation

Participatory Poverty Assessments (PPAs) generally show water and sanitation to be a high priority for the poor. In fact, the poor do not view water supply and sanitation merely in terms of their impact on health or education, but rather as intrinsically desirable goods because of the dignity, privacy, convenience and social status they offer (Kaminga, 2003). For people living in poverty, improved water supply and sanitation facilities are not merely means to an end, but themselves outcomes in poverty reduction.

During the 1980s and 1990s there was considerable investment in the provision of water supply and sanitation in developing countries. However, an evaluation report by the World Health Organization (2000) shows that a significant proportion of the world's population has still remained without access to improved water and sanitation. Between 1990 and 2000, 800 million people gained better access to water and 750 million to sanitation (WHO 2003). These huge numbers of people, however, translates into small percentages. The percentages of global population with access to an improved water supply rose from 79% (4.1 billion) to 82% (4.9 billion) and the proportion with access to improved sanitation facilities from 55% (2.9 billion) to 60% (3.6 billion). In Africa, roughly 40% of the population do not have access to improved water supply and sanitation, and in Asia 19% are without access to an improved water supply and 52% are without access to an improved sanitation. Other regions of the world have higher rates of access, but even in Latin America and the Caribbean many millions remain without (WHO, 2003). Urban water supply coverage in 2000 varies only from 85% in Africa to 100% in Europe and Northern America,

while rural water supply coverage varies from 47% in Africa to 100% in Northern America. These interregional variations are most stark for rural sanitation, with Asia having only 31% coverage, while Northern America has 100% coverage (WHO, 2000). In Latin America and the Caribbean, for example, 66% of the population has access to piped water through household connections, whereas only 24% of the population in Africa and 49% of the population in Asia has access to this type of service. With sanitation, 49% of the population in Latin America and the Caribbean has access to sewer systems, whereas only 13% of the population in Africa and 18% of the population in Asia has access to this type of service (WHO, 2000).

The World Health Organization (WHO) estimated that as of 2002 approximately 1.1 billion people globally had no access to a supply of safe water and 2.4 billion did not have basic sanitation. Principally affected are the poor and the disadvantaged who live in rural and peri-urban areas. They suffer silently without safe water or adequate means of disposing of excreta. According to the World Health Organization, each and every day some 3,900 children die because of dirty water or poor hygiene; diseases transmitted through water or human excrement are the second-leading cause of death among children worldwide, after respiratory diseases (WHO 2003). Water scarcity, poor water quality, and inadequate sanitation negatively impact food security, livelihood choices, and educational opportunities for poor families across the developing world. The current gulf in water use between rich and poor countries is wide—people in industrialized countries use 30–50 times more water than people in developing countries (UN-HABITAT 2003).

Poor water quality continues to pose a major threat to human health. Diarrhea disease alone amounts to an estimated 4.1 % of the total daily global burden of disease and is responsible for the deaths of 1.8 million people every year (WHO, 2004). It was estimated that 88% of that burden is attributable to unsafe water supply, sanitation and hygiene and is mostly concentrated on children in developing countries. Across the world, sanitation provision lags far behind access to water. Sanitation is one of the most off-track MDGs, with the crisis focused on Sub-Saharan Africa and South Asia, both of which have 37% coverage. South Asia's rates of progress in water and sanitation, which have doubled since 1990, give some cause for optimism, although much remains to be done since one in three un-served people lives in China.

Africa is the major source of concern: sanitation coverage has risen by only 5% since 1990 and this has been outstripped by population growth, so that the number of un-served people has actually increased by 111 million over the period. Some of the countries with the largest populations in the world also have the lowest coverage levels, especially for sanitation; China and India are the principal examples. Afghanistan, Cambodia, Mongolia, Myanmar, Nepal and Yemen also have extremely low levels of sanitation coverage. There is evidently a need to accord priority to improving sanitation coverage (WHO, 2000).

The high priority that the poor place on water supply and sanitation has led some countries to use this as a rationale for allocating significant investment funds to them. For instance, when in Uganda the PPAs showed safe water to be a major concern of the poor, the government allocated one-third of the debt relief funds the country received under the Heavily Indebted Poor Countries (HIPC) initiative to improving

water supply and sanitation. In some countries, the importance of water and sanitation to the poor is a major electoral issue.

Between 1971 and 1991, the City of Nairobi received World Bank funding to provide urban housing and water supply and sanitation. An evaluation of the projects revealed that water supply had kept pace with the urban population growth and tariff restructuring had helped in keeping water affordable (World Bank 1996). Although supply in cities is of particular concern because urban populations are growing twice as fast as rural populations, and the percentage of the urban population being supplied with water is actually falling (WHO 2003). As urban populations continue to grow rapidly, placing added pressure on already overstretched municipal services, the long-term prospects for increasing per capita water use in the region appear limited (Thompson *et al.*, 2000). Access to an adequate and safe water supply and to improved sanitation is a fundamental need and a basic human right, vital for the health and dignity of all people.

Kenya is limited by an annual renewable fresh water supply of only 647 cubic meters per capita, and is classified as a water scarce country (UNDP 2003). The percentage of people with access to safe water is 68% in urban area and 49% in rural settlements, according to the most recent data from 2003. Access to sanitation in urban areas is at 65% compared to 40% in rural areas (UNESCO 2006). Only 42 percent of the rural population has access to an improved drinking water source, and the time-intensive pursuit of water collection often prevents women from taking up income generating activities, or in the case of girls, prevents them from attending school.

Access to water near the home can save significant amounts of time for women and girls' time that can be spent on productive activities and education, which lay the groundwork for economic growth. Forty billion working hours are lost each year in Africa to the need to carry water (Cosgrove and Rijsberman, 1998), and improving domestic water supply services reduces female "time poverty." Certain areas of Kenya are even worse off than the national average – in North Eastern Province only 17% have safe water, in Makueni 16% and in Migori and West Pokot, only 6% (UNDP 2003). Accordingly, water-borne or sanitation-related diseases make up the majority of Kenya's morbidity rate and are responsible for over 60% of premature deaths. The most common instances of disease in Kenya are Malaria (32.6%), respiratory system infections (24.6%) and diarrhea and intestinal worms (17%) (UNESCO 2006).

2.2: Participation and level of literacy

In most cases, a community with limited knowledge about a technology makes it difficult for adoption and sustainability of that technology (World Bank report, 1998). There is always a relationship between improvements in education, health and hygiene awareness and the demand for sanitation facilities. Households with members who have a higher level of literacy are most likely to demand and adopt safer methods of excreta disposal than those with low levels of literacy (United Nations, 1993). The higher levels of literacy are also associated with a high premium placed on health status, which will lead to a demand for safer sanitation technologies. Private agencies and nongovernmental organizations require strong support in the major task of social intermediation and providing extensive training and advice to the community, to strengthen its ability to run its own system.

To be effective, control of projects, including project finances, must be delegated to the community as much as possible (Palmer, 1998). When the community plays the primary role in initiating a project and making key decisions about it, the probability that the system will be sustainable dramatically improves (World Bank report, 1998). In the process of involving the community there is increased awareness of such facilities and therefore increased utilization and sustainability. Relationships between the community, private contractors, and other support organizations must be strong and properly structured, with the community as the client and with appropriate incentives for all parties. Palmer (1998) in his report to the World Bank after an evaluation of the Mvula Trust water project in South Africa adds that up-front contributions from the community and ceilings on per capita grant allocations creates incentives for cost-efficiency and all this builds up to sustainability of a project in the community.

2.3: Cultural and Economic Factors

Improved water supply can stimulate small industry, especially at the cottage-industry level where industries are too small to be able to construct their own water supply and sanitation facilities if these are lacking (Hutton, 2004). The list of entrepreneurial activities for which clean water is vital is long: for instance: brick making, beer brewing, tea selling, handicrafts, hairdressing, clothes laundering, and pottery. Better domestic water supply can also make market gardening and small livestock rearing feasible, which, as well as enhancing food security, can be lucrative. For instance, small vegetable gardens as a result of a water project in Zimbabwe were shown to provide produce valued at up to US\$2000 per year (UNICEF, 2004).

In order to increase the rate at which access to improved water and sanitation is extended, further advocacy and assessment of existing projects is needed at international and national levels to increase resource allocations to this process (UNICEF, 2004). The benefits of water supply and sanitation improvements are most often thought of in health terms, and it is true that reduction of disease is one of most immediate and direct impacts. The 1993 World Development Report (WWDR) stated: "The lack of water supply and sanitation is the primary reason why diseases transmitted via feces are so common in developing countries" Of the ten most widespread diseases in slums, five are linked directly to inadequate water and sanitation provision (WHO, 2003).

In the absence of good and reliable water supply, many families are forced to incur direct out-of pocket costs in order to purchase water from vendors, store water in their houses, or disinfect dirty water by boiling or chemically treating it. These costs, particularly the cost of purchased water, can be considerable (Hutton, 2004). As is detailed by WWDR's 2003 report, even at the lower price of 2 shillings per 20 litres container, the rate is eight times that of the lowest tariff for domestic connections, and four times the average tariff in Kenya. It is estimated that in the informal settlements of Nairobi, users pay Kshs 6 per 20 litres jerry can, or over Kshs 500 per cubic meter, for water during times of shortage, higher than water rates practically anywhere else in the world, and twenty times the amount paid for the same volume of water by those with piped connections (Seureca, 2002). The same happens when using the sanitation facilities around the informal settlements; one has to pay in order to use them, visit to the latrines costs 3 shillings. Perceived social pressure and household's attitude have

similar importance in predicting and explaining households' intention to pay for improved water services.

Cultural beliefs have a strong impact on sanitation, and even on the possibility of talking about sanitation. In many cultures, the handling of excreta is considered a taboo and viewed as disgusting or a dangerous nuisance, not to be discussed. No one wants to be associated with excreta. Those who reduce its offensive characteristics for others may be stigmatized by association (WHO, 2000), and this may make people unwilling to manage sanitation facilities. There are cultural aspects for instance, restrictions on sharing sanitary facilities between adults and children, men and women and in-laws and outsiders in general (United Nations, 1993). Depending on the priority given by the respective households this can adversely hinder the utilization of the sanitation facilities as most of them are communally owned leading to other options of excreta disposal.

2.4: Women and Water and Sanitation

Although water has come to be recognized as a fundamental and inalienable human right that should be accessible to all individuals, access to this resource continues to elude many women around the world (WWDR, 2003). Approximately 2.2 million people in developing countries die each year from diseases associated with the lack of access to sufficient and clean water (WSSCC, 2004). The hardest-hit by the crisis, more than half of the 1.2 billion people who do not have access to water are women (ibid.). Furthermore, in most developing countries, water provision and management at the domestic and community levels are usually the preserve of women and girls (Ekejiuba, 1995), some of whom, unlike their male counterparts, are estimated to

spend over 8 hours a day transporting an average of 15 litres of water across 10-15 kilometer distances (UNIFEM, 2003). These responsibilities have important implications for the lives of women and young girls. As Obando (2003) points out, “the carrying of water not only causes them physical disorders, but also makes it difficult for them to get involved in activities such as education, income generation, politics, leisure, and recreation.” Moreover, this situation holds serious implications for achieving the 7th Millennium Development Goal – to halve, by 2015, the proportion of people who are unable to reach, or to afford, safe drinking water (UN Millennium Declaration, 2000).

Unemployment and inadequate wages among the employed restrict slum residents’ ability to meet personal needs and familial obligations (Zulu *et al.*, 2002). As other economic options run out, economic desperation pushes women to rely on sexual relations to obtain sufficient money for rent, children’s schooling, and other basic necessities, and many of them maximize the number of sexual partners they have in order to increase their economic security (Akuffo 1987; Bassett & Mhloyi 1991; Orubuloye *et al.*, 1994).

Water management should not be construed as an easy task. In their roles as water providers and managers, women must sometimes negotiate between the necessities of eating and performing important household chores – an involving task which may hamper their participation in broader societal activities and concerns (Obando, 2003). Securing water in itself can be a costly endeavor. Female slum-dwellers in Kenya pay at least five times more for one liter of water than their counterparts in the United

States (IISD, 2004). Within Nairobi, slum-dwellers pay more for water than their non-slum peers connected to the city supply.

2.5: HIV/AIDS and Water and Sanitation

Marked developments on the African continent suggest a need for urgent attention to an emerging urban crisis: rapid urbanization amid poverty (United Nations 1998), and the urban character of the HIV/AIDS epidemic (DesGrees du Lou 1999). Existing research suggests a linkage between these two trends, with deteriorating economic conditions in urban areas increasing the likelihood that women, especially adolescents, will engage in risky sexual behavior that encourages the spread of HIV/AIDS (Ulin 1992; Carael & Allen 1995). Good sanitation is a further rarity in slum communities. It has been estimated that over 90 per cent of the slum population have extremely poor or inadequate sanitation (Matrix Development Consultants 1993), and in some of the slums it is not uncommon for over 50 people to share one pit latrine.

Easy access to safe and sufficient water and sanitation is indispensable for people living with HIV/AIDS and for the provision of home-based care to AIDS patients. Cultural preferences mean that the majority of AIDS patients are being cared for within their local communities. Water is needed for bathing patients and washing soiled clothing and linen. Safe drinking water is necessary for taking medicines, while nearby latrines make life more tolerable for weak patients. Finally, water is needed to keep the house environment and latrine clean in order to reduce the risk of opportunistic infections.

Water and sanitation provision increases the sense of dignity of both patients and caregivers, (UNAIDS, 2004). The report continues to note that the main mandate of the water supply sector has always been to improve people's health by providing access to safe water supply and sanitation. With HIV/AIDS, this becomes even more pertinent because diarrhea and skin diseases are among the most common opportunistic infections. For some patients, diarrhea can become chronic, weakening them even more. In order for HIV infected people to remain healthy as long as possible and for people with AIDS to reduce their chances of getting diarrhea and skin diseases, adequate water supply and sanitary facilities are of the utmost importance. Clean water is also needed to take medicines.

Of particular importance to Africa, is the fact that access to water supply and sanitation prolongs the lives of people living with AIDS. The epidemic has reached a point in its cycle when those who are HIV positive are starting to fall sick, and are vulnerable to opportunistic infections. In the words of Nkululeko Nxesi, the director of the South African National Association of People Living with AIDS (NAPWA): "In order for HIV -infected people to remain healthy as long as possible and for people with AIDS to reduce their chances of getting diarrhea and skin diseases, adequate water supply and sanitation are of the utmost importance (WHO, 2006).

2.6: Summary

There is a lot of literature on the scarcity of water and sanitation services in the informal settlements and its implications but little literature on the determinants of utilization of these services and their sustainability. By the end of water and sanitation projects it seems that the services also diminish with project closure. The research

study seeks to close the gap of the missing information on what influences the people living in the informal settlement in using the facilities and their sustainability. The results of the study will form background information for organizations planning to design a water and sanitation project in the informal settlements.

CHAPTER THREE: METHODOLOGY

3.0: Introduction

This section gives a description of the process that was used to carry out the survey. It covers: survey design, description of the area, sample size, sampling procedure, pre-testing of the survey instrument, data collection procedures and data analysis techniques used.

3.1: Research Design

A descriptive survey design was used to determine the factors influencing utilization of sanitation facilities in Kibera. Gall (1981) defines survey “as an attempt to collect data from members of a population with respect to one or more variables.” The survey design was used because of its convenience in collecting extensive data from a large sample of respondents within a short time.

Mugenda and Mugenda (1999) describes survey design as means that seeks to obtain information that describes existing phenomena by asking individuals about their perceptions, attitudes, behavior or values. According to Gall, Borg and Gall (1996), in survey studies, conclusions are made about associations and not about cause and effect of a phenomenon. In many cases a survey can be an essential tool for assessing a situation or activity (Nichol, 1991). Therefore this gave insight for the investigator to use survey design. The research setting was the natural environment where phenomenon took place naturally, the unit of analysis was a household and was typically non- experimental and was a cross-sectional survey. In order for a research study to be rich with greater understanding on the factors, the researcher used in-depth interviews, observations and semi-structured questions during data collection.

3.2: Study Area

The study was carried out in Kibera slum in Nairobi. This slum has people from all over the country, which offered a cosmopolitan population with varied backgrounds, traditions and values. Kibera slum has benefited from the water and sanitation project sponsored by the government, NGOs, Christian groups and Self Help groups. At the moment there are 13 recognized villages in total (UNPD, 2004). Situated southwest of the city center, Kibera comprises 13 sprawling slum villages, namely Makina, Mashimoni, Line Saba, Silanga, Kambi Mhuru, Gatwikera, Kianda, Lindi, Kisumu Ndogo, Soweto, Raila, Lindi and Karanja. It has an estimated population of about 1,000,000 residents (UNDP 2004). The population comprises all the ethnic groups in Kenya and one Sudanese tribe, which is the Nubians.

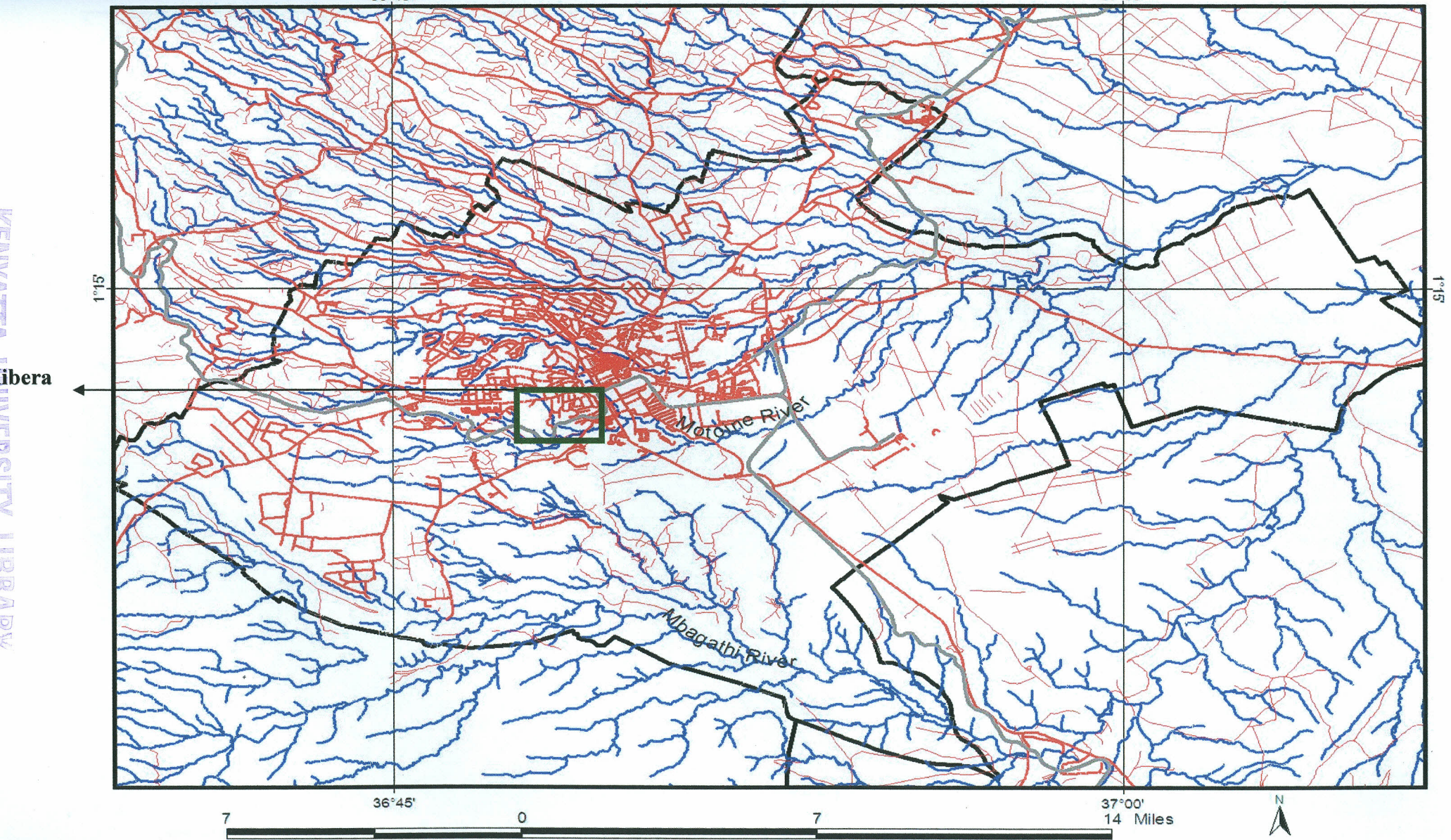


Figure 1.3 Map of Nairobi showing Kibera



Figure 1.4 Map of Kibera

3.3: Target population and Sample Size

The target population was all households within Kibera slums. The targeted population consisted of both men and women who had lived in Kibera for at least five years who would give a good assessment of the projects in the area. A total of 169 households were visited and the head of the family or spouse or for sibling headed families the eldest was interviewed. 9 In-depth Interviews were done among key informants in the area. The key informants were two chiefs, three elders and four representatives of the various groups dealing with water and sanitation from the area who accepted to be interviewed. The sample size was determined using Fisher's exact formula as below:

$$N = \frac{Z^2 pqD}{d^2}$$

N = The desired sample size when estimated population is over 10,000

p = Proportion of target population estimated to be living in Kibera

$$q = 1 - p$$

Z = Standard normal deviate at the required confidence level

d = The level of statistical significance

D = Design effect ≈ 2

$$N = \frac{Z^2 pqD}{d^2}$$

$$N = \frac{1.96^2 \times 0.13 \times 0.87}{0.05^2}$$

$$N = \frac{3.8416 \times 0.1131}{0.0025}$$

N= 173.79

N= 174

(Adapted from Kothari, 2000)

3.4: Method of Sampling

The 169 households from Kibera was sampled using cluster sampling. Thirteen people were interviewed from the 13 villages which have the water and sanitation services among these were 9 key informants who were interviewed. The researcher interviewed the head of the household and for the child headed households the eldest. Though cluster sampling was used each household was picked randomly from their villages, and the respondents met the criteria of having lived in Kibera for the last five years.

3.5: Pre-testing of instrument

The data collection instrument was pre-tested to evaluate the clarity of questions and to ensure that the questions were reliable and valid before conducting the research. This was done among ten people from the slum but responses from the pre-test were not included in the final analysis.

3.5: Data collection

Data was collected by use of questionnaire, in-depth interviews, and observations. This helped to elicit data from the respondents for analysis and report writing. The questionnaire had both closed and open ended items, this helped collect information from respondents' views on the various aspects of the survey. The open-ended questions permitted a greater depth of response and gave insight into the respondents' feelings, lifestyle, interests and decisions (Mugenda and Mugenda, 1999). A five and

three point Likert Scale was used for rating responses for measuring attitudes and feelings of respondents. In-depth interviews were conducted with key informant from Kibera. Observations were done to assess the number of people who were using available latrines per day for seven days continuously during day time from 7am-6pm.

3.6: Data analysis and presentation

Data was analyzed quantitatively and qualitatively to address the objectives of the survey. The Statistical Package for Social Sciences (SPSS) was used to analyze quantitative data and qualitative data were analyzed using NUDIST. Descriptive means, frequencies and percentages were used to describe and summarize data. Tables, pie charts, and graphs were used to present results. Cross cutting themes from the qualitative data were grouped and presented accordingly.

3.7: Ethical Considerations

Permission was sought from the Ministry of Education Science and Technology and the Area Administration in order to conduct the research. All questionnaires had introductory information in order for respondents to give their informed consent before participation in the study. For the in-depth interviews, informed consent was sought from the respondent before the interview started.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.0: Introduction

The results presented here were collected from 169 respondents from Kibera slum in Nairobi both from the questionnaires, observations and in-depth interviews.

4.1.0: Socio-demographic factors of the respondents

The study was an endeavor to establish the factors that influence utilization of water and sanitation services available in Kibera and the following is the description of the participants.

4.1.1: Gender

On average there were equal numbers of male and female participants in the study; however women were slightly more (52.1%) as compared to males (47.9%).

Table 4.1:- Gender of respondents in the sample

| Gender | Frequency (N) | Percentage (%) |
|--------------|------------------|-------------------|
| Male | 81 | 47.9 |
| Female | 88 | 52.1 |
| TOTAL | 169 | 100 |

4.1.2: Marital Status of the Respondent

Most respondents were widowed (41.4%) and this could be as a result of high prevalence of HIV in slum areas (Nyovani *et al.*, 2007). Of the households that were

sampled, there was a significant number of household which were headed by children, whose parents had died (20.7%). The graph below illustrates this information from the research.

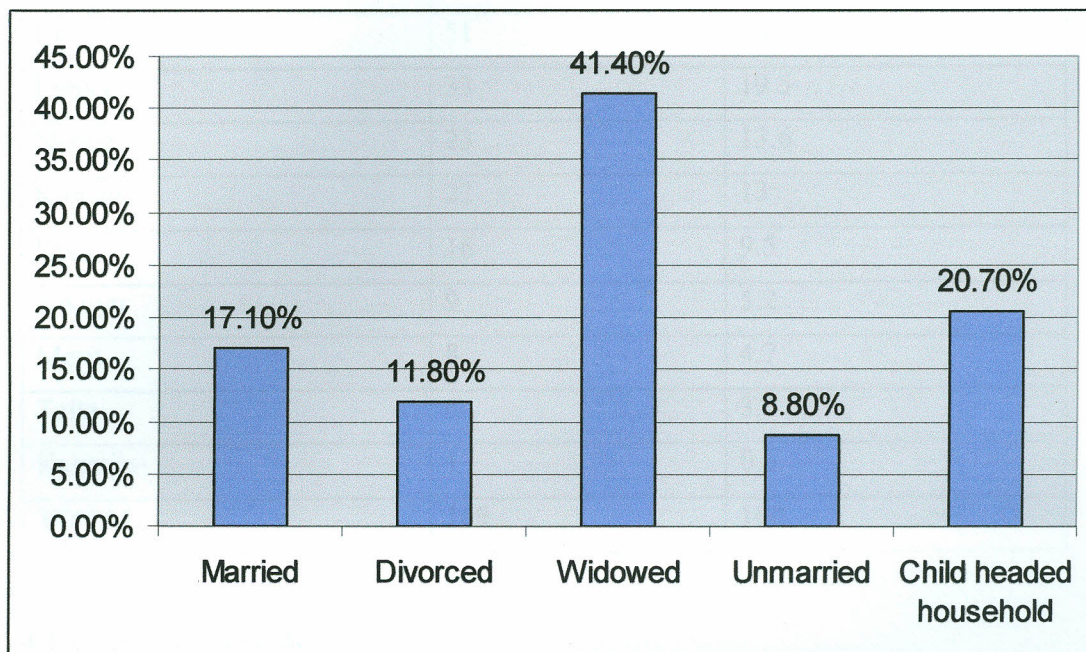


Figure 4.1: Marital Status of the Respondents

4.1.3: Tribes of the respondents

The initial inhabitants of Kibera were the Nubians who were soldiers of the demobilized arms of British East Africa at the end of Second World War, in 1947.

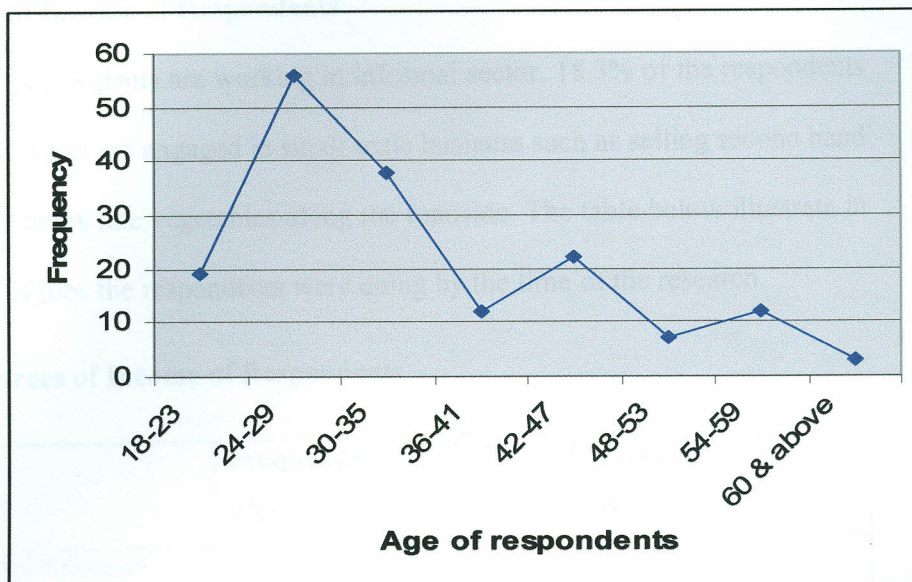
They formed 23% of the study population with the rest being representatives of the dominant ethnic groups in Kenya. With the Kisumu Nairobi Railway passing through Kibera might have contributed to the 30% of the population being Luos one of Kenya's largest ethnic groups.

Table 4.2:- Tribes of the respondents

| Tribe | Frequency (N) | Percentage (%) |
|--------------|--------------------------|---------------------------|
| Luo | 51 | 30.2 |
| Luhya | 33 | 19.5 |
| Nubian | 23 | 13.6 |
| Kamba | 22 | 13 |
| Kisii | 16 | 9.5 |
| Kikuyu | 9 | 5.2 |
| Meru | 8 | 4.7 |
| Taita | 6 | 3.6 |
| Kalenjini | 1 | 0.6 |
| TOTAL | 169 | 100 |

4.1.4: Age of respondents

The respondents' ages ranged between the ages of 18 years and 60 years old with the child headed household falling in the same age bracket. The age bracket of 18-47 that is the reproductive ages formed the highest proportion of the people interviewed (86.8%) with those between ages 48-60 and above being very few. The most represented groups were 24-35 this shows that over 55% of the sample consisted of a young generation of people.

Table 4.3: Age of Respondents**Figure 4.2: Age of respondents****4.1.5: Level of Education of Respondents**

Almost half (49.7%) of the respondents have some secondary education, some dropped out in the course of their education and a few completed their form four secondary education with only 10.7% of the respondents having a certificate course after form four secondary education.

Table 4.3: Highest level of Education of Respondents

| HIGHEST LEVEL OF EDUCATION | FREQUENCY (N) | PERCENTAGE (%) |
|----------------------------|---------------|----------------|
| None | 10 | 5.9 |
| Some primary | 57 | 33.7 |
| Some secondary | 84 | 49.7 |
| Post secondary | 18 | 10.7 |
| TOTAL | 169 | 100 |

4.1.6: Sources of Income of Respondents

Majority of the respondents are working in informal sector. 18.3% of the respondents are self employed and are engaged in small scale business such as selling second hand clothes or other items like vegetables along the roadside. The table below illustrate in detail the kind of jobs the respondents were doing by the time of the research.

Table 4.4: Sources of Income of Respondents

| Source of Income | Frequency (N) | Percentage (%) |
|--|---------------|----------------|
| Bar maid/ hotel attendant | 12 | 7.1 |
| Selling of Grocery | 20 | 11.8 |
| Jua Kali Sector | 27 | 16.0 |
| House help | 16 | 9.5 |
| Industrial area laborer | 2 | 1.2 |
| House wife | 6 | 3.6 |
| Selling second hand clothing/other items | 31 | 18.3 |
| Watchman/woman | 21 | 12.4 |
| Hair dresser | 16 | 9.5 |
| Masonry/ Plumber | 18 | 10.7 |
| TOTAL | 169 | 100 |

4.2: Source of water in Kibera

Most of the respondents (73%) indicated that they get water from a few water tanks that are set up in the community. For every village there is a water point although located close to the road and at times they run dry as the large population competes for the scarce resource. To get water from these water tanks, community members

have to pay a fee per jerrican of water. Only 25% of the respondents get their water from piped water source.

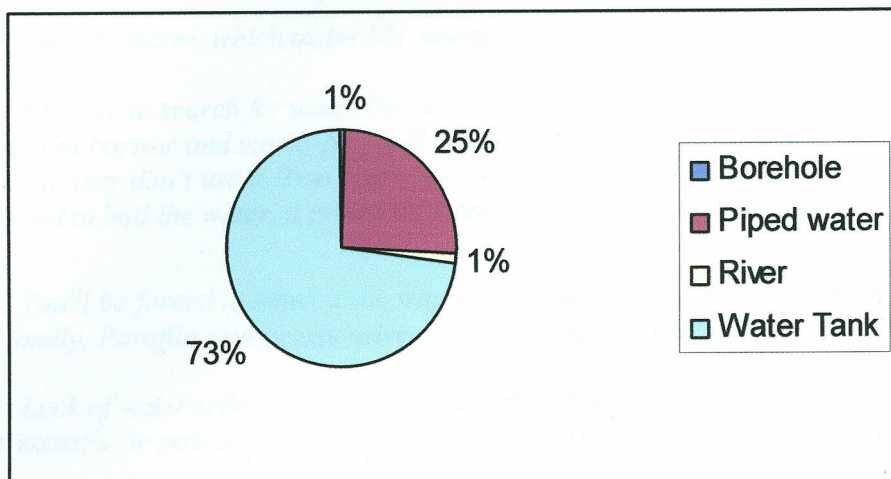


Figure 4.3: Main source of water

4.3: Quality of Water in Kibera

Almost half (48.5%) of the respondent do not know whether the water they use is treated, 50.9% stated that the water they use is not treated, leaving only 0.6% who responded that water they use is treated. From the descriptions of discussants, quality is often closely associated with availability:

Respondent 5: If there is no clean water and you go to a food kiosk and ask for tea, which has milk, you will not know that the water used to cook that tea was dirty.

Respondent 4: For instance, when it rains, the tea is cooked using water that drains from the roofs. And when people relieve themselves in plastic bags, they throw their feces on top of the same roofs.

(Key Informants, 30-55 years old, IDI)

Respondent 1: And you find that the water at the depot is saline and sold at 10 shillings.

Respondent 2: Sometimes, it smells of sewage and you can even see from the color of the water that it is not clean.

Respondent 2: The water itself has germs, because it passes through the sewer lines.

Respondent 3: You find that the water pipes pass through the same trench as the sewer lines, which are usually very dirty, so if the water pipe bursts, then what do we do ?

Respondent 1: Take the water, which tastes like sewage, and boil it?

Respondent 5: We have to search for water because water is life. We sometimes go to the nearby homes to borrow and mostly they will allow us to draw water from a well - and that's because they don't use it. Two years ago, we drew water from these wells, but when you tried to boil the water, it produced foam, and you wanted to use it for cooking.

Respondent 1: You'll be forced to drink it the way it is because you cannot boil water for the whole family. Paraffin is very expensive; we cannot afford that.

Respondent 4: Lack of water reduces the level of sanitation because you'll not be able to wash your utensils or yourself clean. I'll be forced to ration my water so as to economize it.

(Key Informants, 35-55 years old ,IDI)

Thompson *et al.*, (2000) in the study on environment and urbanization shows that the quantity of water used per capita depends on the accessibility of the water source. Those having access through a house or yard connection, or through a well inside the property, will use larger quantities of water than those having to fetch water outside, even if such a source is only a few minutes' walk from the house. This concurs very well with the research as a majority (80%) of the respondents used approximately 30 litres of water for a day's activities ranging from bathing, washing clothes, preparing meals and drinking. The findings suggest that the amount of water available for use among the Kibera resident is minimal and this has impacted negatively on health and hygiene among the Kibera residents. From the research it came out very clearly that the incidence and severity of many 'water-borne' diseases can be reduced simply by increasing the availability of water without necessarily increasing its quality. This is so because from the study the majority (85%) of the respondents indicated that since the onset of the water projects diseases related to water had decreased compared to

before the projects came in. Although almost all (98.5%) the respondents indicated that the water they use is not treated or they are not aware if it is treated this did not seem to bother them, availability was their most concern. With access to more water the health and hygiene of the people will improve positively. This is so because use of clean water reduces the chances of getting most of the infections that could be available in highly populated areas.

4.4: Cost of water in Kibera

Majority (84.6%) of the respondents indicated that they buy 20litres of water at a cost of between Ksh. 3 and Ksh. 4. The water points are approximately 500meters and 1kilometre away from the respondent's houses. The actual cost of water in this informal settlement fluctuates according to availability and location, as the following discussants explain:

Respondent 4: We must buy water there is no alternative for us anyway.

Researcher: How much do you pay for it?

Respondent 4: 3 to 4 shillings per jerry can, the small ones sometime you can get free if you carry one of it with you.

Respondent 5: But there are times when the taps are dry and you can't even get any to buy. If you're lucky, you can buy a 20-liter jerry can at 20 shillings, like from tomorrow (Friday) to Monday there are limited sources for water.

Researcher: So it disappears at a particular time of the week?

Respondent 6: Yes – from Friday to Monday. So, if you need to buy water, you go to the factories.

Respondent 8: Without 'something small' [bribe], there is no water.

Researcher: Who receives the bribe?

Respondent 5: Whoever you meet at the main entrance.

(Girls, 15-19 years old, IDI)

Poor women and men spend a significantly greater proportion of their income on water than do the rich, and the absolute price they pay for water is often ten times or more of tap price. The women are the majority (82.2%) of the gender with the responsibility of buying and carrying the water. The iconic image of woman carrying water on her head is emblematic of a lifelong burden that keeps girls from attending school, prevents women from engaging in productive work, and fetters progress toward the Millennium Development Goals on universal primary education and gender equality. The results on cost of water and sanitation compares well with those of Saureca, (2002), that residents of informal settlements spend more money on water compared to their counterparts with piped water. The same with sanitation facilities, one has to pay before using the latrine facilities, for those who cannot afford they are still using the commonly known flying toilets.

From the results of the research there are very many projects in Kibera on water and sanitation and they are all concentrated in almost the same areas, this is why there is still lack of proper sanitation and availability of water in most parts of Kibera. If all these projects could coordinate and harmonize their efforts, then lack of water and proper sanitation will be a thing of the past. Themes that came out very clearly on this are;

“These projects have forgotten us in the interiors, the latrines are being built close to the roads and we have to walk for long to access these facilities, sometimes you are pressed and the latrine is very far, you have to use the paper”

“Most projects like where others are and therefore leaving the rest of us without any facility”.

The majority of the respondents are employed at the Jua kali sector (47%), house workers (20%), watchmen (16%), and hairdressing (10%). These jobs give very little income to cater for their families and themselves. This result substantiates findings from qualitative data collected in the slums indicating that high fees paid to water vendors and sanitation facilities in the slums represent a major fiscal burden on the urban poor (Wasao and Bauni 2001).

There should be clear policies to the implementers of projects on water and sanitation in order to eradicate the issue of flying toilets and lack of access to clean water in Kibera and other slum areas. With almost all (95%) of the respondents indicating that they value the need for presence of proper sanitation and cheap water provisions concurs very well with the report by Water and Sanitation Program (WSP), (2004), “there is a positive relationship between improvements in education, health and hygiene awareness and the demand for sanitation facilities. With proper awareness on water and sanitation then the demand is high and if these facilities are provided then the issues of proper sanitation and access to water will be a thing of the past. The government and other relevant stakeholders should invest on the same for better lives in the slum areas.

4.5: Women, Water and Sanitation

The need to travel further from home to secure the family's water can expose women and girls to sexual harassment and rape; this can also happen when women who lack safe, nearby sanitation facilities move about at night in search of privacy. This is illustrated by the following excerpts:

Respondent 2: Sometime water can cost someone's body [sex]

Researcher: What do you mean by someone's body?

Respondent 1: Hey! Sometimes if I may tell you when you do not have money you have to give your body for water. The children have to eat and even me and the father so water has to be there anyway.

Respondent 2: Most of these water vendors demand that you have to do sex before getting the water whether you have money or not.

Researcher: what do you do in such occasions?

Respondent 3: If you have no alternative you will have to comply to their demands, you have to choose between getting the water or not complying and no water.

(Women, 20-49 years old, IDI)

From the research interviews and in-depth interviews it came out that women spend a lot of their time looking for water or walking long distance in search for the precious commodity. Majority (83.3%) of the respondents have to walk for not less than 500 meters in search for the precious commodity. The burden is on the woman's shoulder as part of her duties. These reduce the woman's involvement in productive activities and also it has an effect on fertility. The following are some excerpts from the respondents:

"Sometimes when I wake up and there is no water in the nearest water point I have to stop going to school and start the search for water in the area until where I can find some. Most of the time I have to walk about five kilometers before getting the next water point"

“I sell fish at the road side and most of the time am out very early in order to look for water especially when the taps are dry. Some vendors bring water that is smelly and I do not buy that, therefore I have to walk for close to three kilometers in search for clean water for my fish”

“Some of us who have small babies have to really walk for long to get water for bathing, washing the babies and preparing their meals. When the water is not there the babies can stay for two or three days before bathing and they cry easily which makes me not to even have a piece of mind to go out and look for water. I therefore have to walk with them on my back to look for water.”

The issue of women walking for long distance has been there a long time and not only in Kibera but also in other slum areas for instance a study in Korogocho and Viwandani by Chi-chi Undie *et al.*, (2005) elucidated that “female slum-dwellers are obligated to cope using mechanisms that have profound health consequences for both themselves and their families.” The results from this study compares well with the findings of Obando, (2003) who pointed out that, the carrying of water not only causes them physical disorders, but also makes it difficult for them to get involved in activities such as education, income generation, politics, leisure, and recreation. Moreover, this situation holds serious implications for achieving the Millennium Development Goals – to halve, by 2015, the proportion of people who are unable to reach, or to afford, safe drinking water (UN Millennium Declaration, 2000).

Research findings from this study showed that women go out of their way to engage in sexual activities in exchange for water. These poses a great concern especially

with the high prevalence of HIV/AIDS. From almost all the IDIs of women aged between 25-45 years the cross cutting theme was that, if they do not have water, and money but whoever owns the water point is ready to engage in sex with them in exchange for water, then they are ready to do so. The following are some the common statements among the women.

“We have lived here for long and we know the men who would want that in order for us to get water if we do not have money”

“There are men with money and would like to have sex, so we just have to give in, in order get money to buy water and even some for food, but water is my very big concern most times with disposal of waste, its very simple and cheap to use the polythene at night and throw it on the roof top”

As a way of reducing the risk of HIV/AIDS among women in slum areas water and sanitation should be made available and accessible at a cheap rate to them. By so doing we shall not only reduce their risk but also increase their productive time, and they can be in a position to engage in other activities.

4.6: Management of Water and sanitation projects

There are quite a number of water projects running in Kibera from different groups for instance; AMREF, CDF, CDC, MUMM, BINTI PAMOJA, UMANDE TRUST, WORLD BANK, CFK, HOPE FOUNDATION and CHEMI CHEMI YA UZIMA. Slightly above half (54.5%) of these projects are still managed by the organizations that built them while those that are managed by Kibera residents are about 45.5%. Comparing the management of the two groups, those that are managed by Residents are better managed compared to those that are managed by external organizations. The residents manage the water premises and remit 10% of the

proceeds to the organization that build them. Rating of the management of these projects is shown on the table below.

Table 4.5: Rating management of water projects by residents and external organizations

| Rating | Percentage for those Managed by residents | Percentage for those managed by Donor Organizations |
|---------------|--|--|
| Very good | 21.4% | 20.5 |
| Good | 51.1% | 27% |
| Average | 19.1% | 12.7% |
| Below average | 6.1% | 28.7% |
| Poor | 2.3% | 11.1% |

The majority of the respondents (72.5%) rated the management of the projects under the residents as good or very good compared to the management of the projects by donor organizations where (47.5%) of the respondents gave similar rating. These can also be attributed to the fact that almost all (95%) of the respondents participated in the process of implementing the projects they managed by either contributing labor (80%) or providing raw materials (15%) as shown on Table 4.6. This result compares very well with the study by Nichol (1991) who states that development work is largely reflected by the large number of projects and programs in a variety of areas, and it normally depends on an effective partnership between project planners and the local community. The more the beneficiaries are involved in the projects the better they like it and own it, this also adds to the sustainability of the project.

Table 4.6: Contributions of Respondents during the implementation of projects

| Contribution | Frequency (N) | Percentage (%) |
|---|---------------|----------------|
| Providing labor (security, digging trenches, actual placement of facilities, actual construction of the facilities etc) | 136 | 80.2 |
| Contributing raw materials | 25 | 15.1 |
| Got employment | 8 | 5.0 |
| TOTAL | 169 | 100 |

4.7: Disposal of Waste

The findings from this study show that almost all (98.8) of the residents of Kibera do not own the sanitation facilities they use. About half (46.7%) of the respondents are still using polythene bags as a means of disposing their human waste. With no ownership they have to pay between Kshs. 2 and Kshs. 5 in order to use the facility. The research findings elucidated that before the onset of projects in Kibera a majority (97%) of the residents used polythene bags for disposal of their human waste, this is illustrated by the chart below.

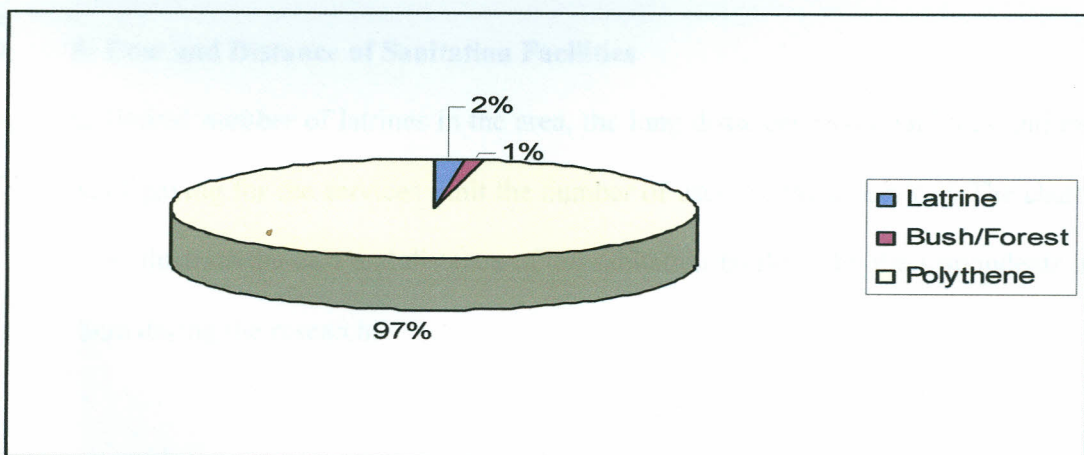


Figure 4.4: Ways of disposing waste before onset of projects

With the onset of sanitation projects in the area there are latrines although for some residents they are far from their house, the majority (86.4%) of the respondents take a

minimum of 20 minutes to walk to the nearest sanitation facility. Table 4.8 shows an assessment of the current latrines by the respondent.

Table 4.7: Assessment of the status of latrines

| Description | Frequency (N) | Percentage (%) |
|---------------------|----------------------|-----------------------|
| Accessible latrines | 51 | 30.4 |
| Clean latrines | 143 | 85.2 |
| Adequate latrines | 7 | 3.9 |
| Improved latrines | 127 | 75.4 |
| TOTAL | 169 | 100 |

Majority of the respondents (85.2%) and (75.4) indicated that the latrine facilities are clean and improved. This is a clear indication that the residents are realizing the importance of practicing good hygiene and consequently this has reduced the occurrence of related ailments in the area.

4.8: Cost and Distance of Sanitation Facilities

The limited number of latrines in the area, the long distances to the facilities and the cost of paying for the services limit the number of users of these services. The charts below illustrate the cost and distance of the sanitation facilities by the respondents in Kibera during the research.

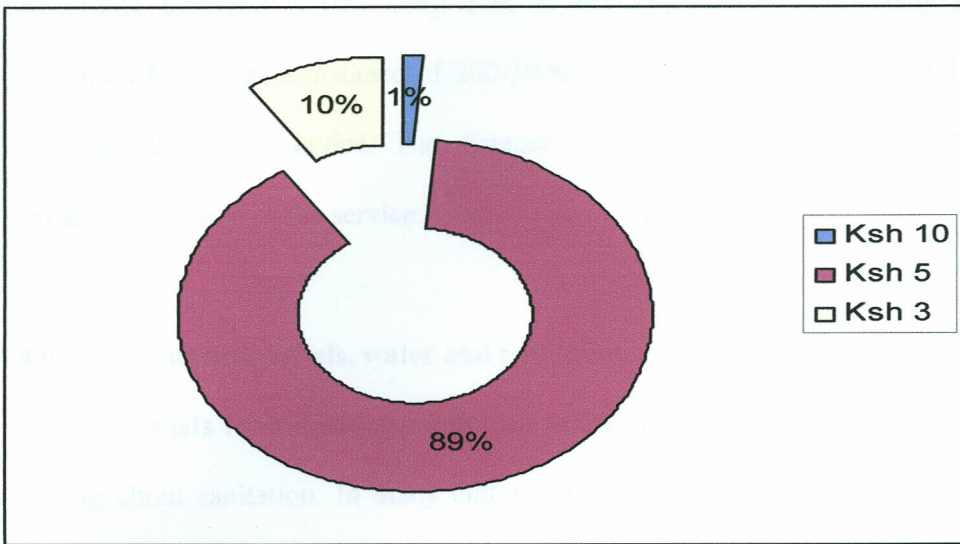


Figure 4.5 (a): Cost of sanitation services to users

The cost of using a sanitation facility ranged from 3 to 5 Kenya shillings for the majority of the respondents. In an urban population where most people live below poverty levels, this is a service that is not sustainable at that cost.

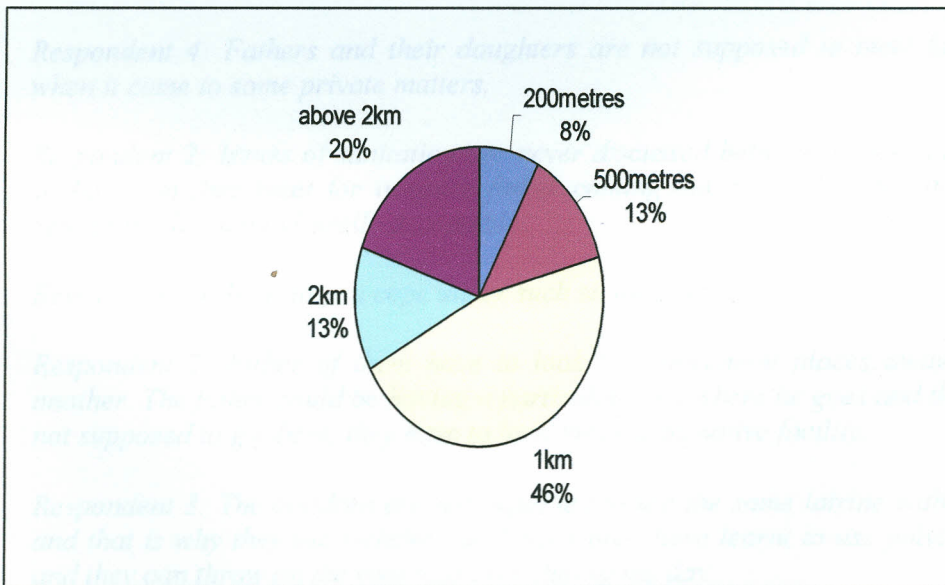


Figure 4.5 (b): Distance of sanitation services to users

According to figure 4.5(b), only 21% of the respondent could easily access a sanitation facility at a distance of 200-300m, the rest had to travel from 1-2km or more for the same service. The distance traveled could be contributing largely towards utilization of the service.

4.9: Socio-cultural beliefs, water and Sanitation

Cultural beliefs have a strong impact on sanitation, and even on the possibility of talking about sanitation. In many cultures, the handling of excreta is considered a taboo and viewed as disgusting or a dangerous nuisance, not to be discussed. No one wants to be associated with excreta. This has contributed more to neighbors and relatives not discouraging the habits of disposing excreta on trenches and roads. The discussants gave us a deeper understanding on the same as shown in some excerpts below:-

Respondent 1: It's obvious that a father is not supposed to go to the same latrine together with his girls

Researcher: But what is the problem with that?

Respondent 4: Fathers and their daughters are not supposed to meet face to face when it come to some private matters.

Respondent 2: Issues of sanitation are never discussed between father and daughter so how can they meet for instance father coming out of the latrine and daughter getting in? It's not culturally acceptable.

Researcher: So how do you cope under such situations?

Respondent 2: Either of them have to look for convenient places away from one another. The father could be having a particular area where he goes and the girls are not supposed to go there, they have to look for an alternative facility.

Respondent 3: The children are not supposed to use the same latrine with the adults and that is why they use trenches, and older ones have learnt to use polythene bags, and they can throw on the roof tops even during the day.

(Women 20-40 years old IDI)

There are cultural aspects for instance restrictions on sharing sanitary facilities between adults and children, men and women and in-laws and outsiders in general (United Nations, 1993). The research confirmed these aspects of culture affecting sanitation and it further elucidated that the greatest contributor to human feces on trenches is due to this cultural belief in families. Given that the children are not allowed to share the facilities with older members of their families, they end up relieving themselves on the trenches or roads. This happens even with families that have their own facilities in the compound. The same sentiments were reported by respondents who had their own facilities and even those who were paying for the facilities, “a child has no respect for older members therefore they can do their thing [go for a call of nature] anywhere” This is a very crude culture which needs to be eliminated among the residents of Kibera for us to achieve better sanitation.

4.10: Relationship between Demographic, and Socio-Economic variables and Utilization of water and sanitation services.

Cox regression model was used to examine the relationship between demographic, socio-economic variables and utilization of water and sanitation services. The first focus of the hypotheses for this study was to test the relationship between the independent variables such as respondents' demographics:- age, gender, education, length of stay in Kibera and family size to utilization of water and sanitation. The results are presented on Tables 4.9 and Table 4.11. The second focus was to test the relationship between socio-economic variables of distance, time, satisfaction and cost to utilization of water and sanitation. The results are shown on Tables 4.12 and 4.10.

4.11: Relationship between demographic variables and Utilization of Sanitation facilities.

Cox regression model was employed on four variables to elucidate any relationship between demographic variables of the respondent and the utilization of sanitation services in Kibera. Among the variables investigated in the model, only level of education was significant ($p < 0.05$), while age of respondent; gender of respondent and length of stay in Kibera were found not to influence the level of utilization of sanitation facilities in Kibera as shown in Table 4.8.

Table 4.8: Relationship between demographic factors and the utilization of sanitation facilities.

| Disposal of Human waste by Demographic Factors | Odds Ratio | Std. Err. | P | [95% Conf. |
|--|------------|-----------|--------|------------|
| Age of respondents | 1.143022 | 0.577411 | 0.791 | 0.424678 |
| Level of education | 1.934342 | 0.704942 | 0.041* | 0.946947 |
| Gender of respondent | 1.46225 | 0.520633 | 0.286 | 0.727699 |
| Length of stay in Kibera | 1.536088 | 0.800162 | 0.41 | 0.553373 |

* $P < 0.05$, 95% CI

The results of the regression showed a significant relationship between level of education of the respondent and the utilization of water and sanitation services in Kibera. These results compares well with that done by United Nations (1993) which explains that households with members who have a higher level of literacy are most likely to demand and adopt safer methods of excreta disposal and water than those

with low levels of literacy. The regression also showed that there is no relationship between the age of the respondent, gender of the respondent and the length of stay in Kibera by the respondent, and utilization of sanitation facilities. This means that use of sanitation facilities is not age, gender or length of stay in Kibera dependant. Level of education is of the factors that has affected the utilization of the sanitation facilities in Kibera.

4.12: Relationship between Socio-Economic Factors and Utilization of Sanitation facilities

A Cox regression analysis was also carried out on cost of latrine, distance to latrine, walking time to latrine, and the satisfaction of latrine services to find out if each of these social economic factors had any influence on the utilization of sanitation facilities in Kibera. The results showed that cost of paying for the services, distance between the services and the respondents' houses, time taken to walk to the nearest latrine, and the satisfaction the respondents got from the services were all significant factors ($P < 0.05$, 95% CI). Findings are presented in Table 4.9.

Table 4.9: Relationship between Socio-Economic variables and the utilization sanitation facilities.

| Disposal of Human waste by Socio-economic variables | Odds Ratio | Std. Err. | P | [95% Conf. |
|--|-------------------|------------------|----------|-------------------|
| Cost of using latrine | 1.812029 | 0.699916 | 0.012** | 0.849922 |
| Distance to latrine | 0.60338 | 0.251867 | 0.026** | 0.266242 |
| Walking time to latrine | 0.347061 | 0.145519 | 0.012** | 0.152583 |

| | | | | |
|----------------------------------|----------|----------|---------|----------|
| Satisfaction of latrine services | 0.385625 | 0.146837 | 0.012** | 0.182831 |
|----------------------------------|----------|----------|---------|----------|

* P < 0.05, 95% CI

The results from the regression model indicate a significant relationship between, cost of using latrine, distance of latrine from the respondent's house, time taken walking to the latrine and the satisfaction the respondents got from the latrine services. These results explain that utilization of these facilities was highly related to Socio-economic variables. Due to the fact that the earnings of the residents are very low explains the fact that they are not able to buy the services that are provided leading them to use of polythene bags as a cheaper means of disposal. In almost all the villages there is one latrine point with two or three poorly maintained facilities, this does not encourage residents to walk for long distance in search of that service. As one of the respondents responded 'I would later use my polythene other than walk all the way to the latrine to go and kick a disease' meaning the facilities are not maintained clean. Sanitation services in Kibera needs to be addressed so as to have these services located cleaner, closer to the people and be made affordable for their utilization to be optimized.

4.13: Relationship between demographic variables and Utilization of water facilities.

Another Cox regression model was employed on the respondents' demographic variables to find out if these demographic factors have any relationship with the amount of water used per household in Kibera. The size of the family and level of education were significant at (P < 0.05) as shown in table 4.10 below:-

Table 4.10: Relationship between demographic variables and amount of water used in a typical day

| Amount of water used | Odds Ratio | Std. Err. | P | [95% Conf.] |
|--------------------------|------------|-----------|---------|-------------|
| Age of respondents | 1.143022 | 0.577411 | 0.791 | 0.424678 |
| Length of stay in Kibera | 1.536088 | 0.800162 | 0.41 | 0.553373 |
| Level of Education | 1.934342 | 0.704942 | 0.041* | 0.946947 |
| Gender of respondent | 1.46225 | 0.520633 | 0.286 | 0.727699 |
| Size of family | 0.38624 | 0.136752 | 0.011** | 0.171821 |

* $P < 0.05$, 95% CI

These results indicate that the higher the level of education and the larger the family the greater the consumption of water. Higher literacy level is associated with demand and adoption of good hygiene practices. These results also indicate that with a big family demand for water is higher than with a smaller one.

4.14: Relationship between Socio-economic variables and amount of water used in a typical day

Regression was done to find out the relationship between socio-economic variables and the amount of water used in a typical day. All the three variables that is amount of water used, time taken to the water source and cost of buying water were highly significant. These results are shown in Table 4.11.

Table 4.11: Relationship between Socio-Economic variables and amount of water used in a typical day

| Socio-economic factors | Odds Ratio | Std. Err. | P | [95% Conf. |
|--------------------------------|------------|-----------|--------|---------------|
| Amount of water used | | | | |
| Time taken to water source | 0.347061 | 0.145519 | 0.012* | 0.152583 |
| Satisfaction on water services | 0.385625 | 0.146837 | 0.012* | 0.182831 |
| Cost of buying water | 0.375624 | 0.146539 | 0.012* | 0.152678 |

P < 0.05, 95% CI

The results shows a strong ($P=0.012^{**}$) relationship between the time taken to the water source, Cost of water and the satisfaction of the water service by the respondents. As much as there are water tanks in almost each of the villages most of the time the tanks are dry and the residents have to walk long distances in search of the water, this hinders them from using their productive time in other socio-economic activities. At the same time the cost of the commodity is very high compared to the meager earning of the residents and this restricts them on how much of the commodity they will use in respect to what they can afford. This is a clear indication that these socio-economic factors are the major determinants of the utilization of water facilities in Kibera.

CHAPTER FIVE:

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0: Introduction

This chapter gives a summary of the major findings from the research, conclusions, recommendations, and suggestions for future research.

5.1 Summary of Results

1. The results from the study survey elucidated that demographic factors; age, gender and duration of stay in Kibera did not influence utilization of water and sanitation but, level of education does influence greatly utilization of water and sanitation in Kibera.
2. The cost and distance of water and sanitation facilities in Kibera were the main hindrance to accessibility of these facilities in the area. The majority of the respondents indicating that the cost of the water and sanitation services are way above what they can afford, the distance they walk is equally a hindrance to their search for the precious commodity. Kibera being a poor urban population setting sustainability of water and sanitation services cannot be achieved at these costs.
3. The quality of water in Kibera was not guaranteed as vendors obtained it from any source for sale, whether it was treated or not. Almost half (48.5%) of the respondents did not know whether or not the water they use was treated, and half (50.9%) stated that the water they use is not treated. Quality is also a factor that influences utilization of water in Kibera.

4. The long distance and the cost of water and sanitation predisposed some women in contracting STDs such as HIV/AIDS in Kibera and therefore the facilities should be made available as one way of curbing the spread of the epidemic in Kibera. The respondents indicated that they exchange sex for water and sanitation in cases where the providers of the service demand so or they are not able to afford the services at that particular moment.
5. Cultural beliefs are influencing greatly the utilization of sanitation facilities in Kibera. The young children are not supposed to share the facilities with the older members of the community, and father and their daughters are not supposed to meet face to face when it comes to some private matters such as use of sanitation facilities, these have contributed greatly to the never ending use of the commonly known as flying toilets in Kibera.
6. Management of projects in Kibera is best done by the residents themselves, and in situations where these has been observed there is sustainability of the projects.

5.2: Conclusions

1. Water and Sanitation projects being implemented in Kibera that involved the beneficiaries had better acceptance and sustainability than those managed by donors.
2. Socio-cultural beliefs had a strong impact on utilization of sanitation facilities in Kibera. Cultural restrictions on sharing sanitary facilities between adults and children, men and women still persist. These beliefs have a negative impact on achievement of environmental sanitation in Kibera.
3. The distance and cost of water and sanitation services in Kibera was prohibitive for the majority of respondents thereby making this services unsustainable.

4. Women still carry the burden of fetching water for their families and this impacts negatively on other economically productive activities.
5. Education is an important factor in utilization of water and environmental sanitation. Respondents with higher levels of education adopted safer and more hygienic methods of sanitation compared with those with lower levels of education.
6. Disposal of waste in Kibera is still being done by use of the commonly known flying toilets.
7. The quality of water for consumption in Kibera is questionable. Almost half of the respondent did not know whether or not the water is treated, with half of them stating that the water they use was not treated.

5.3: Recommendations

1. Projects on water and sanitation should be well distributed in Kibera for easy accessibility by all residents in the area. The project implementers should coordinate and harmonize their efforts in order to distribute their resources according to community needs.
2. Community mobilization should be done to create awareness of the existence of these services in order to end the use of polythene bags for disposing human waste.
3. Policies should be put in place to support sustainability of projects in the slum areas.
4. The government and NGO's should build more latrines in Kibera so as to curb the issue of flying toilets.

5. With the availability of City Council of Nairobi's water network in Kibera the Council should ensure that the water and environmental sanitation is available to the residents as a way of uplifting their livelihoods.
6. Implementation of water and sanitation projects in Kibera and other slum areas should include an education component to ensure that the beneficiaries have well understood the context of the project, and this will not only help in owning the project but also increasing the levels of literacy among the beneficiaries for better sustainability.

5.4: Suggestions for Future Research

Since this work was an assessment of the factors influencing the utilization of sanitation facilities in Kibera by use of both quantitative and qualitative methods, the research serves as an eye opener to factors and consequences of lack of adequate water and sanitation facilities in slum areas. Therefore, further research be carried on the following areas:

1. A research should be conducted on sustainability of community based water and sanitation programs in the other slums in Nairobi and other towns.
2. A study should be undertaken to assess the impact of disconnection of "illegal" piped water in the slums by the Nairobi Water company.

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APPENDIX

5.1 QUESTIONNAIRE

Good morning/Afternoon/Evening,

My name is _____ am a postgraduate student in Kenyatta University. Am doing a research on sanitation facilities in Kibera/Korogocho in partial fulfillment of the masters degree in Community Resource Management. I would like to ask you some question. I assure you that your responses will be treated as confidential and will only be used for research purposes.

Socio-economic factors

1. a) What is your gender?

Male

Female

b) Which is your tribe _____

2. What is your age? _____

3. How long have you lived here? _____

4. What is your highest level of education _____

5. What do you do for a living? _____

6. Please tell me the sanitation projects you know that are operating in Kibera

7. Have you participated in any of them?

Yes

No

In what ways have you participated?

8. (b) using the scale of 1-5. how can you rate the general occurrence of the ailments in the area before and after the projects? 1= Very frequent, 2= Frequent, 3= Not frequent, 4= Occasional and 5= Not there at all

| | Before the projects | After the projects |
|------------------|---------------------|--------------------|
| Diarrhoea | _____ | _____ |
| Cholera | _____ | _____ |
| Dysentery | _____ | _____ |
| Malaria | _____ | _____ |
| Others mentioned | _____ | _____ |

Utilization and sustainability of Water Services

1. What is the main source of water in this area? _____
2. How do you get Your water? _____
3. Is the water that you get treated? _____
4. Who is responsible for buying the water? Mother ___ Father ___ Other ___
5. If you buy your water how much does it cost you per 20litre container? _____
6. How much water do you use in a typical day? _____
7. How many members are you in this household? _____
8. How far is the water supply? (Meters or Kilometers)
9. How are the water points or sources managed?
 - a) If managed by residents for how long now?
 - b) If managed by people who built them for how long now?

c) How can you rate management of the sources by either group using the scale of 5=very good; 4=good; 3=average; 2= below average; 1=bad.

10. Managed by area residents _____ Managed by the people who built them

11. What is the main hindrance to clean water in this area?

12. How have you benefited from the water projects in the area?

13. How can you rate the importance of availability of water source in the area using a scale (1=Not important, 2=Important, 3=Very important) _____

14. What is your general comment on water projects in the area.

Utilization and sustainability of Sanitation services

1. Are you aware of any sanitation projects in the area?

Yes

No

2. How do people in this area dispose off their human waste?

Use toilet

Polythene bag

Latrine

In the forest/bush

Other (specify) _____

a) Do you own the facility that you use?

Yes

No

b) If NO do you pay for it?

Yes

If yes how much _____

No

3. How did people in this area used to dispose off their human waste before the sanitation project began?

Use toilet

Polythene bag

Latrine

In the forest/bush

Other (specify) _____

4. Were there toilets/latrines before the start of any project?

Yes

No

How close were they to your house (in Metres/Kilometres)?

5. Are the current toilets; (Tick any that applies to you)

Closer?

Many around?

Cleaner?

Improved?

Other (specify) _____

6. How satisfied are you with the service?

a) satisfied _____ b) somehow satisfied _____ c) very satisfied _____

7. Approximately how long do you take to get to the nearest latrine facility? (in minutes) _____

8. Did the distance or absence of the toilet dictate the times you used to go for a call of nature? Yes _____ No _____

9. Have you seen people use the polythene bags to empty their long calls of nature or the commonly called 'flying toilets'?

Yes

No

10. Are they still using them? Yes _____ No _____

11. Have you or your family used the method? Yes _____ No _____
12. How close is the nearest latrine/toilet facility from your house? _____
13. How are the latrines distributed in the area?
14. How are the latrines managed? _____
15. If managed by the residents for how long now?
16. If managed by the people who built them for how long now?
17. How can you rate management of the latrines by either group using the scale of
5=very good; 4=good; 3=average; 2= below average; 1=bad.
Managed by area residents _____ Managed by the people who built them _____
18. How have you benefited from sanitation projects?

19. How can you rate the importance of the toilets in the area using the scale below
(1=Not important 2=Important 3= Very important) _____
20. What is your general comment on sanitation projects in the area?

THANK YOU!

5.2 IN-DEPTH INTERVIEW GUIDE

Introduction

Thank you so much for your willingness and time to take part in this interview. My name is **Lenah Kebaso**. I am a student from Kenyatta University doing a Msc in Community Resource Management. I am doing a research on assessing the factors that influence accessibility and sustainability of water and sanitation services in Kibera. I will share what I would have found out with the University and the Government and other relevant stakeholders in policy development at community level.

I am interested in learning about what is going on in Kibera when it comes to water and sanitation facilities. Many times, people from outside think they know what families are experiencing in this community when they really don't. To me you are the real expert and there's a lot I can learn from you. So today I would like to ask you a few questions about what people in this community experience when it comes to water and sanitation. This is very informal; you can talk about anything you think is important for me to know. I also want to remind you that everything we talk about today is confidential. No one will hear this tape except for people working on this research. Whenever I will be writing the report, I will use numbers rather than names in the report so no one can identify you. If there are any questions you'd rather not answer, just let me know, that's fine.

I. Icebreaker Questions

Let's start thinking over your experience having lived in Kibera for a while. Most people living in a community can easily agree on the major problems their community faces. What are some of the key problems or concerns you see in Kibera nowadays?

Which one of these problems would you say is the most important? Why?

What about the second most important? Why?

II. Water Questions

1. Now when people in Kibera say they worry about Water, what do they mean?

- What are they actually say?
- Are they genuine?

2. What do you consider as good water in this community and why? What do you consider as bad water in this community and why?

- On average how much water do you use in a day?
- What are some of the activities that you must do in everyday?
- Are they any of these activities not done due to lack of water?

3. How do you get the water that you use?

- Do you buy?
- If you buy how much is it?

4. When the water is unavailable for buying what do you do?

- How do you survive without water?
- For how long can you miss water?

5. What are some of the projects in Kibera that are dealing with water?

- Name them.
- Have you participated in any of them? If so in what ways did you or are participating?
- Are the projects still in operational?
- Where are they located if you know?

III. Sanitation questions

1. Now when people in Kibera say they worry about Sanitation, what do they mean?

- What are they actually say?
- Are they genuine?

2. What do you consider as good Sanitation in this community and why? What do you consider as bad Sanitation in this community and why?

- On average how many times do you use the facility in a day?
- What dictates you in using the facility?
- Are there times when you want to visit the sanitation facility but you are restricted by something, Tell me what was this?
- Do you pay for this facility or you use it free of charge?

4. When the Sanitation facility is unavailable for using what do you do?

- How do you survive without visiting the latrine?
- For how long can you survive without?
- Are there cultural norms associated with sanitation in this community?

5. What are some of the projects in Kibera that are dealing with Sanitation?

Name them.

- Have participated in any of them? If so in what ways did you or are participating?
- Are the projects still in operational?
- Where are they located if you know?

IV Water and Sanitation in General questions

THANK YOU

1. What are the major challenges people have with water and sanitation in Kibera?

2. What are the effects of these challenges?

3. What effect do these challenges have on children and especially the girl child in the community?

4. How do people cope with these water problems in the community? What kinds of things do they do to manage?

5. Who are involved during bringing in projects in Kibera?

- Are you involved before or after? Or at what point are you involved?
- What are some of the benefits you have got from some of these projects
- What are your greatest desires from these projects?

6. What are some of the future plans by the community in regard to water and Sanitation?

THANK YOU