

**INFLUENCE OF WATER PROVISION ON THE QUALITY OF
LIFE FOR URBAN SLUM DWELLERS - THE CASE OF
KOSOVO-MATHARE PILOT WATER PROJECT, NAIROBI**

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A research project report submitted in partial fulfillment of the requirements for the
award of Master of Arts Degree in Project Planning and Management of the University of
Nairobi

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DECLARATION

This research project report is my original work and has not been presented for any award or degree in any University.

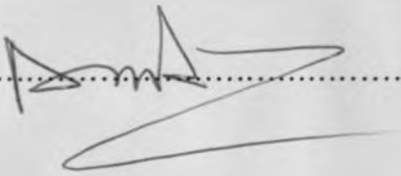
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This research project report has been presented with my approval as a University supervisor.

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DEDICATION

This research project is dedicated to my family, dad and mum - Nick and Bancy Mati, my siblings Munene, Wycliffe and Sylvia who have stood by me during the pursuit of this Masters degree, to Sheila Karimi who has been my career mentor, and to my grandmothers Penina and Emily for their prayers and encouragement.

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ABSTRACT

Growing demand for water services in urban slums in Nairobi has for long been addressed through various interventions by NGOs, CBOs and informal small scale water vendors. With the ongoing water sector reforms in Kenya, there is emphasis on strengthening the pro-poor focus of the sector. Institutions established to formalize water services are licensed water service providers (WSPs), along with water services regulation through the Water Services Regulatory Board (WASREB), and pro-poor financing through the Water Services Trust Fund (WSTF).

The primary objective of this study was to assess the influence of formalized water provision on the quality of life of urban slum dwellers of Kosovo-Mathare in Nairobi. The study explored the perceived impacts of the Kosovo water project implemented by Nairobi Water and Sewerage Company (NCWSC) in 2009. The variables studied were affordability of water, access to water, quality of water and pro-poor focus by NCWSC in water provision. The main findings showed that reliance on informal water vendors had reduced hence the cost of water had decreased by 50%. Regularity of daily water supply improved for 51% of the slum dwellers; in addition 92.9% covered less than 50 metres distance to their main water source even as 87.8% of the same populace spent less time to get water from their main. Health was improved for 36% of the slum dwellers as a result of improved access to safe drinking water. However, even as NCWSC empowered the Kosovo community to participate in sustainable operation of the water project, 91.8% of the community was not aware of the pro-poor policy by NCWSC.

The research methodology used a descriptive survey design and data was collected using a questionnaire. It was administered to 98 respondents selected by stratified random sampling to ensure proportionate representation people from each of the ten Clusters of Kosovo. One focus group discussion with 9 participants was carried out at Kosovo to collect additional qualitative data. Correlational and descriptive statistics were used to analyze data, present and interpret the findings of the study.

The recommendations from the study were that its findings could act as benchmark for guiding formalization of water service provision to similar urban slums. It also proposed better empowerment of communities operating such projects. This study may expose areas for further research so as to understand similar projects better.

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ABBREVIATIONS AND ACRONYMS

BWB –	Blantyre Water Board
CBO –	Community Based Organization
CCN –	City Council of Nairobi
GIZ –	German Technical Cooperation
HDI –	Human Development Index
ISD –	Informal Settlements Department
KIWASCO –	Kisumu Water and Sewerage Company
KCC –	Kampala City Council
km –	Kilometres
l/c/d –	Litres/Capita/Day
MDG	Millennium Development Goal
NCWSC –	Nairobi City Water and Sewerage Company
NWSC –	National Water and Sewerage Corporation of Uganda
NGO –	Non-governmental Organization
SPSS –	Statistical Package for Special Sciences
UfW –	Unaccounted for Water
UN	United Nations
UN-Habitat	United Nations Human Settlements Programme
UPC –	Urban Projects Concept
WARIS –	Water Resources Information System
WASREB –	Water Services Regulatory Board
WSB –	Water Services Board
WSP –	Water Service Provider
WSTF -	Water Services Trust Fund

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Two out of three people in the world will face water shortages by 2025. But the burden of water related problems falls most heavily on the poor. Globally, 1.5 billion poor people lack access to safe drinking water supply and 2.7 billion lack basic sanitation (Proglia, 2008). The problems with water are a burden to these people's health, productivity and quality of life (Chino, 2008).

A century ago, the industrial revolution triggered fast growth of towns and cities across Europe and North America. Today the developing world is experiencing rural-urban migration on an unprecedented scale. By 2020, the number of cities with 1 to 5 million inhabitants is expected to rise by some 13%, whereas those with 0.5 to 1 million residents should rise by 25%. For the first time in human history, urban population has exceeded rural population, expanding every month by 5.5 million (Proglia, 2008). According to the United Nation's forecasts, by 2015, 23 out of the 27 largest cities in the world will be located in less developed countries(Proglia, 2008). Municipal services are therefore faced with increasing number of consumers and individual needs, thus finding it difficult to modernize their water and sewerage systems to reach satisfactory coverage, and to guarantee everyone's access to the essential service (Proglia, 2008).

In Africa, urbanization is taking place at an unprecedented pace. Urbanization is a reality that must be faced and turned to advantage as cities drive the engines of economic and social development. However, urbanization has put enormous pressure on the continent's natural resources, water in particular. The provision of adequate supplies of water to the growing number of urban residents, especially the urban poor, is one of the biggest challenges facing governments and local authorities today. Water scarcity is also rapidly becoming a source of social conflict. More than half of the populations living in African cities today are denied access to municipal water supplies and the poor are forced to pay to street vendors for a litre of water as much as 5 to 20 times what their affluent neighbors pay for municipal supplies. The urban water is a crisis of governance rather than a crisis of scarcity (Tibaijuka, 2005).

The initiation of the water sector reforms by the Government of Kenya through the Ministry of Water and Irrigation (MWI) was through the 1999 National Water Policy and later fully implemented after the Water Act of 2002. Reforms involved decentralizing and devolving the management of water services and empowering new entrants to shape the sector. The impetus for policy reforms was largely influenced by the acceptance that good governance was critical for economic growth, and that this could translate into how public affairs over provision of rural and urban water supplies, and sanitation services were managed. The Water Act 2002 (Republic of Kenya, 2002) addresses water resources management, water and sewerage services delivery, institutional arrangements and financing (Barasa, 2005a). The role of the government is redefined to focus on regulatory mechanisms and creating an enabling environment rather than direct service provision. The Water Act 2002 has laid the legal framework for implementing the current water policy. Its main thrust is the separation of the functions of water supply and sewerage from those of managing water resources, and also policy formulation from sector regulation. Water service providers (WSPs) are quasi-governmental institutions or autonomous entities devolved from water departments of local authorities. Generally, the reform process embraces the principles of commercialization and private sector participation as powerful responses to problems of water delivery services in urban and peri-urban areas (Barasa, 2005a).

Kosovo is one of the twelve villages in Mathare Valley, a slum residential area in Nairobi, Kenya. Unlike other settlements in Nairobi with challenges of density, this unique village has basic organization of structures with streets running perpendicular to the descending landscape. Situated on the banks of Nairobi River, Kosovo stretches approximately 700meters on the northern banks of the river (Appendix V). It is situated in Mathare Sub-location off Thika Road where it borders the Mathare Mental Hospital, Mathare Police Depot and Mathare 4B village. Like other informal settlements, Mathare is characterized by inadequate access to basic services such as lack of security and unresolved issues of land tenure. Housing consists of a range of materials, with many living in unpaved earthen floor with tin walls and roofs. Only 12% of the housing stock has houses whose walls are made of stone. Of the 1,993 housing units, there are approximately 5 rooms per unit and 2.6 persons per room. Close to 92% of slum households are rent-paying tenants and 8% owner-occupiers. This is consistent with the of rest Nairobi where close to 82% of slum residents are tenants. Landlords make up about 5% of the population. They own the structures and collect rent, but do not have title deeds to the land (Pamoja Trust, 2009).

The settlement started in 2001 and the first settlers were victims of an eviction that took place at Village II (Kwanduru), where land is said to have been sold to Muslims to build a mosque. The affected squatters were allocated 9.1 hectares at Kosovo by the Government and they acquired space through balloting. The settlement had two public toilets and few private ones and the cost for using the public toilets was Ksh.2 or Ksh.50 per month. Electricity had been fixed permanently by the Kenya Power and Lighting Company and the residents paid a standard fee of Ksh.300 per month for the service. By 2007, the number of water points in villages of Mathare, which were provided by Nairobi City Council (NCC) through the Catholic Church, was 48. However, these water points were operated by few cartels that sold water at up to Ksh.30 per 20 liter container. Arbitrary pricing of the precious commodity made it unaffordable, not easily accessible and of uncertain quality in most instances. Conflicts arose due to few number of available water sources servicing the large population while the cartels took advantage of the situation to exploit the residents even more (Pamoja Trust, 2009).

Kosovo- Mathare pilot water project was initiated in 2007 to carry out formalization of water services provision through a participatory programme - the Urban Projects Concept (UPC). In the planning phase of the UPC initiative by the Water Services Trust Fund (WSTF) and Ministry of Water and Irrigation (MWI), it was believed that the success of this project would be the outcome of close partnership between a WSP - Nairobi City Water and Sewerage Company (NCWSC), an NGO - Pamoja Trust, a micro-finance institution - Akiba Mashinani Trust, the project financiers - GIZ through WSTF, and the residents through an *Oversight Committee*. In 2008, NCWSC forwarded a funding proposal to WSTF and received funds for construction of 4 water kiosks, a new 3.5km distribution pipeline, installation of household water meters and uprooting of existing illegal pipelines. Community mobilization was done by WSTF and NCWSC in partnership with a local NGO (Pamoja Trust). Credit from local microfinance, Akiba Mashinani Trust, was availed to the slum dwellers for purchase of 200 domestic water meters from NCWSC. The project was completed and commissioned in 2010.

1.2 Statement of the Problem

For slum dwellers in Nairobi, life has been difficult as they have been getting a raw deal in terms of adequate access to affordable and quality water. For many years, they have been subdued and

extorted by cartels that have controlled their water supply. For this reason, the Water Sector Reforms in Kenya that began on enactment of the Water Act 2002 focus on improved and formalization of water services provision to all low-income urban areas of Kenya.

This study sought to assess how the formalized system had made it possible for slum dwellers to access quality and affordable water. It also sought to establish whether the quality of life of the slum dwellers had changed as a result of people's ability to access clean and affordable water. It also tried to identify bottlenecks in the system. Since other scholarly works had not focused on Kosovo-Mathare in this respect, this study also provided information for others to learn.

1.3 Purpose of the Study

This study assessed the factors in water provision influencing quality of life for urban slum dwellers. It specifically studied the Kosovo-Mathare residents in Nairobi - the pilot water project by Nairobi Water and Sewerage Company.

1.4 Objectives of the Study

The specific objectives of this study were:

1. To investigate the influence of the affordability of water on the quality of life of the slum dwellers of Kosovo -Mathare.
2. To establish the influence of the access to water on the quality of life of the slum dwellers of Kosovo -Mathare.
3. To determine the influence of the quality of water on the quality of life of the slum dwellers of Kosovo -Mathare.
4. To examine the influence of pro-poor focus in water service provision by NCWSC on the quality of life of slum dwellers of Kosovo -Mathare.

1.5 Research Questions

The study was guided by the following research questions:

1. How does the affordability of water influence the quality of life of slum dwellers in Kosovo–Mathare?
2. How does the accessibility to water influence the quality of life of slum dwellers in Kosovo–Mathare?
3. How does the quality of water influence the quality of life of slum dwellers in Kosovo–Mathare?
4. How does pro-poor focus in water service provision by WSPs, influence the quality of life of slum dwellers in Kosovo–Mathare?

1.6 Justification of the Study

It is noted that there is a huge number of slum dwellers in urban areas and the need for them to have quality life; water being a major factor affecting their quality of life. The impacts of upgrading water provision infrastructure and the attendant social dimensions on the livelihoods of the poor who live in the slums of Nairobi have remained largely unknown.

Previous studies have focused on exposing statistics of slum populations that have no basic access to quality water or have poor service levels in terms of water supply, mostly for purposes of MDG monitoring (Schafer, Werchota and Dolle, 2011). Such data is needed to facilitate an understanding of the service levels for slum water supply and for planning purposes help WSPs to design projects that will extend formal water supply infrastructure. However, studies to establish the effects of this formal infrastructure on the quality of life of slum dwellers in Nairobi have not been done.

This study was therefore designed to show how/why if water supply infrastructure in urban slums of Nairobi is formalized and regulated by licensed water service providers, people living in these informal settlements would have improved quality of life by having more affordable water, better access and improved quality water.

1.7 Significance of the Study

The findings of this study would help ensure that dwellers of informal settlements in urban areas provide support, participate in sustenance and eventually reap the benefits of implemented UPC water projects, whilst the intended WSPs thereby getting value for money spent and a return on the investment. The study would also benefit urban planners, government policy makers, donors, other researchers and the public. For other researchers, it would expose areas for further research which can be useful for expanding knowledge in the Kenya water reforms field. Finally, improving water supply systems forms the bulk of the country's infrastructure which is one of the constituents of the economic pillar of Kenya's Vision 2030.

1.8 Delimitations of the Study

This study was confined to Kosovo informal settlement of Mathare in Nairobi County. It was a study on the influence of the pilot Mathare-Kosovo water project being operated by NCWSC, on the quality of life of the residents of the said informal settlement. Other factors that influence the quality of life in the informal settlements were held constant for the purposes of this study. Some of these included security, household incomes, health, type of housing and education.

1.9 Limitations of the Study

Some of the pertinent issues encountered were the dynamic geography of the study area; a vast and dense slum with a large part of the slum inaccessible when it rained. Secondly, a significant amount of funds and time were required to collect data.

1.10 Basic Assumptions of the Study

It was assumed that all respondents to be involved in this study would give accurate and honest responses, and will be available and prepared to give it. In addition, the quality of water in the NCWSC pipeline network would be good since this study would not incorporate water quality data verification. Lastly, there would be no illegal connections and pipelines buried underground in Kosovo-Mathare.

1.11 Definition of Significant Terms

This study encompassed the following terms:

Access to Water: Relates to coverage in terms of regularity of water supply, relative distances from the household to water source and amount of time taken waiting at the source to obtain the water.

Affordability of Water: Improved ability to pay for quality water now, as compared to ability to pay for the same water before the Kosovo pilot water project.

Cluster: Households grouped together on adjacent lanes/streets within Kosovo settlement; with sequential naming of each group alphabetically. Kosovo is clustered into ten sections - from cluster A to cluster J.

Informal Settlement: An area characterized by inadequate access to basic services, by lack of security and unresolved cases of land tenure.

Oversight Committee: Organization of three representatives from each of the ten clusters of Kosovo, which is a platform for the residents to participate in development schemes.

Pro-poor Focus: People's awareness of the pro-poor water policy. It is also informed by the level of their participation to influence that policy.

Quality of Life: Term used to evaluate the general well-being of individuals and societies. It also means achievement of desirable change in living standards. For this study, quality of life means a product of the interplay among social, health, economic and environmental conditions influenced by formalization of water services in urban slums.

Quality of Water: It is the health standard of drinking water, which is informed by contamination level in a water network system from the source up to the user-point. It is also informed by necessity to treat water at the household level.

Urban Slum Dweller: Person living in a run-down area of a city characterized by substandard housing, squalor and lacking in tenure security.

1.12 Organization of the Study

Chapter one gives the background to the study, research problem, purpose and objectives of the study, research questions, the significance, assumptions, limitations and delimitations of the study, and the definition of significant terms. Chapter two on the empirical literature review is done to study what other experts and researchers have already done along the field of formalizing water supply in informal urban settlements. This aims at identifying gaps in what has already been done in the area of study, identifying key questions which may not have been adequately answered, and also extracting of essential information from the empirical studies. Chapter three describes the research design, population, sampling design, data collection method, data analysis and operational definitions of variables. Chapter four presents the data analysis, interpretation and a summary of key findings. Lastly, Chapter five, the last section of the report, presents key study findings, discussions, conclusions and recommendations made. Study contribution to knowledge and suggestions for further research are also explored.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains detailed empirical literature on the main variables in the study. These variables are the affordability, accessibility and quality of water, pro-poor focus, and their effect on quality of life, in formalized water service provision.

2.2 Quality of Life

The term quality of life is used to evaluate the general well-being of individuals and societies (Costanza, 2002). The term is used in a wide range of contexts, including the fields of international development, healthcare, and politics. Quality of life should not be confused with the concept of standard of living, which is based primarily on income. Instead, standard indicators of the quality of life include not only wealth and employment, but also the built environment, physical and mental health, education, recreation and leisure time, and social belonging. According to ecological economist Robert Costanza (Costanza, 2002); though quality of life has long been an explicit or implicit policy goal, adequate definition and measurement have been elusive.

2.2.1 International Development

Quality of life is an important concept in the field of international development, since it allows development to be analyzed on a measure broader than standard of living. Within development theory, however, there are varying ideas concerning what constitutes desirable change for a particular society, and the different ways that quality of life is defined by institutions therefore shapes how these organizations work for its improvement as a whole (UNDP, 2007).

Organizations such as the World Bank declare a goal of "working for a world free of poverty", with poverty defined as a lack of basic human needs, such as food, water, shelter, freedom, access to education, healthcare, or employment. In other words, poverty is defined as a low quality of life. Using this definition, the World Bank works towards improving quality of life

through neoliberal means, with the stated goal of lowering poverty and helping people afford a better quality of life. Other organizations may also work towards improved global quality of life using a slightly different definition and substantially different methods. Many NGOs do not focus at all on reducing poverty on a national or international scale, but rather attempt to improve quality of life for individuals or communities. One example would be sponsorship programs that provide material aid for specific individuals. Though many organizations of this type may still talk about fighting poverty, the methods are obviously significantly different. Because of these differences in the theory and practice of development, there are also a wide range of quantitative measures that are used to describe quality of life (Costanza, 2002).

2.2.2 Qualitative Measurement of Quality of Life

Unlike per capita GDP or standard of living, both of which can be measured in financial terms, it is harder to make objective or long-term measurements of the quality of life experienced by nations or other groups of people. There are two aspects of personal well-being: Emotional well-being, in which respondents are asked about the quality of their everyday emotional experiences—the frequency and intensity of their experiences of, for example, joy, stress, sadness, anger, and affection—and life evaluation, in which respondents are asked to think about their life in general and evaluate it against a scale. Such and other systems and scales of measurement have been in use for some time (UNDP, 2007).

The 2006 Human Development Report by UNDP concludes that life evaluations - that is, considered evaluations of their life against a stated scale of one to ten - rises steadily with income. On the other hand, reported quality of emotional daily experiences (reported experiences of joy, affection, stress, sadness, or anger) levels off after a certain income level (approximately \$75,000 per year); income above \$75,000 does not lead to more experiences of happiness nor to further relief of unhappiness or stress (UNDP, 2007). Below this income level, there is decreasing happiness and increasing sadness and stress, implying the pain of life's misfortunes, including disease, divorce, and being alone, is exacerbated by poverty.

2.2.3 Human Development Index

Perhaps the most commonly used international measure of development is the Human Development Index (HDI), which combines measures of life expectancy, education, employment

rates and standard of living, in an attempt to quantify the options available to individuals within a given society (UNDP, 2007). The HDI is used by the United Nations Development Programme in their Human Development Report.

Countries in Sub-Sahara Africa at different stages in carrying out reforms of their water sectors: some have gained experiences with new business-oriented management styles in the urban water sector (Uganda), some have implemented urban pilot projects (Kenya) whilst others are already planning the "second generation" of reforms (Senegal). Countries have embarked on water sector reform with different priorities and strategies and have advanced faster in certain areas but may be lagging in others. For example, reform in Zambia first focused on institutional development, with the creation of institutions such as a national regulator or a subsidy fund whereas reform in Senegal focused on the introduction of private sector participation. As a result, the countries are at different points on their reform path, which makes it slightly easier to compare their HDI performance and provide insights into the sequencing of reforms (Appendix III).

2.2.4 Liveability and Health Care

The term quality of life is also used by politicians and economists to measure the liveability of a given city or nation. The widely known measures of liveability calculate the liveability of countries and cities around the world, respectively, through a combination of subjective life-satisfaction surveys and objective determinants of quality of life such as divorce rates, safety, employment and infrastructure. Such measures relate more broadly to the population of a city, state, or country, not to individual quality of life. Within the field of healthcare, quality of life is often regarded in terms of how it is negatively affected, on an individual level, a debilitating illness that is not life-threatening, life-threatening illness that is not terminal, terminal illness, the predictable, natural decline in the health of an elder, an unforeseen mental/physical decline of a loved one, chronic, end-stage disease processes (Costanza, 2002).

2.2.5 Quality of Life Compared with 'Standard of Living'

'Standard of Living' is a measure of the quantity and quality of goods and services available to people. It measures such aspects as GDP per capita, life expectancy, births/1000, infant mortality/1000, doctors/1000, cars/1000, TV/1000, telephones/1000, literacy levels, %GDP spent on education, % GDP spent on health, cinema attendance, newspaper circulation, fertility rate,

density, population per dwelling, etc. Quality of life therefore, is the product of the interplay among social, health, economic and environmental conditions which affect human and social development (UNDP, 2007).

2.2.6 Quality of Life in Nairobi's Informal Settlements

Nairobi's slum dwellers grapple daily with poverty, high housing and service costs, a lack of water and sanitation, violence and disease. According to study as shown in table 2.1, on the profile of Nairobi's informal settlements UN-Habitat (2009), 73% of Nairobi's slum dwellers live below the official poverty line, defined as Ksh 3,570 [US\$42] per month. The mean per capita monthly income for poor slum dwellers is Ksh 3,145 [US\$37], while monthly expenses are shown in table 2.1. Although this seems to exceed the UN defined poverty threshold of one dollar a day, however it is still inadequate to cater for all basic needs.

Table 2.1: Monthly average spending by Nairobi's slum dwellers (UN-Habitat, 2009)

Item	Cost
Food	Ksh 1,350 [US\$15.9]
Transport	Ksh 425[US\$5]
Water	Ksh 605 [US\$7.1]
Electricity	Ksh 340 [US\$4]
Rent	Ksh 850 [US\$10]
<i>Exchange rate at the time was 1 US\$ = KSh.85</i>	

According to Gemon (2008) less than 22% of slum households have a water connection, 65% rely on water kiosks and street water vendors and each slum dweller uses about 23 liters of water per day. Approximately 22% of slum households have an electricity connection and 77% use kerosene for lighting. Only 15% of residents note that streets have lighting. Sanitary infrastructure is particularly inadequate. Only 1/4 of slum dwellers report having access to a private toilet, such as a pit latrine, while 3/4 of the population shares a public toilet with at least 70 other people. Women are often forced to avoid communal toilets, especially at night, for fear of rape. Fewer than 12% of toilets are connected to sanitary sewers and close to 80% of all slum dwellers garbage is dumped in their informal settlement since there is practically no municipal waste collection service in Nairobi's slums. Housing consists of a range of materials, but most

live in dirt floor shacks with sheet metal walls and roofs. Only 12% of the housing stock has a permanent external wall, constructed with brick, stone or block. There are 2.6 persons per room and approximately 1.6 rooms per unit. Close to 92% of slum households are rent-paying tenants and 8% owner occupiers. This is consistent with Nairobi as a whole, where close to 82% of residents are tenants. Structure owners (also known as landlords) make up about 5% of the slum population and tend to own the structure and collect rents, but do not have title to the land (Gemon, 2008).

2.3 Affordability of Water

Many African water utilities have little capacity or motivation to invest in services for poor people. They concentrate their financial resources on maintaining the main elements of their infrastructure and on daily running costs. In such a situation, investing in low-income areas such as small towns or peri-urban settlements is not a priority, and most of the programmes serving them are externally funded through loans or grants from donors. In most large African cities, supplying informal settlements is a major problem for the water utilities. Their service contracts with the government or municipality often exclude those areas, because their existence is not officially recognized even though a significant proportion of the population lives there. Those people generally obtain their water through a system in which customers with household connections resell water to those without them. This practice is normally illegal but tolerated.

Even where there is water, the quality is often poor, leading to exposure to waterborne diseases. The Human Development Report 2006 stresses that the crisis in water is above all a crisis for the poor. It further states that almost two in three people lacking access to clean water survive on less than US\$2 a day, with one in three living on less than US\$1 a day (UNDP 2007). Moreover, the poorest people not only get access to less water, and to less clean water, but they also pay some of the world's highest prices. The latter applies particularly to the urban poor, mainly because they are often forced to buy water from private water vendors (Kjellén, 2006).

2.3.1 Cost of Water in Kenya's Informal Settlements.

Urban poor residents in Kenya face relatively higher costs of water. This could be due to:

Capital investment: The estimated investment by each private vendor to establish a water kiosk is about Ksh150,000 [US\$2,000]. The bulk of this cost comes from laying pipes to connect the

kiosk to a distant utility network. Vendors report that pipe costs account for at least half of investment costs.

Corruption and rent-seeking: Vendors in Kibera slum of Nairobi report that at least a quarter of their initial investment is in the form of bribes to facilitate a connection (known locally as 'speed-up' fees). The utility requires a great deal of information to register a water connection, including the applicant's plot number, address details, a landlord's certification as a proof of residence, and a certificate of employment. The kiosk operators have problems fulfilling these requirements as they are often not employed in the formal sector, and many people in Kibera do not have clear land title, or have landlords who will not provide a certificate. In addition, vendors are required to make on-going unofficial payments to utility officials in order to stay in business.

Temporary Shortages: Cartels take advantage of temporary water shortages to make rapid profits. These shortages are usually created by general problems at the utility, which result in service interruptions. However, there are reports that artificial shortages are sometimes created through collusion with utility officials.

Tariffs: Despite the fact that a bulk rate has been incorporated into the tariff policy of NCWSC (Appendix IV), this has not been effective in bringing down costs for consumers. Kiosks are usually registered as domestic connections due to the requirements of obtaining a bulk connection and additional costs (such as a deposit which doubles that of a domestic connection). Kiosks are usually charged tariffs according to the increasing block tariff, and end up pay high retail rates. At the highest block of the tariff, each additional cubic meter purchased by the operator costs Ksh35 or Ksh0.7 per jerry can (Appendix IV).

2.3.2 Payment for Water by the Urban Poor

Low-income households are remarkably effective at controlling finances on a daily or weekly basis, but have difficulty dealing with longer billing periods that do not correspond with the timing of their income (daily, weekly, or irregular). This requires them to make payments that have accrued significantly over several weeks. The monthly and bimonthly or quarterly payment period may suit middle and high-income users that are paid on a monthly basis but this is rarely appropriate for low-income users. It places significant strain on household budgeting and expenditure (Gemon, 2008).

In order to discourage late payment or non-payment of bills, water utilities in Kenya often implement enforcement procedures such as levying a penalty, disconnecting the defaulter or terminating the supply and retaining the customer's deposit. Households with financial difficulties, even of a temporary nature, are therefore heavily penalized. This is particularly demoralizing for low-income households and unnecessary if simple alternative measures could have been employed to allow them to remain connected. The use of a flat rate may be appropriate when connection costs are high and consumption levels are low.

According to Gemon (2008), a number of approaches are considered to facilitate improved payment. For instance:

Flexible payment arrangements: In order to reduce disconnection rates and ease the burden on low-income households, greater flexibility in the approach to payment should be introduced to enable households to pay their water bills in a manner more suited to their household budgeting and expenditure. Efforts should be made to investigate what options are relevant to the local context, for instance: Increasing the frequency of billing, allowing several smaller payments against a single bill; introducing intermediate billing based on consumption patterns and removing the cost of meter-reading and management.

Pre-payment arrangements: Pre-payment arrangements can be established to encourage consumers to restrict their use to what they have paid for. In South Africa, pre-paid meters are being tested on a large scale. Results have been mixed with initial lessons indicating that technological solutions alone may not be sufficient (several of the meters have been vandalized and others re-programmed to supply water free of charge).

In addition to pre-payment arrangements based on electronic card systems or more simple tokens, it is possible to introduce measures that allow consumers to make more frequent payments through banks and savings institutions. While deposits (of any kind) act as a form of prepayment and alleviate the need for penalties as a means of enforcing payment, the upfront deposit may form yet another barrier for a low-income household (without them having defaulted) as it requires them to make a lump sum payment that may be beyond their means.

Favorable payment terms for accumulated arrears: Other mechanisms that can assist low-income customers include efforts to negotiate friendly payment terms for accumulated arrears. In particular, by allowing consumers to pay outstanding bills in installments, low-income households can remain connected and spread payments into periods when they are more

financially stable. For instance, low-income households may be more able to pay at particular times in the year due to the seasonality of their work.

Easier access to payment centers: Establishing local payment centers in low-income areas may also facilitate payment by improving proximity of payment sites to customers. Typically low-income households live in marginal areas on the periphery of cities and utility payment centers are located a significant distance from the residence or place of work. Paying bills may mean taking time out of work. More careful consideration of the constraints that low-income households face (especially when they are trying to make payments) is likely to lead to better cost recovery.

Improving billing accuracy: Reducing wastage and the losses incurred through leakages is also an important means to improving rates of payment. Understandably all households are unhappy to pay for water they did not consume. Customers in low-income areas may receive bills that reflect malfunctioning installations (such as taps, appliances and meters, due to infrequent or poor maintenance). In unplanned areas where networks may have been installed by customers using sub-standard materials, leakage and wastage are currently the primary causes of high bills, leading to non-payment and disconnection. Initiatives include network infilling programs that enable households to replace 'spaghetti' pipelines with more reliable and closer connections, more frequent meter reading, increasing customer awareness, facilitating checks and repairs and carrying out demand management and water conservation programs.

2.3.3 Water Tariff Regulation in Kenya

With the adoption of the Water Act 2002 (Republic of Kenya, 2002), social and political considerations outweigh the economic considerations in the setting of tariffs such that water is largely considered a social good. The need to have a different view on the pricing of water becomes urgent, so increasingly, water is now/also viewed as an economic good. This necessitates the development of appropriate tariff structures and cost recovery measures. In order to gain acceptance, the water pricing systems are developed with the full consultation of water users (Section 57 of the Water Act -2002). The Act also directs the management of the demand of water in a sustainable way. This includes market-based and technology-based strategies. The two major market-based strategies are water pricing ("the user pays" principle, with special treatment of low-income users) and effluent charges ("the polluter pays" principle). One of the

technology-based strategies as per the Act concerns the reduction of unaccounted-for-water (Republic of Kenya, 2002).

2.3.4 Tariff Structure - Nairobi City Water and Sewerage Company

The tariff structure in force in Nairobi City is an increasing block tariff (see Table 2.2). The official water tariff provides little indication of what people are actually paying. Despite low average water use, estimated at only 40 liters per capita per day, households are paying remarkably high unit prices for water.

Table 2.2: Domestic Tariff Structure for Nairobi – 2009 (Pamoja, UC Berkeley, 2009)

	Block 1	Block 2	Block 3	Block 4
Consumption (m³)	0-10	11-30	31-60	>60
Tariff (Ksh./ m³)	13	20	29	35
Tariff (US\$ / m³)	0.16	0.24	0.37	0.47
Tariff (Euro / m³)	0.13	0.19	0.28	0.35

However, the actual average water cost is estimated to be Ksh297 per cubic meter [US\$3.50] in Nairobi's informal settlements. The main reason behind the high prices is that poor households are buying water from informal on-sellers such as tankers, kiosks and water delivery services (Pamoja, UC Berkeley, 2009).

Despite the NCWSC's attempts to deliver a subsidy through their tariff, there could be evidence that the poor, who are more likely to rely on water sold by third parties, pay more per unit of water. In an attempt to partially address the problem, the water utility has established a flat rate of Ksh13 per cubic meter for bulk supply to water kiosks serving informal settlements. However, this has not been effective in bringing down costs to consumers as few kiosk operators are actually billed at this rate as they often end up being charged the regular domestic tariff. As consumption is high, this pushes the price of water into the highest blocks of the tariff. These costs, as well as the investment costs and overheads incurred by the kiosk operators, translate into very high prices at kiosks.

No matter what they are compared to, prices that most water kiosks in slums charge is high. Although WASREB and the water utility has made a recommendation that water be sold for Ksh2 per jerry can (about US\$0.30), this is not usually observed because of the costs associated with establishing and running water kiosks. A more common price is Ksh5 per jerry can (or Ksh100 [US\$1.30] per m³) prevails, which is eight times more the lowest block of the tariff at domestic connections and four times the average recommended tariff for Nairobi. During water shortages, the prices soar to Ksh10 or as much as Ksh20 for a 20-litre jerry can (the equivalent of Ksh500 or US\$6.60 per m³). The unit cost of water in Nairobi's slums can thus rise above the average price of water at household connections in other African countries (Appendix IV).

2.4 Access to Water

Water supply in Kenyan cities is highly inequitable. Over 50% of the urban poor, living in slums, have no access to safe drinking water and end up paying vastly more for municipal piped water. Autonomous quasi-government water companies provide water in towns, but their water supply capacity is insufficient to cover the urban needs. These water providers have been privatized to increase resource mobilization and investments (WASREB, 2008).

As per Kenya's National Water Services Strategy for 2007-2015, only 60% of households in urban areas have access to safe water. In the low-income settlements where a majority of the urban poor live, only 20% of the population have access to safe water, exposing them to relatively high tariffs charged by water vendors. These settlements are also bedeviled by poor hygienic conditions owing to low coverage and the dilapidated state of sanitation facilities. The poor state of sanitation poses risk of pollution to water sources from which most of the informal settlements draw water (WASREB 2008):

2.4.1 Global Access to Water

More than 1 billion people worldwide have no access to an improved water source. In Africa only half the urban population has access to improved water, while in Asia only 30% of the urban population has access. Again, there are large variations across and within countries. In Cambodia 96% of the richest fifth of the population has access to an improved drinking water source, but just 21% of the poorest fifth does. In Morocco, 97% of the richest fifth of the

population have access to an improved water source, but just 11% of the poorest fifth does. In Peru the corresponding shares are 98% and 39%. (World Development Report, 2004)

According to UN-Habitat (2009), the urban poor get their water by queuing for hours to collect water from standpipes or illegal connections. Others buy their water from vendors who charge up to twenty times more than the price paid by their wealthier neighbours. As such, not only do the poor suffer financially; they also suffer poor health from using unsafe water. It is estimated that at any one time, close to half the population in Africa, Asia and Latin America suffer from one or more of the main diseases associated with inadequate water (UN-Habitat, 2009).

2.4.2 World Health Organization - Acceptable Service Level

The World Health Organization (WHO) has defined a basic service level which is based upon the standard of 25 litres of safe water per person per day (l/c/d) at no more than a 200 metres walking distance. This means that a family consisting of 4 persons (the current average household size in urban areas) in order to be able to lead a healthy living, has to have access to 3,000 litres. The basic service level should also deliver a minimum 10 litres per minute per household to cover peak demand. A national water tariff regulator and government recognized WSP that provides the service, should ensure an environment for setting tariffs - including a pro-poor tariff where appropriate (WARIS, 2008).

2.4.3 Access to Water in Informal Settlements of Kampala, Uganda

Approximately 45% of the total population of Kampala, Uganda resides in one of the so-called informal settlements. Although the Kampala City Council (KCC) discourages people to settle in informal areas, most informal settlements will continue to exist and, when considering the near future, are likely to undergo a process of densification and extension. The National Water and Sewerage Corporation (NWSC) of Uganda have the obligation to supply the whole urban population of Kampala with safe treated water. The NWSC basic service level is 20 l/c/d at no more than 200 metres from dwellings and delivering 10 litres/ minute, to cover peak demand. NWSC provides the service and for setting tariffs (including a pro-poor tariff where appropriate). The main objective of the *Affordable Basic Water Policy* of NWSC is to ensure that no one is denied access to water supply simply because they are resident in informal settlements.

Underlying this is the recognition that supply of water at a basic level assists in alleviating poverty, improves community health and frees women from drudgery. This implies that the main target group of the policy are the urban poor (Sobsey, 2007).

2.4.4 Access to Water in Informal Settlements of Jinja, Uganda

The findings from a study at informal settlements in Jinja, Uganda shown in table 2.3, illustrates that once water is delivered through at least a single tap on-plot, the quantity of water increases significantly and further increases are found only when water is piped into the home and is available through multiple taps (Sobsey, 2007). Average consumption of water when it is piped into the home is relatively high (155 l/c/d), but decreases to 50 l/c/d when water is supplied to a yard level. When water is outside the home, average consumption drops still further to roughly one-third the average consumption at a yard tap and one-tenth that of households with water piped into the home (Sobsey, 2007).

Table 2.3: Average water consumption figures in Jinja, Uganda (Sobsey, 2007)

Type of Supply	Average Consumption (l/c/d)	Service Level
Traditional sources, springs or hand-pumps	15.8	Communal
Stand-post	15.5	Communal
Yard tap	50.0	In compound
Household connection	155.0	Within house (multiple)

The above suggests that the volume of water used in the home is sensitive only to gross differences in service level. Therefore the first priority is to ensure that households have access to an improved water source within one kilometer, which corresponds to the current definition of reasonable access used in assessing progress in global coverage with water supply and sanitation (WHO and UNICEF, 2000). Beyond this, unless water is provided at a household level, no significant changes in water quantities collected are noted.

2.4.5 Access to Water in Informal Settlements of Kisumu, Kenya

A *Citizens' Report Card* on urban water undertaken in Kenya's three largest cities – Nairobi, Mombasa and Kisumu – in 2006 shows similar results. A comparison of the 'poor' and the 'non-poor' revealed that there are distinct inequities in access to mains connections between the poor and non-poor, with the poor reporting lower access. The difference is particularly dramatic in Kisumu, where only 7% of the poor reported having access to mains connections compared to 81% of the non-poor.

Poor households are more likely to use water kiosks as their primary source of water than the non-poor and therefore pay higher prices for lower levels of service. Furthermore, many households are experiencing periods of water scarcity, and the poor are more likely to face scarcity than the non-poor. During such periods, consumers are forced to rely on unsafe and expensive sources of water (Citizen's Report Card, 2007).

2.4.6 Private Sector Participation in Improving Access

Two alternative types of private sector participation in the water sector concern water kiosks and private water vendors. Water kiosks are a form of public-private partnership whereby the government provides water to the kiosk where it is re-sold to the local customers. The 'private' component can be a private company but also a group of citizens united in a community-based organization (CBO) and either or not supported by one or more NGOs.

Private water vendors – also known as the "other" private sector (Solo, 1999) – are informal and/or small-scale operators who provide water (and sanitation) services in mostly low- and middle-income neighbourhoods. They operate apart from the government and may even be illegal. They have a generally negative image, usually cast as "the 'bad guys' who charge usurious rates". However, there are many types of small-scale entrepreneurs in the water and sanitation sector other than the young men transporting two or more 20-litre jerry-cans of water on their bicycles and selling it at high prices during the dry season.

2.4.7 Effects of Improved Access to Water

Improved access to safe and affordable water, especially to the urban poor, is likely to have an impact on their livelihood, directly or indirectly, in at least three ways (UN-Habitat, 2009). First,

it has a positive impact on health (and, as a consequence, nutrition), which increases time and energy to invest in productive activities. Secondly, closer proximity of water sources and increased quantity available reduces the time necessary to fetch water. Lastly, improvements are especially relevant for women, who are traditionally responsible for looking after ill relatives, and for fetching water for the whole household.

Improved access to safe and affordable water at the household and individual level is likely to reduce the time spent on fetching or queuing for water, waterborne diseases, child morbidity, expenditure on water, and water related conflicts; to increase the girl-child's school attendance since girls are sometimes forced to be late or miss school to help their mothers fetch water; and to improve household's health conditions.

2.5 Quality of Water

Water provided for direct consumption and ingestion via food should be of a quality that does not represent a significant risk to human health. A 'zero-risk' scenario for public supplies is not achievable and evidence points to the need to define tolerable risks, commonly based on estimates of numbers of excess cases per defined population size. This approach underpins much risk assessment thinking within the water sector for both microbial and chemical contaminants (WHO, 1999).

Disease may result from consumption of water containing toxic levels of chemicals. The health burden is most significant for three chemicals: arsenic, fluoride and nitrate. Arsenic contamination of drinking water sources is being found in increasing numbers of water supplies world-wide and in Asia in particular. The total disease burden is as yet unknown, but in Bangladesh, the country with the most widely reported problem, between 35 and 77 million people are at potential risk (WHO, 1999). Fluoride is also a significant global problem and WHO (1999) suggest that over 60 million people are affected by fluorosis in Sub-Saharan Africa, India and China, and suggest the total global population affected as being 70 million. Nitrate is also of concern although there remains uncertainty about the scale of adverse health effects from nitrate as few countries include *methemaglobinaemia* as a notifiable disease. Raised nitrate is, however,

identified as a potential public health problem in countries where concentrations in groundwater reach extremely high values (WHO, 1999).

The quality of water that is consumed is well-recognized as an important transmission route for infectious diarrheal and other diseases (WHO, 1999). The evidence from the literature suggests that water availability has an important influence of health and diarrhoea incidence in particular, although as noted by Esrey et al. (1991) this is not necessarily true for all age groups. Esrey suggests that it is only when the water supply is delivered on-plot that health gains are found. It is also noted that this may be due to a number of factors, not least of which is the better socio-economic status of households with this level of service and possibly better quality of water supplied (Esrey, 1991). There appears to be limited published literature on the impact of providing non-piped water supplies on-plot, which would be of particular importance in determining the fraction of diarrhoeal disease that is directly attributable to increased service level and the fraction attributable to other factors.

2.5.1 Treatment and Maintenance of Water Supply

Treatment and maintenance are also key factors for the safety of water supply. Common challenges that face many piped water supply systems include contamination of source by industry, agriculture and municipal activities, old and deteriorating treatment works and distribution systems, demand for water outstripping supply, the increasingly recognized problem of treatment-resistant pathogens such as cryptosporidium and fear over toxicity of disinfection by-products. A further factor is the development of bio-films within the distribution network. These are nutrient rich collections of micro-organisms which provide an environment favourable to pathogen survival inside pipes. Intermittent water supplies can result in water being effectively unavailable for hygiene purposes. Often households need to store water. Domestic water storage vessels are the main breeding sites for vectors (Gemon, 2008).

Intermittence is also associated with changes in pressure within distribution networks which can lead to materials being drawn in through fractures in the pipes. This can then lead to secondary contamination of the water supply, depending on levels of residual chlorine. Similarly, where water is collected from non-piped sources, the nature of water storage and treatment are both important. As discussed above, in section 2.3, the literature suggests that pathogens from outside

the immediate household are more hazardous than those routinely found within the household. Therefore it is more important for water quality interventions to safeguard the quality of the water source rather than to attempt to improve domestic water storage (WHO, 1999). There are suggestions for treatment of water within the household to improve quality of often-contaminated source water. Routine household treatment of water in many cases often involves boiling. It kills off most pathogens but can be expensive and time consuming. It has been estimated that one kilogram of wood is needed to boil one litre of water for one minute. This may not be a choice for lower-income households where resources are limited (Sobsey, 2007).

2.5.2 Collection, Transportation and Storage of Water in the Home

Maintaining the quality of water during collection and manual transport is the responsibility of the household. Good hygiene practices are required and should be supported through hygiene education. Hygiene education programmes provide households and communities with skills to monitor and manage their water hygiene. Household treatment of water has proven to be effective in delivery of public health gains. Monitoring of treatment processes will be specific to the technology. When household treatment is introduced, it is essential that information (and, where appropriate, training) be provided to users to ensure that they understand basic operational monitoring requirements (WHO, 1999).

2.5.3 Water Quantity Requirements for Hygiene

The estimated quantities of water at each level may reduce where water supplies are intermittent and the risks of ingress of contaminated water into domestic water supplies will increase. Where optimal access is achieved, but the supply is intermittent, a further risk to health may result from the compromised functioning of waterborne sanitation systems (Sobsey, 2007).

The public health gains derived from use of increased volumes of water typically occur in two major increments. The first relates to overcoming a lack of basic access, where the distances and time involved in water collection result in use of volumes inadequate to support basic personal hygiene and may be marginally adequate for human consumption. Further significant health gains occur largely when water is available at household level.

Other benefits derived from the second step in improving access include increased time for example, child-care and food preparation and productive activity. Health gains derived from increased access between these two major steps appear limited, although other gains in relation to increased time for activities such as child-care, food preparation and productive activity (including education) may be significant and progressive. Further incremental improvements may also occur at higher levels of service, associated with further increased access and drinking-water quality control, but also linked to improved socio-economic status. Where the basic access service level has not been achieved, hygiene cannot be assured and consumption requirements may be at risk. Therefore providing a basic level of access is the highest priority for the water and health sectors (Sobsey, 2002).

2.5.4 Productive Uses of Domestic Water in Poor Urban Households

The productive uses of domestic water at a household level include brewing, small-scale food production and household construction in low-income areas. Direct health benefits are derived for example from improved nutrition and food security from gardens crops that have been watered. Indirect health benefits arise from improvements in household wealth from productive activity. In urban areas, this often is essential for low-income communities to meet nutritional requirements and may offer additional income from small-scale sales. Families living in 'ultra-poverty' water could form anywhere between 1.5 and 10% of the total production costs in household enterprises. The removal of a water supply or deterioration in the quality of supply, through decreased quantity or availability or increased intermittence or cost may lead to further poverty among poor households using this water for small-scale economic activities such as food production (Sobsey, 2002).

The quality of water used for productive processes needs to be suitable for domestic supply where it is used for processing food for retail. However, in terms of overall use of water sources, the economic use of water typically greatly exceeds that used for domestic supply, but may compromise the ability of the resource to meet basic needs (either through over-consumption or through uses leading to quality deterioration). The health sector oversight of water supply in Kenya, has traditionally not considered productive uses of water as important to control. However, it is increasingly recognized that productive uses of water have particular value for

low-income households and communities and have health and well-being benefits (Sobsey, 2002).

2.5.5 Water Utility's Role in Improving Water Quality

A water service provider (WSP) comprises, as a minimum, the three essential actions that are the responsibility of the drinking-water supplier in order to ensure that drinking-water is safe. These are:

System Assessment: To determine whether the drinking-water supply chain (up to the point of consumption) as a whole can deliver water of a quality that meets health-based targets. This also includes the assessment of design criteria of new systems;

Effective Operational Monitoring: Identifying control measures in a drinking-water system that will collectively control identified risks and ensure that the health-based targets are met. For each control measure identified, an appropriate means of operational monitoring should be defined that will ensure that any deviation from required performance is rapidly detected in a timely manner; and

Management: Management plans describing actions to be taken during normal operation or incident conditions and documenting the system assessment (including upgrade and improvement), monitoring and communication plans and supporting programmes.

For water quantity to act as an absolute constraint on hygiene and health, it must be available only in very small quantities. To act as a positive driver for improved standards of living, water must be available at higher service levels and ideally good quality supplied at least through one tap to the house or plot.

2.6 Pro-Poor Focus

Supplying water and sanitation to poor people is difficult work for a water utility, because they generally have low consumption and often live in areas that are difficult to access. Only a well-managed/competent utility can provide this service, using good technical and commercial staff. As to finance, a water utility needs sufficient investment capacity to apply pro-poor strategies such as subsidized connections, because these involve advance expenditure by the utility. A financially weak company, on the other hand, cannot develop a viable pro-poor investment

strategy because it depends on external funds that it cannot control. This managerial and financial strength of the utility company is more important than its public or private ownership. Various participatory or bottom-up approaches have been developed and applied worldwide in response to the perception that top-down and supply-driven approaches are the cause of the problems. In the urban water and sanitation projects financed by WSTF, the approaches include:

- (i) Beneficiary consultation and participatory planning: Through formation of project task teams comprising few community members;
- (ii) Community development support: Facilitation of task team meetings, public barazas, stakeholders' forums/ workshops;
- (iii) Engagement of nongovernment organizations (NGOs): To carry out community mobilization and sensitization activities;
- (iv) Local government involvement: To support projects by providing public land for infrastructure set-up; and
- (v) Private sector participation: The use of private individuals, enterprises, or financial institutions to achieve project objectives.

2.6.1 Background to Pro-Poor Approach by Nairobi City Water and Sewerage Company

According to the World Bank/WSP report on Kenyan water utilities of 2005, there are several reasons that informal settlements in Nairobi got little attention from the water company (NCWSC). Revenue collection in the settlements was negligible, due in part to low billing rates by the utility (less than 10 percent of water delivered was billed in Kibera slum) and low payment rates by the water re-sellers. There also were many illegal connections and the utility was reluctant to provide more water in an environment where much of it would be stolen. In addition, the water utility had historically preferred to simply use water rationing to limit its losses. Until recently, the attitude towards water vendors and private water kiosk operators was that they were part of the problem. Driving them out of business was seen as an effective measure to reduce unaccounted-for-water.

2.6.2 Pro-poor Policy

World Development Report 2004 unbundles the service delivery chain into three sets of actors: clients, service providers, and policymakers. The effectiveness of services depends on

relationships among these players, including in particular the structure of incentives facing providers and recipients, which in turn are shaped by five central elements of service delivery—resources, information, decision making, delivery mechanisms, and accountability.

The well-being of poor people is the point of making services work. The value of public policy and expenditure is largely determined by the value the poor attach to it. When publicly provided and funded housing is left vacant, when food supplies are not eaten, when free but empty public health clinics are bypassed in favor of expensive private care, this money is wasted (World Development Report, 2004).

Improving services means making the interests of poor people, matter more to service providers. Engaging poor clients in an active role as purchasers, as monitors, and as co-producers can improve performance tremendously. Public/ government pro-poor policies help poor people acquire better services by expanding the influence of their own choices; having the income of providers depend more on the demands of poor clients; increasing the purchasing power of poor people; and providing better information and a more competitive environment to improve the functioning of services.

Where such choices are not feasible, governments can expand consumer power by establishing procedures to make sure complaints are acted on. Sad to say, governments and donors frequently neglect the possible role of poor clients in sustaining better services - or treat that role merely as an instrument for achieving a technically determined outcome. Neither governments nor donors are accustomed to asking the poor for advice. (World Development Report, 2004)

2.6.3 Regulatory Environment to Serve the Urban Poor

Regulatory functions are often split amongst agencies at different levels. Most governments typically regulate water utilities responsible for network services from a national agency or ministry (e.g. an independent regulatory agency), while point sources, such as wells/boreholes may be regulated at either local or national level. Where an independent regulatory body exists it may delegate some tasks to other competent bodies (e.g. water quality monitoring, etc.).

To date there are only a handful of independent regulatory agencies in sub-Saharan Africa. These agencies, in Kenya, Mozambique, Zambia, Malawi, Burkina Faso and Ghana, are relatively new

and are still working out arrangements for improving their functions in relation to serving the urban poor. One of the main tasks of the regulator is to nationally standardize operations of water utilities to ensure fair competition and guard against monopolies and cartels. Despite the prevalence of small-scale providers in many countries, most utilities in Africa have, as mandated by the national regulator, exclusive (monopoly) authority to provide services within defined low-income urban area. Access to information for monitoring quality and levels of service is a key area of concern for regulatory agencies. As information on services to the poor is often particularly weak, the regulator may not have access to the necessary information to allow for effective monitoring. Adequate regulatory capacity is required (either in-house or outsourced) to enable periodic independent assessments. Where a regulatory agency does not have the skills or capacity, the collection of information regarding services to the poor may be done with the assistance of NGOs, and consumer or professional associations.

2.6.4 Urban Pro-Poor Water Supply in Blantyre, Malawi

Water supply in the city of Blantyre (population 620,000) is managed and regulated by the Blantyre Water Board (BWB), a government corporation. The existing city facilities are insufficient to meet the increasing demand for potable water. In particular, the unplanned (squatter) and peri-urban areas (representing 55% of the population) and the traditional housing areas are all underserved. Only 27.4 % of households in the city have house connections, the remainder rely on 80 public water points (Mitlin, 2008).

As the BWB cannot meet the cost of financing mains extensions throughout the city, communities in informal settlements are encouraged to raise their own funds (from their members, NGOs, donors and other funding agencies) in order to speed up the implementation of water projects in their areas. However, despite the benefits of this approach in increasing the rate of coverage achieved, the downside was that materials of varying quality and sub-standard workmanship led to leaks, wastage and lack of pressure. The lack of availability of spare parts and other problems exacerbated the situation (Mitlin, 2008). Although BWB had provided assistance for urban slums on request, in order to rectify this problem and simultaneously maintain the benefits from community or NGO/donors financing extensions, the BWB decided to standardize procedures and play a more active role in the planning, implementation and

monitoring of community initiated water extension projects. BWB accepts group applications for water development in low-income urban areas and these procedures have been established:

- (i) On receipt of a request, BWB carries out an assessment of the feasibility of the proposed installation;
- (ii) If feasible, BWB prepares a preliminary design and cost estimates;
- (iii) The community/residents finalizes financing arrangements with donors;
- (iv) BWB prepares a detailed design, a bill of quantities, a cost estimate and specifications (work to be done, materials to be used etc.);
- (v) The donor, BWB, and the community draw up a contract for materials/works/costs. This tripartite contract stipulates the contract period and provides for supervision and a general commitment to accept adherence to standards and specifications;
- (vi) Independent agents/technical staff supervise the works;
- (vii) Pressure tests and bacteriological quality analysis are required for approval of the installations and their connection to the public mains.

Since 2005, five new area extensions (serving 183,000 people) in the low income areas have been completed adhering to these procedures. BWB takes total charge (directly or through appointed supervisors) of the technical aspects of the water development projects in unplanned communities. While there is some concern that the procedures may be too restrictive and limit initiative, it appears that, in practice, the standards and specifications are objective and accepted. Moreover, it is generally agreed that as BWB will operate and maintain the low-income area water networks, it is entitled to insist on minimum standards.

2.6.5 Pro-poor Water Supply in Kisumu, Kenya

As part of its pro-poor programme, Kisumu Water and Sewerage Company (KIWASCO) has implemented a 'delegated management model' in Nyalenda – a densely populated slum area in Kisumu. In this model, KIWASCO sells water in bulk and at a subsidized tariff to a private operator in the community, who in turn manages its distribution and other aspects. The selected operator acts as an agent of KIWASCO in terms of connecting customers operating the sub-network, collecting revenue and fixing leaks. It is not only a performance-based contract but also a profit-making enterprise towards access to clean and affordable water. The model is intended

to make water affordable to the poor, bring a sense of ownership and thereby reduce some of the problems related to human interference like illegal connections and leakages.

Project proponents believe that a delegated management model has increased access to safe and affordable water; reduced unaccounted-for-water through less illegal connections, less vandalism and less leakages; and increased revenue collection for the company. In this project, KIWASCO sells water to the operator at Ksh. 25 per m³. Through water kiosks and the distribution system set up by KIWASCO, the operator sells the water to consumers at Ksh. 50 per m³, i.e. Ksh. 1 per 20-litre container, cheaper than what the company charges other customers. It is the intention of KIWASCO to extend this model to other low-income neighbourhoods (Mitlin, 2008).

2.6.6 Pro-poor Water Supply in Kosovo - Mathare, Kenya

Water Sector Reforms that began on enactment of the Water Act 2002, focus on improved and formalized water services provision in low-income urban areas of Kenya. The Government has mandated the WSTF to establish an institutional framework – the Urban Projects Concept (UPC) – to enable all licensed water service providers (WSPs) in Kenya to access grants from WSTF for construction of water infrastructure in these areas. Implementation and operation of UPC projects by WSPs regulated by WASREB, is done in partnership with local NGOs and slum dwellers. This has widely been seen to improve the accessibility, quality and affordability of water. Kosovo pilot project is being operated by the Informal Settlements Department of NCWSC. The project was implemented jointly with the community of Kosovo, Pamoja Trust - a local NGO based in Nairobi and WSTF as the financiers (Seur, Karimi, et al, 2010).

The Kosovo project has improved water infrastructure to enable the slum dwellers access water at the household level through individual water connections. This is meant to reduce the high cost of water, increase NCWSC's revenue, reduce spillage or unaccounted for water (ufw), improve the health being of the residents by reducing water borne diseases and minimize community conflicts arising from the struggle to access water. However preliminary evaluation reports - from the water company, NGOs and Donors - drawn from a series of community consultative forums and workshops during the implementation of the project observed and noted that a number of issues were being raised that influence the accessibility to water at the

household level. These issues are security of tenure; structure of relationship between land owners/ landlords and tenants; connection costs; and provision of infrastructure.

Recent efforts by the government in the slum improvement programmes indicate that the government does not have sufficient information that can facilitate proper physical planning for the provision of infrastructure and services in the informal settlements thereby necessitating a joint partnership with the private and civil society organizations that have the skills and competence in that field. Organizations like Pamoja Trust, a local NGO in Nairobi that has offered support to the Kosovo-Mathare project, has managed to integrate tools and approaches practiced in the world by other countries where slum dwellers have managed to influence processes and activities that have enhanced positive relationship with the state agencies towards the development of their settlements. Pamoja Trust was instrumental in availing some vital information during implementation of the Kosovo-Mathare water project, which could not be met by NCWSC. Some of the tools that have emerged as being influential in the processes of participatory planning for the project were community enumerations; area mapping (Appendix D); community dreaming and planning processes; and community organization along daily saving schemes.

2.7 Theoretical Framework

This study is based on the theory of participation. According to Fawlett et al (1995) in the theory of participation, he defined community participation as the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interests or similar situations to address issues affecting the well being of those people. It is a powerful vehicle for bringing about environmental and behavioural changes that will improve the living standards of the community and its members. It often involves partnership and coalitions that help mobilize resources and influence systems, change relationships among partners and serve as catalysts for changing policies, programs and practices (Fawlett et al 1995)

The concepts concerning community participation offer one set of explanations as to why the process of community engagement might be useful in addressing the physical, interpersonal and cultural aspects of individuals' environments. The real value of participation stems from the finding that mobilizing the entire community. Rather than engaging people on individualized basis or not changing them all, leads more effective results (Fawlett et al, 1995) stated change is

more likely to be successful and permanent where the people it affects are involved in initiating and promoting it. The crucial element of community engagement is participation by individuals, CBOs and institutions that will be affected by the effort (Fawlett et al, 1995).

People anywhere have the purpose and the potential to shape and transform their own lives. However, the ability of ordinary people to shape their reality is firstly, often crushed by the social forces around them; and secondly, is largely determined by their historical context. Freire (1973) postulates that to get out this trap, marginalized people needed to achieve what he calls a critical level outlook on their world. Such an outlook would do two things; first, it would enable them read their reality correctly and second, it would help them move from a reactionary to a progressive position where they can shape that reality they have read correctly.

Paulo Freire (1973) hypothesizes that people live at three levels of awareness and that they act differently at each level. The three levels of awareness are the magic level, the naïve level, and the critical level. People at the magic level explain the events and forces that shape their lives in terms of myths, magic, or powers beyond their understanding and control. They tend to be fatalistic, passively accepting whatever happens to them as fate or 'God's will'. Usually they blame no one for the hardships and abuses they suffer but endure these as facts of life about which they cannot do anything. Those at the naïve level base their actions on incomplete understanding. They do not passively accept hardships of being "on the bottom" but try to adapt so as to make the best of the situation in which they find themselves by willingly accepting the values, rules, and social order defined and passed down by those on top. Significantly, they make no attempt to critically examine or change the social order. They are exploited, but are at the same time dependent upon those with authority or power, whom they fear and try to please. Lastly, people at the critical level make use of scientific process – observation and critical thinking - to explain their world, the causes of poverty and other human problems. They question the values, rules and expectations passed down by those in control. They discover that not individuals, but the social system itself, is responsible for inequality, injustice, and suffering; and that even the "bosses" that wield power over them are themselves also victims of the system that also dehumanizes them. Hence, they know that through radical transformation of the norms of organized society – including a fairer distribution resources and exercise of power – can the most serious ills of both the rich and the poor be corrected.

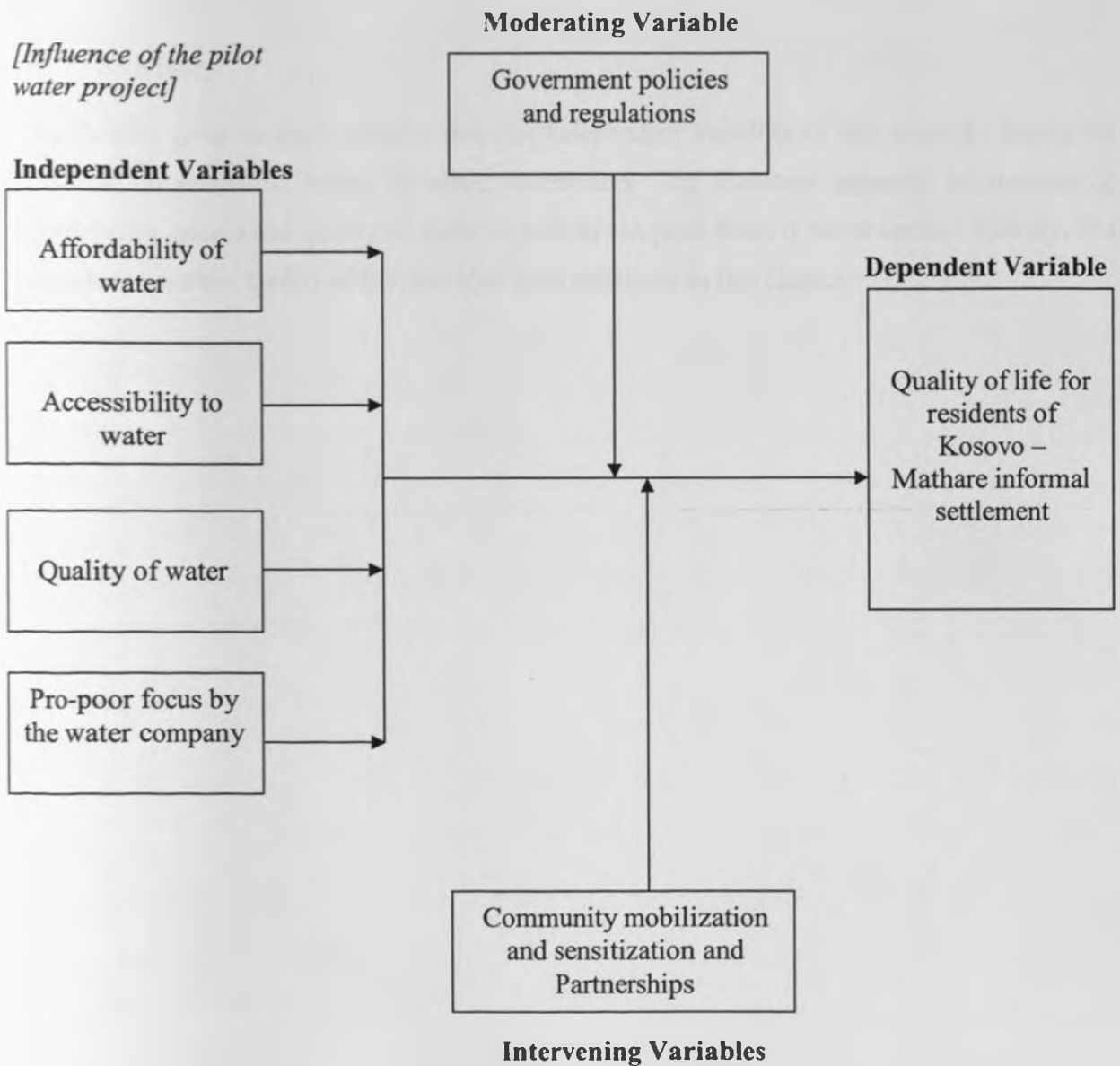
An empowered community possesses the ability to understand their reality and to analyze the

factors that shape that reality; the ability to decide what they want to be; the willingness to act to change the situation for the better; and the ability to ensure sustainability of those efforts. Government and donor support should be determined by the people; people must get only what they need, not what others think they should get. It should be proportional to what people can support or sustain – nothing too grandiose that people are forced to maintain at huge costs though benefits are doubtful. The ownership concept for government and donor projects should be such that the community will protect the project from vandalism, ensure the completion of the started project, and ensure that the project is sustained (Hedayat et al, 2010).

NCWSC through Pamoja Trust used the local *Oversight Committee* as an entry point to implementing the project with the Kosovo community. Community mobilization carried out by Pamoja Trust facilitated local capacity to support the project thus enabling residents to drive the upgrading process. Furthermore, Pamoja Trust was instrumental in providing financial assistance to Kosovo residents by introducing a savings and credit scheme, Akiba Mashinani Trust, to enable Kosovo residents access loans for purchase of water meters from NCWSC. Therefore, the philosophy that the urban poor can be involved in financing some portion of a development project has helped to advance slum upgrading. Residents were instrumental in ensuring that all incidences of vandalism were reported and that the project was completed. There was general expectation by residents that on completion of the water project, their lives would be better.

2.8 Conceptual Framework

Figure 1: Conceptual Framework



The dependent variable in this study was quality of life of the residents of Kosovo- Mathare. The independent variables were the critical success factors. These were affordability of water; access to clean water; quality of water; and pro-poor focus by water service providers. The moderating variable was the institutional framework providing an enabling environment for positive change. This included Government policies through the Ministry of Water (MWI) and regulatory

framework through the Water Services Regulatory Board (WASREB). The intervening variables were partnerships, community mobilization and sensitization.

2.9 Summary

This chapter gives in depth insights into the independent variables of this study by basing the literature on published works by other researchers. The literature captures information on affordability, access and quality of water as well as pro-poor focus in water service delivery. The dependent variable, quality of life, has also been discussed in this chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives an explanation and justification on the choices of methodology approaches that will be used and adapted in order to answer the research questions posed. This chapter outlines the project's research design, population of interest, sampling procedure data collection instruments and finally how the data collected was analyzed.

3.2 Research Design

This study used a descriptive survey design, where questionnaires were used to collect data. It also largely relied on a qualitative approach by seeking to capture detailed information about the perceptions that beneficiaries have on their living conditions with regard to formalized water services. According to Mugenda and Mugenda (1999), a descriptive survey design determines and reports the way things are or answers questions concerning the current status of the subjects in the study. Kothari (2004) describes descriptive surveys as fact-finding enquiries, involving asking questions (often in the form of a questionnaire) of a large group of individuals, adding that the major purpose is description of the state of affairs as it exists at present and represent the findings/ information statistically.

This strategy was useful for gaining statistical knowledge of individual, organizational, social and real life occurrences thereby allowing retention of the holistic and meaningful characteristics of the real life events.

3.3 Population

Kosovo-Mathare settlement of Nairobi had a resident population of 5,531 people according to the MajiData baseline survey to map all low-income urban areas of Kenya; carried out by the Water Services Trust Fund and the Ministry of Water and Irrigation (WSTF, 2010).

3.4 Sampling Design

Sampling techniques provide a range of methods that enable the researcher to reduce the amount of data needed to collect by collecting data from a sub-group rather than all possible cases or elements (Kish, 2011). Stratified random sampling was adapted for this study.

3.4.1 Sampling Process and Procedure

A sample is the number of units selected from the population for investigation (Mugenda and Mugenda, 1999). The advantage of using stratified random sampling according to Kish (2011) is that it provides a better accuracy compared to simple random sampling and systematic random sampling. Stratified random sampling requires a smaller sample hence saves money and time and at the same time avoids unrepresentative populations.

The first sample size was randomly selected from each stratum using the formula explained by Kish (2011), as indicated below:

$$n = N / [1 + N (e)^2]$$
$$n_h = (N_h / N) * n$$

Where:

N = Total population size

n = Total sample size

N_h = Population size for stratum

n_h = Sample size for stratum

e = error margin (0.1)

Example:

$$n = 5531 / [1 + 5531(0.1)^2] = 98 \text{ (sample size)}$$

$$\text{Cluster A sample size is: } (443 / 5531) * 98 = 8 \text{ respondents}$$

$$\text{Cluster B sample size is: } (810 / 5531) * 98 = 14 \text{ respondents}$$

$$\text{Cluster C sample size is: } (468 / 5531) * 98 = 8 \text{ respondents}$$

Table 3.1 shows the sample sizes for each of all the clusters.

Table 3.1: Sample Population for the Study

Strata/Cluster	Population per Cluster	Sample Size
A	443	8
B	810	14
C	468	8
D	532	9
E	1,056	19
F	835	15
G	159	3
H	607	11
I	334	6
J	287	5
TOTAL	5,531	98

The population was divided into ten strata, representative of the ten Clusters of Kosovo-Mathare settlement. The table shows the population of each Cluster and the sample size from each Cluster, for purposes of this study. The researcher developed a questionnaire and administered it to the 98 respondents (Appendix I).

Data was also collected by use of a focus group discussion. According to Best and Kahn (2006), focus groups are group discussions centered on a single or narrow range of topics. The information gathered was qualitative (opinions, insights and personal responses) as opposed to quantitative (uniform facts), as it provided an opportunity to gather and probe insights of participants. A typical focus group session lasts for 90 to 120 minutes, including a summing up session at the end; and an ideal group will have 6-10 participants – too few and one does not get the interaction that adds value over individual interviews; or too many and people will not participate fully (Best and Kahn, 2006). The focus group for this study had 9 respondents:

- One (1) water kiosk operator in Kosovo;
- One (1) public health worker in Mathare;
- One (1) *Oversight Committee* member;
- One (1) landlord/ structure owner of Kosovo;
- One (1) tenant of Kosovo;
- One (1) Assistant Chief of Kosovo;

- One (1) WSTF representative;
- One (1) Pamoja Trust representative;
- One (1) NCWSC representative.

Themes to guide the focus group discussion were developed (Appendix II).

Sampling of the two groups identified in 3.4.1 made use of the survey approach to combine both qualitative and quantitative methods. While 'quantitative' referred to counts and measure of things, 'qualitative' referred to the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things (Kothari, 2004).

This study also consisted of collecting two sets of data on the study site and subject. The first was a questionnaire which was administered to one adult in the selected households. At the same time, one focus group discussion with guiding themes was conducted to capture the perceptions that may not have been conclusively captured by the questionnaire.

3.5 Data Collection Methods

Validation and testing for reliability of the research instrument was done before the actual data was collected.

3.5.1 Data Collection

Data was collected through the use of a questionnaire and a focus group discussion since the study was concerned mainly with variables that could only be directly observed such as views, opinions, perceptions and feelings of the respondents. Questionnaires were administered to people who were literate and were unlikely to have difficulties responding to the questions. Specifically designed close-ended questions were used to collect the quantitative data, while the open-ended were used to collect qualitative data. The sample size was also generally large (98 respondents) and given the time constraints, questionnaires were the ideal tool for collecting data.

Focus group discussions are qualitative and in-depth interviews with key informants who know what is going on in the community (Best and Kahn, 2006). Qualitative data was also collected during a two-hour themed interview through the focus group discussion held at Kosovo social

hall, where open-ended questions were applied. The researcher had a list of themes and questions to be covered and the research assistants noted down the respondents' responses. The order of questions varied depending on the flow of the conversation and additional questions were asked to explore the research questions and objectives. The purpose of the focus group discussion was to collect information from people who had firsthand knowledge of the Kosovo water project.

3.5.2 Validity of Research Instruments

Any data collection tool worth its purpose has to be fit to measure what it intends to measure and should also be capable of generating the same results on repeat measurements. Validity is concerned with whether the findings are really about what they appear to be about. It refers to the degree to which a specific research method measures what it claims to measure. Best and Kahn (2006) argue that validity is a unitary concept and hence the term validity evidence may be used rather than the traditional terms of construct, content and criterion-related validity.

Validity evidence in this study was ensured through translation to Kiswahili of the questionnaire, to ensure words meant what they should. In addition, the supervisors of this research reviewed the research instruments to their satisfaction. Experts comprising experienced professionals in water supply helped to judge the content of the study's adequacy using Best and Kahn's two-step method of demonstrating evidence of validity, i.e. first, defining the universe of content that could be included in the test, and secondly, ensuring that the test's items were representative of the universe. Documents and literature on the subject was also used as sources of evidence. However, such documents and literature were not included in the analysis but were used extensively as complementary sources.

3.5.3 Reliability of Research Instruments

The reliability of a research instrument refers to the extent to which the instrument yields stable and consistent results on repeated trials. Although unreliability is always present to a certain extent, there will generally be a good deal of consistency in the results of a quality instrument gathered at different times; and the tendency toward consistency found in repeated measurements is referred to as reliability (Best and Kahn, 2006). Reliability test were done to minimize the errors and biases in the study.

The questionnaire was pretested and improved after pretesting. Reliability of the data was tested for the different scales of the demographic characteristics, measured using SPSS and obtaining an average Cronbach alpha reliability coefficient. In general, Cronbach alpha value above 0.7 is considered adequate for internal consistency or the degree of interrelatedness of the study item scales (Nunnally, 1978). The Alpha value generated by SPSS for this study was 0.7428 (Appendix VIII). This signified the reliability of the questionnaire used for data collection.

3.6 Data Analysis

While data collection is the systematic recording of information, data analysis according to Best and Kahn (2006) involves working to uncover patterns and trends in data sets. They add that by publishing data and techniques used to analyze and interpret the data, scientists give the community the opportunity to both review the data and use it in future research.

The data collected was entered and analyzed as per the research objectives by simple descriptive analysis using Microsoft Excel and Statistical Package for Social Scientists (SPSS) version 12.0 software. The software is commonly used for analyzing survey data (ibid) and its choice is underpinned on its numerous advantages ranging from user friendliness, ability to analyze multi-response questions, cross section and time series analysis, and cross tabulation to capability to be used alongside Microsoft Excel and Word. The process involved data cleaning and initial data cleaning to ensure that erroneous entries were inspected and corrected where possible. Initial data analysis used descriptive statistics to check the quality of data and measurements, the characteristics of the data samples and whether the implementation of the study fulfilled the intentions of the research design.

3.6.1 Qualitative Data Analysis

Qualitative data analysis was used to summarize the mass of words generated by the focus group discussions. The data was arranged into relevant themes at the end of the day's focus group discussion, so as to form themed summaries. Any other new information that emerged during the discussion was added into the summary of themes. Finally, based on all the themed summaries, a decision is made on the type of data generated (whether quantitative or qualitative), and it was used to inform relevant statistical analysis.

3.6.2 Quantitative Data Analysis

Quantitative data was converted to numerical codes, including as much information as possible to avoid initial omission of vital information, which might have been impossible to recover later. Similar information as per the study's variables was categorized together to give a summary of results. The descriptive statistics used included measures of central tendency (mean, mode and median) and the measures of dispersion included the standard deviation, range, skewness and kurtosis (Nunnally, 1978).

Skewness is another name for asymmetry; one tail of the curve is drawn out more than the other. A negative value indicates skewness to the left; a positive, skewness to the right. Kurtosis is the peakedness of the curve, whereby a negative value indicates platykurtosis [fewer items at the mean and at tails but more in intermediate regions]. A positive value shows leptokurtosis [more items near the mean and at the tails but fewer in the intermediate regions] (Nunnally, 1978). Determination to check if the degrees of skewness or kurtosis were significantly non-normal was by comparing the numerical value for skewness/kurtosis with the range formed by twice the standard error of skewness/kurtosis. If the value for skewness/kurtosis fell within this range, then the distribution was considered to be sufficiently normal.

To uncover the relationships between different types of variables, Pearson's correlation coefficient (Pearson's r) was used. It was statistical measure of the co-variation or association between the variables. The correlation coefficient r , ranged from +1.0 to -1.0. If the value of r was 1.0, there was a perfect positive linear relationship. If the value of r was -1.0, there was a perfect negative linear relationship or a perfect inverse relationship. No correlation was indicated if $r = 0$. The correlation coefficient indicated both the magnitude and direction of the linear relationship. The correlation matrix was used as the standard form of reporting the correlation results because this statistical approach could be used to analyze interrelationships among a large number of variables and to explain original variables not only in a condensed way but also in terms of their common underlying dimensions with a minimum loss of information.

3.7 Operational Definition of the Variables

Operational definition is a description of a variable, term or object in terms of the specific process or set of validation tests used to determine its presence and quantity. Properties described

in this manner must be publicly accessible so that persons other than the definer can independently measure or test for them at will (Kish, 2011). One primary way in which operational definitions varied was in the extent to which they were able to capture the concepts/variables the researcher had defined. This correspondence was the “validity” of the operational definition or the extent to which it actually measured the variables it was intended to measure. The operational definition of variables was generally designed to model the conceptual definitions as illustrated by Figure 1- the conceptual framework. Table 3.2 illustrates and summarizes the operational definitions that were used in this research.

Table 3.2: Operational Definitions of Variables in the Study

Objective	Variable	Indicator(s)	Measurement	Scale	Data Collection Method	Data Analysis
To investigate how a affordability of water influences the quality of life of informal settlement residents	<u>Independent Variable</u> Affordability of water	a) Amount of water afforded per household b) Cost of water per 20 litre jerry can before and after new system c) Monthly cost of metered water supply	a) No. of jerry cans bought and used per day b) Change of cost of water per 20 litre jerry can • 0 - 2 Ksh. • 2 Ksh. • Over 2Ksh. c) Monthly cost of metered water • 0 - 500 Ksh. • 500-1000 Ksh. • Over 1000Ksh.	Ordinal	Questionnaire	Correlational and descriptive statistics
To establish how access to water influences quality of life in informal settlements	<u>Independent Variable</u> Accessibility to water	a) Source of water b) Regularity of supply c) Distance of water source d) Time taken waiting so as to access water at the source	a) Metered piped water , unmetered piped water, yard tap, water kiosk or water vendor b) Supply hours per day • 0 – 6 hours • 6 - 12 hours • 12 - 24 hours c) Distance • 0 - 50 metres • 50 - 100 metres • Over 100 metres d) Time • 0 – 20 minutes • 20 – 40 minutes • Over 40 minutes	Interval	Questionnaire	Correlational and descriptive statistics

Objective	Variable	Indicator(s)	Measurement	Scale	Data Collection Method	Data Analysis
To determine how the quality of water influences the quality of life in informal settlements	<u>Independent Variable</u> Quality of water	a) Physical condition of water network b) Treatment of water before and after new system	a) Pipeline network: • No. of dilapidated pipes • Incidences of piped water mixing with sewage b) No. of households that: • Treat water • Do not treat water	Ordinal	Questionnaire	Correlational and descriptive statistics
To explore the influence of pro-poor focus on the quality of life of residents in informal settlements	<u>Independent Variable</u> Pro-poor focus in water provision	a) Community knowledge of pro-poor policy b) Participation in implementation of pro-poor policy	a) No. of people aware of the pro-poor policy and what they know b) No. of people reporting to NCWSC burst pipes, cartels, illegal connections and water supply disruptions	Ordinal	Questionnaire	Correlational and descriptive statistics
To assess the factors affecting quality of life of residents in Kosovo informal settlement	<u>Dependent Variable</u> Quality of life for residents of urban slums	a) Improved health of residents b) Reduced household budget on water c) Reduced time waiting and distance to water source d) Relationship with NCWSC has improved	a) No. of residents reporting improved health benefits b) No. of households with reduced expenditure on water after the project c) No. of people spending less time fetching/ accessing water d) No. of people who are satisfied with NCWSC's services	Ordinal	Questionnaire and a focus group discussion	Correlational and descriptive statistics

3.8 Summary

The research methodology chapter brings out and explains how the study will be conducted. The reasons for conducting the study as outlined are also given and explained. In this chapter the method of data collection is also outlined. The tools for collecting data are also outlined and expounded on. Selection of the data collecting tools is also defended heavily relying on research theories for this purpose. How the data collected will be presented is also clearly outlined.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents and interprets the analyzed data, which is discussed under thematic areas and sub-sections in line with the study objectives. The thematic areas include: demographics, affordability of water, access to water, quality of water, pro-poor focus in water services provision and quality of life.

4.2 Response Rate

A questionnaire with open and close-ended questions was administered to 98 respondents in Kosovo-Mathare. There was a 100% response rate, which was possible since the questionnaires were personally administered by 3 research assistants. In addition the research assistants were able to quickly replace any respondent who declined to be interviewed. The second group of respondents from the focus group discussion; also returned a response rate of 100% all 9 participants took part in the discussion.

4.3 Demographic Characteristics

Since data were collected from both residents and focus group respondents, an attempt was made to present data first in terms of demographics of respondents.

4.3.1 Distribution of Respondents by Gender

During data collection the respondents' gender were noted on the questionnaire.

Table 4.1: Gender distribution of respondents

Gender	Frequency	Percent
Male	36	36.7
Female	62	63.3
Total	98	100.0

Resulting distribution showed that out of 98 respondents, 36 (36.7%) were male while 62 (63.3%) were female.

4.3.2 Distribution of Respondents by Age

The ages of respondents were noted as shown in Table 4.2.

Table 4.2: Age Distribution of the respondents

Age	Frequency	Percent
18-30 years	39	39.8
31-55 years	51	52.0
56-80 years	8	8.2
Total	98	100.0

Those that were within the age bracket of 18–30 years were 39 (39.8%). 51 (52%) respondents were within the age brackets of 31–55 years, and 8 (8.2%) were within the age brackets of 56–80 years.

4.3.3 Distribution of Respondents by Occupation

Presented in Table 4.3 are the occupations of the respondents.

Table 4.3: Occupation of the respondents

Occupation	Frequency	Percent
Self-employed	40	41.2
Employed	18	18.6
Casual Worker	24	24.7
Unemployed	15	15.5
Total	97	100.0

Self-employed respondents were 40 (41.2%), 18 (18.6%) were employed, 24 (24.7%) were casual workers, 15 (15.5%) were unemployed, and there was no response from 1 respondent.

4.3.4 Distribution of Respondents by Average Monthly Household Income

The ranges of average monthly household incomes are presented in Table 4.4.

Table 4.4: Average monthly household income

Household Income	Frequency	Percent
< Ksh 1,000	21	21.9
Ksh. 1,001 - Ksh. 5,000	49	51.0
Ksh. 5,001 - Ksh. 8,000	20	20.8
> Ksh. 8,000	6	6.3
Total	96	100.0

Households that had an average monthly income below Ksh.1,000 were 21 (21.9%), 49 (51.0%) got between Ksh.1,000-Ksh.5,000, 20 (20.8%) got between Ksh.5,000-Ksh.8,000, and 6 (6.3%) had an average monthly income above Ksh.8,000.

4.3.4 Distribution of Respondents by Number of Dependants per Household

Number of dependants per household was assessed as presented in Table 4.5.

Table 4.5: Number of dependants per household

Number of Dependants	Frequency	Percent
1 - 2 persons	39	41.1
3 - 4 persons	46	48.4
5 - 6 persons	10	10.5
Total	95	100.0

Respondents with 1-2 dependants in their households were 39 (41.1%), 46 (48.4%) had 3-4 dependants in their households, and 10 (10.5%) had 5-6 dependants in their households. There was no response from 3 respondents.

4.4 Affordability of Water

The study sought to assess the respondents' spending on and consumption of water.

4.4.1 Water Amounts Bought compared to Consumption Amounts per Household

Table 4.6: Number of jerry cans bought

Jerry cans bought	Frequency	Percent
None	42	44.7
1	1	1.1
2	8	8.5
3	6	6.4
4	9	9.6
5	13	13.8
6	6	6.4
7	5	5.3
8	2	2.1
9	2	2.1
Total	94	100.0

Table 4.7: Number of jerry cans used

Jerry cans used	Frequency	Percent
None	5	5.1
1	8	8.2
2	19	19.4
3	17	17.3
4	18	18.4
5	12	12.2
6	9	9.2
7	4	4.1
8	3	3.1
9	1	1.0
10	1	1.0
12	1	1.0
Total	98	100.0

As illustrated by Table 4.6, 42 (44.7%) households did not buy water from the NCWSC water kiosks. Hence out of the 56 households that relied on the kiosks, 13 (13.8%) bought 5 jerry cans per day, 9 (9.6%) bought 4 jerry cans per day, 6 (6.4%) bought 3 jerry cans per day, 8 (8.5%) bought 2 jerry cans per day, while only 1 (1.1%) bought 1 jerry can per day.

The study revealed that an average of 3.7 jerry cans was used per household per day in Kosovo. Table 4.7 shows that per household 8 (8.2%) used 1 jerry can, 19 (19.4%) used 2 jerry cans, 17 (17.3%) used 3 jerry cans, 18 (18.4%) used 4 jerry cans, 12 (12.2%) used 5 jerry cans, 9 (9.2%) used 6 jerry cans, 4 (4.1%) used 7 jerry cans, 3 (13.1%) f used 8 jerry cans, while only 3 (3.0%) used above 9 jerry cans per day.

4.4.2 Cost Comparison of Water Before and After the Project

Comparison per jerry can between cost of water at the NCWSC water kiosks and cost of buying from water vendors is presented in Tables 4.7 and 4.8.

Table 4.8: Cost after (NCWSC water kiosk)

Cost of water from kiosk	Frequency	Percent
0 - Ksh. 2	5	5.3
Ksh. 2	59	62.1
Over Ksh. 2	28	29.5
Total	95	100.0

Table 4.9: Cost before (water vendor)

Cost of water from water vendor	Frequency	Percent
0 - Ksh. 2	7	7.2
Ksh. 2	40	41.2
Over Ksh. 2	50	51.5
Total	97	100.0

Before the Kosovo water project, 7 (7.2%) residents bought water at less than Ksh.2, 40 (41.2%) bought at Ksh.2, with 50 (51.5%) residents having bought water at above Ksh.2. After the Kosovo water project, residents who bought water at less than Ksh.2 were 5 (5.3%), 59 (62.1%) residents bought at Ksh.2, with 28 (29.5%) residents having bought water at above Ksh.2. The average cost of water per jerry can was Ksh.2.

4.4.3 Monthly Cost of Metered Water Supply

The monthly cost of metered connections is shown in Table 4.10.

Table 4.10: Average monthly water bill per household

Monthly water bill	Frequency	Percent
0 - Ksh. 500	13	15.1
Ksh. 500 - 1,000	22	25.6
Over Ksh. 1,000	5	5.8
None/NA	46	53.5
Total	86	100.0

Respondents who paid a monthly water bill less than Ksh.500 were 13 (15.1%), 22 (25.6%) residents paid between Ksh.500–1,000, with 5 (5.8%) having paid above Ksh.1,000. Analysis showed that the average monthly water bills were between Ksh.500-1,000.

4.5 Access to Water

The study sought to assess the respondents' access to water.

4.5.1 Main Water Source

The water sources before the Kosovo water project are shown in Table 4.11.

Table 4.11: Main water sources before Kosovo water project

Water source before project	Frequency	Percent
Metered piped water at home	6	7.5
Unmetered piped water at home	35	37.5
Yard tap	5	12.5
Water vendors	34	42.5
Total	80	100.0

Respondents who had metered piped water at home were while 6 (7.5%), 35 (37.5%) had illegal/unmetered piped water at home, 10 (12.5%) relied on yard taps, and 34 (42.5%) bought water from vendors.

The water sources after the Kosovo water project are shown in Table 4.12.

Table 4.12: Main water sources after Kosovo water project

Water source after project	Frequency	Percent
Metered piped water at home	32	35.6
Unmetered piped water at home	13	14.4
Yard tap	11	12.2
NCWSC water kiosk	18	20.0
Water vendors	16	17.8
Total	90	100.0

Respondents who had metered piped water at home were 32 (35.6%), while 13 (14.4%) had illegal/unmetered piped water at home, 11 (12.2%) relied on yard taps, 18 (20%) used water from the water kiosks, and 16 (17.8%) bought water from vendors.

4.5.2 Regularity of Water Supply

Assessment of the regularity of water supply at the main source is shown in Table 4.13.

Table 4.13: Regularity of water supply from current source

Is water supply regular?	Frequency	Percent
Yes	50	52.1
No	41	42.7
Don't know	5	5.2
Total	96	100.0

Regular water supply from the main water source was reported by 50 (52.1%) respondents, while 41 (42.7%) did not have regular water supply and 5 (5.2%) were not sure whether water supply was regular.

Regularity of water supply was also measured by the daily number of hours water was supplied.

Table 4.14: Hours per day water is available at the source

Daily water availability	Frequency	Percent
0 - 6 Hrs	22	23.2
6 - 12 Hrs	38	40.0
12 - 24 Hrs	34	35.8
None/NA	1	1.1
Total	95	100.0

Respondents who reported between 0-6 hours of water supply were 22 (23.2%); while 38 (40.0%) reported 6-12 hours of supply, with 34 (35.8%) reporting between 12-24 hours.

4.5.3 Distance of Water Source

The distance to the water source for households was evaluated as shown in Table 4.15.

Table 4.15: Distance to water source

Distance to water source	Frequency	Percent
0 - 50m	91	92.9
50 - 100m	7	7.1
Over 100m	0	0.0
Total	98	100.0

A distance between 0-50 metres was reported by 91 (92.9%) respondents, and 7 (7.1%) reported a distance between 50-100 metres.

4.5.4 Time Taken to Access Water

Time in minutes taken to access water at the water source was measured as shown in Table 4.16.

Table 4.16: Time taken to access water

Time to access water	Frequency	Percent
0 - 20 min	86	87.8
20 - 40 min	10	10.2
Over 40 min	2	2.0
Total	98	100.0

Respondents who took between 0-20min to access water were 86 (87.8%), while 10 (10.2%) took 20-40 minutes, with only 2 (2%) taking over 40 minutes to access water.

Table 4.17: Number of days per week water is available

Days water is available	Frequency	Percent
3	5	5.6
4	10	11.2
5	12	13.5
6	8	9.0
7	54	60.7
Total	89	100.0

Table 4.17 shows time in days per week that water was available at the nearest water source. 5 (5.6%) people had water 3 days per week, 10 (11.2%) had water 4 days per week, 5 (13.5%) had water 5 days per week, 8 (9.0%) had water 6 days per week, and 55 (60.7%) had water 7 days of the week.

4.6 Quality of Water

Residents were asked to rate the quality of water from NCWSC as shown in Table 4.18.

Table 4.18: Safety of drinking water

Is water safe for drinking?	Frequency	Percent
Yes	79	80.6
No	13	13.3
Don't know	6	6.1
Total	98	100.0

Water safe for drinking was found in 79 (80.6%) responses, while 13 (13.3%) found the water unsafe for drinking, and 6 (6.1%) did not know whether the water was safe for drinking.

4.6.1 Physical Condition of the Water Network

The study sought to establish further the reasons that some of the residents felt that the NCWSC water was unsafe for drinking as shown in Table 4.19.

Table 4.19: Reasons for unsafe water

Reasons for unsafe water	Frequency	Percent
Dilapidated pipes	7	8.4
Burst pipes	14	16.9
Mixture with sewage	3	3.6
None/NA	59	71.1
Total	83	100.0

Though 59 (71.1%) felt that the physical condition of the water network was good, 7 (8.4%) reported dilapidated pipes, 14 (16.9%) reported burst pipes while 3 (3.6%) has witnessed mixture of piped water with raw sewage.

4.6.2 Water Treatment Before and After Kosovo Water Project

The treatment methods of water before and after the project were assessed. Tables 4.20 and 4.21 compare the treatment methods at the two points in time.

Table 4.20: Water treatment before project

Number treating before project	Frequency	Percent
Not treating	67	68.4
Boiling	12	12.2
Water guard	12	12.2
Chlorine	3	3.1
Filtering	4	4.1
Total	98	100.0

Table 4.21: Water treatment after project

Number treating after project	Frequency	Percent
Not treating	78	79.5
Boiling	8	8.2
Water guard	6	6.1
Chlorine	6	6.2
Filtering	0	0.0
Total	98	100.0

There was an increase from 67 (68.4%) to 78 (79.5%) in the number who were not treating water and increase from 3 (3.1%) to 6 (6.2%) in the number treating with Chlorine. There was a decrease from 12 (12.2%) to 8 (8.2%) in the number boiling water, a decline from 12 (12.2%) to 6 (6.1%) in the number using WaterGuard, and a reduction from 4 (4.1%) to nil (0%) in the number filtering water.

4.7 Pro-Poor Focus

Respondents were asked to rate the relationship they had and the services they received from NCWSC. This is illustrated in Table 4.22.

Table 4.22: Rating of NCWSC by Kosovo residents

Rating of NCWSC	Frequency	Percent
Satisfied	31	31.6
Quite satisfied	35	35.7
Quite dissatisfied	16	16.3
Dissatisfied	13	13.3
Not sure	3	3.1
Total	98	100.0

Respondents who were satisfied were 31 (31.6%), while 35 (35.7%) were quite satisfied, 16 (16.3%) were quite dissatisfied, 13 (13.3%) were dissatisfied, and 3 (3.1%) were not sure.

4.7.1 Awareness of the Pro-poor Policy

Table 4.23 shows the number of Kosovo residents who were aware of the pro-poor policy.

Table 4.23: Awareness of pro-poor policy

Awareness of policy	Frequency	Percent
Yes	8	8.2
No	90	91.8
Total	98	100.0

Residents who were aware of the pro-poor policy by NCWSC were 8 (8.2%) while those who did not know about the policy were 90 (91.8%).

4.7.2 Participation in Implementation of the Pro-poor Policy

Results indicate that 91.8% of Kosovo residents were not knowledgeable in the pro-poor policy or its implementation. In addition, the study sought to establish if they reported any water-related incidences to NCWSC as shown in Table 4.24.

Table 4.24: Incidents commonly reported to NCWSC by Kosovo residents

Reported incidents	Frequency	Percent
Burst pipes	16	16.3
Illegal connections	4	4.1
Cartels	3	3.1
Vandalism of pipes	9	9.2
Water supply disruptions	9	9.2
Overpriced water bill	7	7.1
I don't report anything	50	51.1
Total	98	100.0

Incidents of reported burst pipes was found in 16 (16.3%) responses, while 4 (4.1%) reported illegal connections, 3 (3.1%) reported the presence of cartels, 9 (9.2%) reported vandalism of pipes, 9 (9.2%) reported water supply disruptions, 7 (7.1%) reported over-priced water bills, while 50 (51.1%) chose not to report anything.

4.8 Quality of Life

Residents were asked to state in what aspects they felt that their lives had possibly improved due to formalization of water supply in Kosovo. This is shown in Table 4.25.

Table 4.25: How quality of life has improved

Quality of life	Frequency	Percent
Health has improved	36	
Health has is the same	62	
Total	98	100.0
Reduced expenditure on water	30	
Same expenditure on water	68	
Total	98	100.0
Less time used to get water	36	
Same time used to get water	62	
Total	98	100.0
Better relationship with NWSC	12	
Same relationship with NWSC	86	
Total	98	100.0

Results show that 36 (36.7%) residents felt that their health had improved, 30 (30.6%) felt that their expenditure on water had decreased, 36 (36.7%) felt that the time spent accessing water had decreased, and 12 (12.2%) felt that their relationship with NCWSC had improved.

As illustrated in Table 4.26, respondents were asked to state whether in general their lives had improved as a result of formalization of water supply in Kosovo.

Table 4.26: Quality of life rating by Kosovo residents

Quality of Life	Frequency	Percent
Life has improved	68	70.1
Life is the same	22	22.7
Life has not improved	4	4.1
Don't know	3	3.1
Total	97	100.0

Results show that 68 (70.1%) residents reported that their lives had improved, 22 (22.7%) reported that their lives were still the same, 4 (4.1%) reported that their lives had not improved, and 3 (3.1%) did not know whether their lives had improved or not.

4.9 Summary

Analyzed data in this Chapter has been presented and interpreted in line with the independent and dependent variables and the objectives of this study.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the key findings, the discussion, conclusion, recommendations, and suggestions for further research for contribution to the body of knowledge.

5.2 Summary of Main Findings

The first objective of the study was to investigate the influence of the affordability of water on the quality of life of the slum dwellers of Kosovo -Mathare. 40% of the households in Kosovo had a metered water connection. Residents with metered household connections paid an average monthly water bill of Ksh.600. Residents without individual connections bought water from their neighbors or from the NCWSC water kiosks at Ksh.2 per jerry can. For the residents who relied on water kiosks or neighbours, the average amount of water afforded per household was found to be 2.7 jerry cans per day, though average daily consumption per household was 3.7 jerry cans per day. There was a reduction by 20.9% in the cost of water per jerry can after the Kosovo water project when compared to before the project.

The second objective was to establish the influence of the access to water on the quality of life of the slum dwellers of Kosovo. Currently, 87 households in Kosovo have domestic water meters, while the other households buy water from the 4 kiosks. The study established that after the Kosovo water project there was a decreased reliance on water vendors from 42.5% to 17.8%, and reduction in the number of illegal (unmetered) household connections from 37.5% to 14.4%. The number of legal (metered) household connections increased from 7.5% to 35.6%. Water was available between 12-24 hours per day for a majority of the residents (35.8%), for 7 days a week for 60.7% of the residents, and the proximity to the water source for 92.9% of the residents was less than 50 metres away. Therefore access to water as a result of Kosovo water project had been enhanced.

The third objective was to determine the influence of the quality of water on the quality of life of the slum dwellers of Kosovo. 80.6% of the residents found the water safe for drinking. There was a remarkable improvement in the quality of water after the Kosovo water project when compared to before and an increase from 68.4% to 79.5% in the proportion of residents who were not treating water. In addition, there was a decrease from 12.2% to 8.2% in the number of residents boiling water, a decline from 12.2% to 6.1% in the proportion using WaterGuard, and a reduction from 4.1% to nil (0%) in the number filtering water. Reasons cited for poor quality water were the occasional pipe bursts, some pipes were dilapidated and these conditions may have led to mixture of the piped water with raw sewage.

For the last objective on the influence of pro-poor focus on the quality of life of Kosovo residents, the residents rated the relationship and the services by NCWSC. 31.6% of the residents were satisfied, 35.7% were quite satisfied, 16.3% were quite dissatisfied, 13.3% were dissatisfied, and 3.1% were not sure. However, 91.8% of the residents were not aware of the pro-poor policy by NCWSC, hence the weak correlation ($\rho=0.298$) between pro-poor focus and quality of life.

5.3 Discussion

This section discusses the findings of the study and relates them to relevant empirical literature.

5.3.1 Demographic Characteristics

Demographic characteristics of respondents revealed that gender distribution was skewed towards female as there were 27% more female than male respondents, further indicating more women than men were in charge of water matters in Kosovo households. Most respondents were self-employed (41.2%), closely followed by casual workers who were 24.7%, while the employed were 18.6% and unemployed 15.5%. The vast majority of households (51.0%) earned between Ksh.1,000-5,000 per month and 21.9% below Ksh.1,000. According to UN-Habitat (2009), 73% of Nairobi's slum dwellers live below the official poverty line, defined as Ksh 3,570 [US\$42] per month and the mean per capita monthly income for poor slum dwellers is Ksh 3,145 [US\$37] (UN-Habitat, 2009). Hence the Kosovo populace in this study was found to live in poverty.

5.3.2 Affordability of Water

Assessment of the affordability of water revealed some remarkable trends. First, the amount of water bought per household per day from the NCWSC kiosks was compared to amounts of water used per household per day. The finding was that an average of 2.7 jerry cans was bought from the NCWSC kiosks per day; but an average of 3.7 jerry cans was used per household per day. Lower purchases from water kiosks could have been attributed to the selling of water by residents with individual water connections to their neighbours who did not have a connection, thus deterring the latter from buying water from the kiosks.

Cost comparison of water before and after the Kosovo project showed that when residents previously bought water from vendors, the average cost per jerry can was Ksh5 but after the project it had reduced by 50% to Ksh.2.50. The cost of water after the project was still above the WASREB recommendation of Ksh.2 (WASREB-Impact, 2010). In NCWSC's attempt to partially address the block tariff issue the water utility established a flat rate of Ksh13 per cubic meter for bulk supply to water kiosks serving informal settlements. However, this has not been effective in bringing down costs to consumers as few kiosk operators often end up being charged the regular domestic tariff (Table 2.2). As consumption is high, this pushes the price of water into the highest blocks of the tariff. These costs, as well as overheads incurred by the kiosk operators, translate into higher prices at kiosks (Pamoja, 2009). Respondents added that occasionally water was sold at Ksh.4 at NCWSC kiosks during periods of supply disruption.

The average monthly cost of water for households with individual connections was Ksh. 500. The average monthly spending on water by Nairobi's slum dwellers is Ksh.605 (Table 2.2). Only 46.5% of the residents had individual connections as most residents could not afford the connection fee of Ksh.2,500. The focus group discussion exposed ten residents' complaints to NCWSC over alleged monthly water bills that seemed inconsistently higher than their usage. NCWSC individual connection consumers in Kosovo, unlike the water kiosks customers, are billed on a domestic tariff based on an increasing block tariff (Pamoja, 2009).

Cross-tabulation of household incomes, monthly water expenditure and quality of life was made. 30 out of the 98 respondents felt that there was reduced monthly expenditure on water as a result of the Kosovo water project. 22 (73%) residents reported that their lives had improved as a result

of reduced expenditure on water, with households with an income of between Ksh.1,001-5,000 making up a majority 50% of residents who felt that reduced expenditure on water had improved their lives. 6 (20%) felt that their lives were still the same despite reduced expenditure on water. 1 (3%) felt that life had not improved despite reduced water expenditure; and 1 (3%) did not know whether their lives had improved due to the reduced expenditure (Appendix VII). Prior to the Kosovo water project, the cost of water was set by so-called "market forces" but after the Kosovo project, NCWSC water tariffs and prices were regulated by WASREB, hence was cheaper. A national water tariff regulator and government recognized WSP that provides the service, should ensure an environment for setting tariffs, including a pro-poor tariff where appropriate (WARIS, 2008). Therefore, this reduction in water expenditure for 50% of the slum dwellers helped to improve the household budget and avail extra funds for other household items.

5.3.3 Access to Water

Investigation into the main water sources before and after the Kosovo project established that after the project there was decreased reliance on water vendors from 42.5% to 17.8%, and reduction in the number of illegal (unmetered) household connections from 37.5% to 14.4%. Concurrently, the number of legal (metered) household connections increased from 7.5% to 35.6%. Sustainable access to safe water incorporates improved service reliability, availability, physical access, own household connection or regulated public source (Schafer, Werchota and Dolle, 2011).

Respondents who had regular water supply from their mains were 51%. Reasons given by the others were occasional water supply disruption due to the ongoing Thika Road construction; closure of the water kiosks for long periods without prior notice; pipe bursts that not fixed on time by NCWSC; and water rationing by NCWSC once a week in Kosovo's Cluster E. Regularity of water supply was also measured by the daily number of hours water was supplied to the slum dwellers. A minority 23.2% got between 0-6 hours water supply; a majority 40% got 6-12 hours of supply, with 35.8 getting between 12-24 hours.

Slum dwellers who spent less time (less than 20 minutes) to access water as a result of Kosovo project were 87.8%. This was attributed to the extension of the pipeline network for individual connections and improved proximity to the four NCWSC water kiosks. In addition, households with individual connections spent relatively less time accessing water compared to those buying from water kiosks. In addition, the distance to the main was significantly reduced to less than 50 metres for 92.9% of the households. The basic service level is based upon the standard of 25 litres of safe water per person per day (l/c/d) at no more than a 200 metres walking distance; and should also deliver a minimum 10 litres per minute per household to cover peak demand (WHO, 1999).

Cross-tabulation of household incomes, access to water and quality of life was made. 34 out of the 98 respondents felt that there was less time (in minutes) spent to get water as a result of the Kosovo water project. 70% residents reported that their lives had improved as a result of less time spent accessing water, with households with an income of between Ksh.1,001-5,000 making up a majority 41% of residents who felt that less time spent accessing water had improved their lives. 24% felt that their lives were still the same despite reduced time spent in accessing water. 5% felt that life had not improved despite their spending less time to get water (Appendix VII).

5.3.4 Quality of Water

The results from the study showed that in 80.6% of the responses, NCWSC water was safe for drinking in its raw form. 13.3% did not agree. Esrey et al. (1991) suggests that it is only when the water supply is delivered on-plot via reliable and well maintained pipeline networks that health gains are found. Some reasons identified were occasional pipe bursts leading to contamination or mixture of the water with raw sewage, or some pipes that were dilapidated and susceptible to rust and sediment build up. Poor quality piped water if consumed is well-recognized as an important transmission route for infectious diarrheal and other diseases (WHO, 1993).

Cross-tabulation of household incomes, water quality and quality of life was made. 36 out of the 98 respondents felt that there was better health as a result of the Kosovo water project. Indicators of better health of the residents were the incidences of water-borne diseases before and after the

Kosovo water project. 36% of them reported that their lives had improved as a result of better health, with households with an income of between Ksh.1,001-5,000 making up a majority 50% of residents who felt that reduced incidences of water borne diseases had improved their lives. 8% felt that their lives were still the same despite their health improving. 3% felt that life had not improved despite reduced water expenditure; and another 3% did not know whether their lives had improved due to improved health (Appendix VII).

5.3.5 Pro-poor Focus

Respondents who knew about the pro-poor policy were 8.2 %, while 91.8% did not. Those who knew about the policy were further asked to state what they knew, and some of their responses were captured verbatim:

“Every human being has a right to access clean and safe water.”

“Every human being has a right to water and better life.”

“No wastage of water will enable all to have water.”

“The water company supplies pure and clean water.”

The residents did not mention water tariffs applicable to low income area and were not aware of the Informal Settlements department of NCWSC that was formed in 2007 to address the needs of the low-income settlements. An empowered community possesses the ability to understand their reality and to analyze the factors that shape that reality; the ability to decide what they want to be; the willingness to act to change the situation for the better; and the ability to ensure sustainability of those efforts (Freire, 1973).

Finally, assessment of respondents' complaints to NCWSC was sought. Residents who did not report anything to NCWSC claimed that most of their previous complaints to the water utility went many weeks without responsive action. They also claimed that when they experienced minor problems like leaking pipes, they preferred to rely on their neighbours for water as they sought local artisans to repair the problem. NCWSC's Informal Settlements Department (ISD) engaged the Pangani Regional Office of the water company in carrying out water meter readings and billing customers in Kosovo. There was reluctance at the onset of project operation for the regional office staff, specifically the meter readers, to walk through Kosovo to read meters as

they cited security concerns. In early 2011, ISD staff in collaboration with WSTF held meetings with the regional office to sensitize them that Kosovo customers had the same rights as other customers. Residents interviewed during the focus group discussion rated it a positive move by the ISD.

Cross-tabulation of household incomes, pro-poor policy and quality of life was made. 12 out of the 98 respondents felt that they had a better relationship with NCWSC as a result of the Kosovo water project. 50% of these reported that their lives had improved due to a better relationship with NCWSC, with households with an income of between Ksh.5,001-8,000 making up a majority 33% of these slum dwellers who felt that a better relationship with NCWSC had improved their lives (Appendix VII).

5.3.6 Quality of Life

Overall analysis shows that 36.7% of the residents felt that their health had improved, 30.6% felt that their expenditure on water had decreased, 36.7% felt that the time spent accessing water had decreased, and 12 (12.2%) felt that their relationship with NCWSC had improved. Widely known measures of liveability calculate the liveability of cities around the world through a combination of subjective life-satisfaction surveys and objective determinants of quality of life, some of which are health and relationships (Costanza, 2002).

The four aspects were key to determining whether the slum dwellers appreciated the Kosovo water project, and whether their quality of life was better. Poverty is defined as a low quality of life (World Bank, 2006). Using this definition, the World Bank states that working towards improving quality of life through neoliberal means, with the stated goal of lowering poverty and does help people afford a better quality of life (World Bank, 2006). Respondents were asked to state whether in general their lives had improved as a result of formalization of water supply in Kosovo. 70.1% residents reported that their lives had improved, 22.7% reported that their lives were still the same, 4.1% reported that their lives had not improved, and 3.1% did not know whether their lives had improved or not.

5.4 Conclusion

The study assessed the perceived impacts of the WSTF funded water project that was implemented in 2008 by NCWSC at Kosovo informal settlement in Mathare, Nairobi. It involved finding out whether the quality of life of the residents had improved as a result of the water project. Assessment of the change in the quality of life was measured against affordability of water, access to water, the quality of water and the relationship between Kosovo residents and NCWSC.

The study established that the cost of water had decreased for people relying on kiosks and those with individual consumer connections at the household level. Time taken to access water and the distance to the source of water had decreased. The quality of water was perceived to be better compared to periods before the water project, when they were uncertain of the safety of drinking water sold by vendors. However, most residents were not aware of the pro-poor policy by NCWSC as per the water sector reforms guidelines.

Most households in Kosovo were either located less than 50 metres to their nearest water kiosk, or had an individual metered connection in the house. Introduction of water kiosks and individual household water connections reduced the time taken for fetching water for most households. The extra hours gained in the day have been largely used to carry out other household activities like cooking, laundry, cleaning, child care or business.

There was an increase in the number of residents who were not treating water. Residents who were still treating water after the Kosovo water project had the perception that water in the NCWSC pipeline network was unsafe due to occasional pipe bursts that left the water susceptible to contamination. Other than the statistic on the safety of water gathered through the questionnaire, the Kosovo water project also contributed to improved hygiene in many households. Participants interviewed during the focus group discussion, said they had increased their frequency of bathing and laundry.

Lastly, most slum dwellers expressed their satisfaction with the water project and stated that their quality of life had improved.

5.5 Recommendations

Drawing on the findings of this study and the conclusions made, a series of recommendations are pointed here below.

1. For urban planners, government policy makers, donors and the public, the findings of this study could act as a bench mark for guiding the extension of water services by other WSPs in Kenya to their urban slum areas. This could be by learning from NCWSC, with an aim of taking the country to an era of sustainable water service provision.
2. The involvement of communities much more in the implementation, operation and maintenance of water infrastructure in informal settlements than is currently the case needs to be reconsidered for ownership of the assets, and also for a change of the attitude that water provision is a right that belongs to the rich.
3. Community empowerment and strengthening the customer care relations of WSPs could be better made of in the sectoral approach to water provision.
4. Going by the support afforded to WSPs by urban slum dwellers in formalizing water provision, this study recommends that WSPs could capitalize on the support to acquire more customers and improve billing efficiency, so as to get value for money spent and a return on their investment.

5.6 Suggestions for Further Research

Further research is suggested on:

1. Other urban slums of Nairobi where NCWSC has extended formal water services through the WSTF funding.
2. Similar water projects that have been implemented by other licensed water companies in Kenya in their low-income urban areas.
3. Other factors in water provision, not covered by this study, that influence the quality of life of urban slum dwellers in Kenya.

5.7 Summary

This chapter outlines the summary of the main findings, the discussion, conclusion, recommendation and suggestions for further research.

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APPENDIX I: QUESTIONNAIRE

KOSOVO-MATHARE WATER PROJECT

Questionnaire No.: _____ Date/ Tarehe: _____ Cluster: _____

Dear respondent,

I am a post-graduate student at University of Nairobi conducting research on the influence of the pilot Kosovo-Mathare water project on quality of life. Your response to this questionnaire is crucial to the successful completion of this research project. Please attempt to answer all the questions and tick the appropriate answer that best suits your opinion for each question. Individual responses will be anonymous. Your time and participation in this study will be greatly appreciated. Thank you.

[Mimi ni mkufunzi katika Chuo Kikuu cha Nairobi. Ninatekeleza uzinduzi kuhusu mradi wa maji wa Kosovo-Mathare na jinsi mradi huu umestawisha hali ya maisha. Majibu yako kwenye uzinduzi huu yatakuwa ya manufaa sana. Tafadhali jaribu kujibu maswali yote kwa kuweka alama kwenye jibu linalofaa kwa kila swali. Jina lako halitafichuliwa. Nitashukuru wakati utakaochukua kuweka maibu yako. Asante.]

SECTION A: DEMOGRAPHIC CHARACTERISTICS/ (DEMOGRAFIA)

1. What is your gender? *Jinsia yako ni ipi?*
Male / *Mwanaume* [] 01 Female / *Mwanamke* [] 02
2. What is your age? *Umri wako ni upi?*
18-30 [] 01
31-55 [] 02
56-80 [] 03
3. What is your highest level of education? *Ni kipi kiwango cha masomo yako?*
None / *Bila* [] 01
Primary / *Shule ya msingi* [] 02
Secondary / *Shule ya upili* [] 03
Tertiary / *Chuo* [] 04
Adult literacy / *Masomo ya watu wazima* [] 05
4. What is your occupation? *Kazi yako ni ya aina gani?*
Self employed / *Nimejajiri* [] 01
Employed / *Nimeajiriwa* [] 02
Casual work / *Kibarua* [] 03
Unemployed / *Sijaajiriwa* [] 04
5. What is your average household income per month? *Mapato ya boma lako ni kiwango kipi?*
< Ksh.1,000 [] 01
Ksh.1,001-Ksh.5,000 [] 02
Ksh.5,001-Ksh.8,000 [] 03
>Ksh.8,001 [] 04

6. What is the number of dependants in your household? *Watu wangapi wategemezi wanaishi kwenye boma lako?*

1-2 [] 01

3-4 [] 02

5-6 [] 03

7-8 [] 04

SECTION B: AFFORDABILITY OF WATER (*UWEZO WA KUNUNUA MAJI*)

7. How many jerry cans do you buy from the water kiosk per day? *Unanunua mitungi ngapi ya maji kwa siku kutoka kwa kiosk ya maji?*

_____ Jerry cans / Mitungi

8. How many jerry cans do you use per day? *Unatumia mitungi ngapi ya maji kwa siku?*

_____ Jerry cans / Mitungi

9. How much do you currently buy water per jerry can from the water kiosk? *Kwa wakati huu unalipa pesa ngapi kwa kila mtungi unalonunua kutoka kwa kiosk ya maji?*

0 - 2 Ksh. [] 01

2 Ksh. [] 02

Over (zaidi ya) 2 Ksh. [] 03

10. How much did you previously buy water per jerry can from water vendors? *Kabla ya mradi ulilipa pesa ngapi kwa kila mtungi ulilonunua kutoka kwa wachuuzi?*

0 - 2 Ksh. [] 01

2 Ksh. [] 02

Over (zaidi ya) 2 Ksh. [] 03

11. If you currently have an individual connection, how much is your water bill per month? *Kama una mita nyumbani, unalipa kiwango kipi cha pesa kwa mwezi kwa matumizi ya maji?*

0 - 500 Ksh. [] 01

500 - 1,000 Ksh. [] 02

Over (zaidi ya) 1,000 Ksh. [] 03

SECTION C: ACCESS TO WATER (*UPATIKANAJI WA MAJI*)

12. What is your current main water source? *Kwa sasa unapata maji kwa njia gani?*

Metered piped water at home/ *Maji ya mfereji nyumbani iliyowekwa mita* [] 01

Unmetered piped water at home / *Maji ya mfereji nyumbani bila mita* [] 02

Yard tap / *Mfereji ya jumla kwenye ploti* [] 03

Nairobi Water Co. water kiosk / *Kiosk ya maji ya Nairobi Water Co.* [] 04

Water vendors / *Wachuuzi wa maji* [] 05

Other (specify) / *Nyingine (eleza)* _____ [] 06

13. What was your main water source before the Kosovo water project? *Kabla ya mradi wa maji, ulipata maji kwa njia gani?*

- Metered piped water at home/ *Maji ya mfereji nyumbani iliyowekwa mita* [] 01
Unmetered piped water at home / *Maji ya mfereji nyumbani bila mita* [] 02
Yard tap / *Mfereji ya jumla kwenye ploti* [] 03
Water vendors / *Wachuuzi wa maji* [] 04
Other (specify) / *Nyingine (eleza)* _____ [] 05

14. Is water supply from your current source regular? *Kwa sasa una tegemeo hakika ya maji unayoyapata?*

- Yes / *Ndio* [] 01
No / *La* [] 02
Don't know / *Sijui* [] 03

Please give a reason for your answer / *Tafadhali toa sababu:* _____

15. How many hours per day is water available at the source? *Maji hupatikana masaa ngapi kwa siku?*

- 0 - 6 hours [] 01
6 - 12 hours [] 02
12 - 24 hours [] 03

16. What is the distance to your nearest water source? *Maji yaliyo karibu zaidi na kwako yapatikana kwa umbali gani?*

- 0 - 50 metres [] 01
50 - 100 metres [] 02
Over 100 metres [] 03

17. What is the amount of time you take to fetch water, including waiting time at the source? *Ni muda upi unatumia kwa kawaida kuchota maji, ukijumuisha pamoja na muda wa kungojea hayo maji?*

- 0 - 20 minutes [] 01
20 - 40 minutes [] 02
Over 40 minutes [] 03

18. How many days per week is water available? *Maji hupatikana siku ngapi kwa wiki?*

_____ Days / *Siku*

SECTION D: QUALITY OF WATER (*UBORA WA MAJI*)

19. In your opinion, is water from your main source safe for drinking? *Kwa maoni yako, maji unayopata ni safi ya kunywa?*

- Yes / *Ndio* [] 01
No / *La* [] 02
Don't know / *Sijui* [] 03

20. If water from your main source is not safe for drinking, why not? *Kama maji si safi ya kunywa, ni kwa nini?*
- Dilapidated pipes / *Mtandao wa bomba uliozoroteka* [] 01
 Burst pipes / *Bomba zilizopasuka* [] 02
 Mixture with sewage / *Mchangayiko na maji taka* [] 03
 Other (specify) / *Nyingine (eleza)* _____ [] 04
21. Were you treating water before the Kosovo water project? *Kabla ya mradi wa maji wa Kosovo, ulikuwa unasafisha maji ya kunywa?*
- Yes / *Ndio* [] 01
 No / *La* [] 02
22. If YES to question 21, how were you treating water? *Kama jibu la 21 ni NDIO, hapo awali ulikuwa unasafisha aje maji ya kunywa?*
- Boiling / *Kuchemsha* [] 01
 Water Guard [] 02
 Chlorine [] 03
 Filtering / *Filta* [] 04
23. How are you currently handling your water treatment? *Kwa wakati huu unasafisha vipi maji ya kunywa?*
- Not treating / *Sisafishi* [] 01
 Boiling / *Kuchemsha* [] 02
 Water Guard [] 03
 Chlorine [] 04
 Filtering / *Filta* [] 05

SECTION E: PRO-POOR FOCUS (*UHAMASISHO WA WANAVIJIJI*)

24. How do you rate the services by Nairobi Water Co. to your water supply needs? *Unaweza thamini vipi huduma unazopata kutoka kampuni ya maji ya Nairobi Water Co.?*
- Satisfied / *Nimeridhika* [] 01
 Quite Satisfied / *Nimeridhika kiasi* [] 02
 Quite dissatisfied / *Sijaridhika kiasi* [] 03
 Dissatisfied / *Sijaridhika* [] 04
 Not sure / *Sijui* [] 05
25. Do you know about the pro-poor water policy by Nairobi Water Co.? *Unajua kuhusu sera ya maji kwa wanavijiji inayotekelezwa na Nairobi Water?*
- Yes / *Ndio* [] 01
 No / *La* [] 02

26. If YES to No.25, briefly indicate what you know about the pro-poor water policy. *Kama jibu la 25 ni NDIO, eleza kwa kifupi unavyojua kuhusu sera hiyo ya maji:* _____

27. What do you normally report to Nairobi Water Co. about their services to you? Please tick where appropriate. *Kwa kawaida, unaripoti mambo yapi kwa kampuni ya Nairobi Water? Tafadhali sahihisha panapofaa.*

- | | |
|---|-----------------------------|
| Pipe bursts / <i>Bomba zilizopasuka</i> | <input type="checkbox"/> 01 |
| Illegal connections / <i>Bomba haramu</i> | <input type="checkbox"/> 02 |
| Cartels / <i>Wachuuzi haramia</i> | <input type="checkbox"/> 03 |
| Vandalism of pipes / <i>Wizi wa bomba</i> | <input type="checkbox"/> 04 |
| Water disruption/ <i>Maji kukatwa</i> | <input type="checkbox"/> 05 |
| Over-priced water bill/ <i>Bili ghali ya maji</i> | <input type="checkbox"/> 06 |
| I don't report anything/ <i>Siripoti kitu</i> | <input type="checkbox"/> 07 |

SECTION F: QUALITY OF LIFE (*UBORA WA MAISHA*)

28. How do you think the quality of your life has changed due to formalization of water at Kosovo by Nairobi Water Co.? *Unadhani maisha yako yameboreka vipi kutokana na kuwekwa kwa maji rasmi hapa Kosovo na kampuni ya maji ya Nairobi Water?*

- | | |
|--|-----------------------------|
| Health has improved / <i>Afya imeboreka</i> | <input type="checkbox"/> 01 |
| Reduced expenditure on water / <i>Kupunguka kwa pesa ninazotumia kupata maji</i> | <input type="checkbox"/> 02 |
| Less time used to get water / <i>Wakati wa kutafuta maji umepunguka</i> | <input type="checkbox"/> 03 |
| Better relationship with Nairobi Water Co. / <i>Uhusiano bora na Nairobi Water Co.</i> | <input type="checkbox"/> 04 |
| None of the above / <i>Hakuna jibu hapo</i> | <input type="checkbox"/> 05 |

29. Please rate if access to water, water quality, its affordability and pro-poor focus, has affected your life. Tick the appropriate answer below. *Tafadhali jumuisha kama upatikanaji wa maji, ubora wa maji, uwezo wa kununua maji na uhamasisho wa wanavijiji, imebadili hali ya maisha yako. Tafadhali chagua jibu linalofaa:*

- | | |
|---|-----------------------------|
| Life has improved / <i>Maisha imeboreka</i> | <input type="checkbox"/> 01 |
| Life is the same / <i>Maisha haijabadilika</i> | <input type="checkbox"/> 02 |
| Life has not improved / <i>Maisha haijaboreka</i> | <input type="checkbox"/> 03 |
| Don't know / <i>Sijui</i> | <input type="checkbox"/> 04 |

APPENDIX II

MAIN THEMES FOR FOCUS GROUP DISCUSSIONS AT KOSOVO

1. How has the formalized water system improved you life?
2. What do you see as hindrances in the system that keeps your life from improving?
3. Compare the residents' views on access, affordability and quality of water supplied by NCWSC now, and their views on access, affordability and quality of water when previously supplied by cartels.
4. What are the main effects of formalization?
5. What recommendations would you make to Nairobi Water Company so as to improve the current system?
6. What is the residents' relationship with the water company (NCWSC)?
7. What do the residents know about the Water Sector Reforms, especially about the pro-poor focus in water service provision?

APPENDIX III

Socio-economic Characteristics of Some Sub-Saharan Countries (UNDP, 2007)

Case study	Total Population (million)	Urban population (million)	GDP/ capita (PPP US\$ 2002)	UNDP HDI Position
Burkina Faso	11.8m	3.0m	1,100	175
Kenya	32m	11.6m	1,020	148
Mali	11.6m	2.7m	930	174
Senegal	10.5m	4.2m	1,580	157
Tanzania	34.4m	7.9m	580	162
Uganda	27.2m	4m	1,390	146
Zambia	9.9m	4.6m	840	164

Source: UNDP website (<http://hdr.undp.org/statistics/data/>).

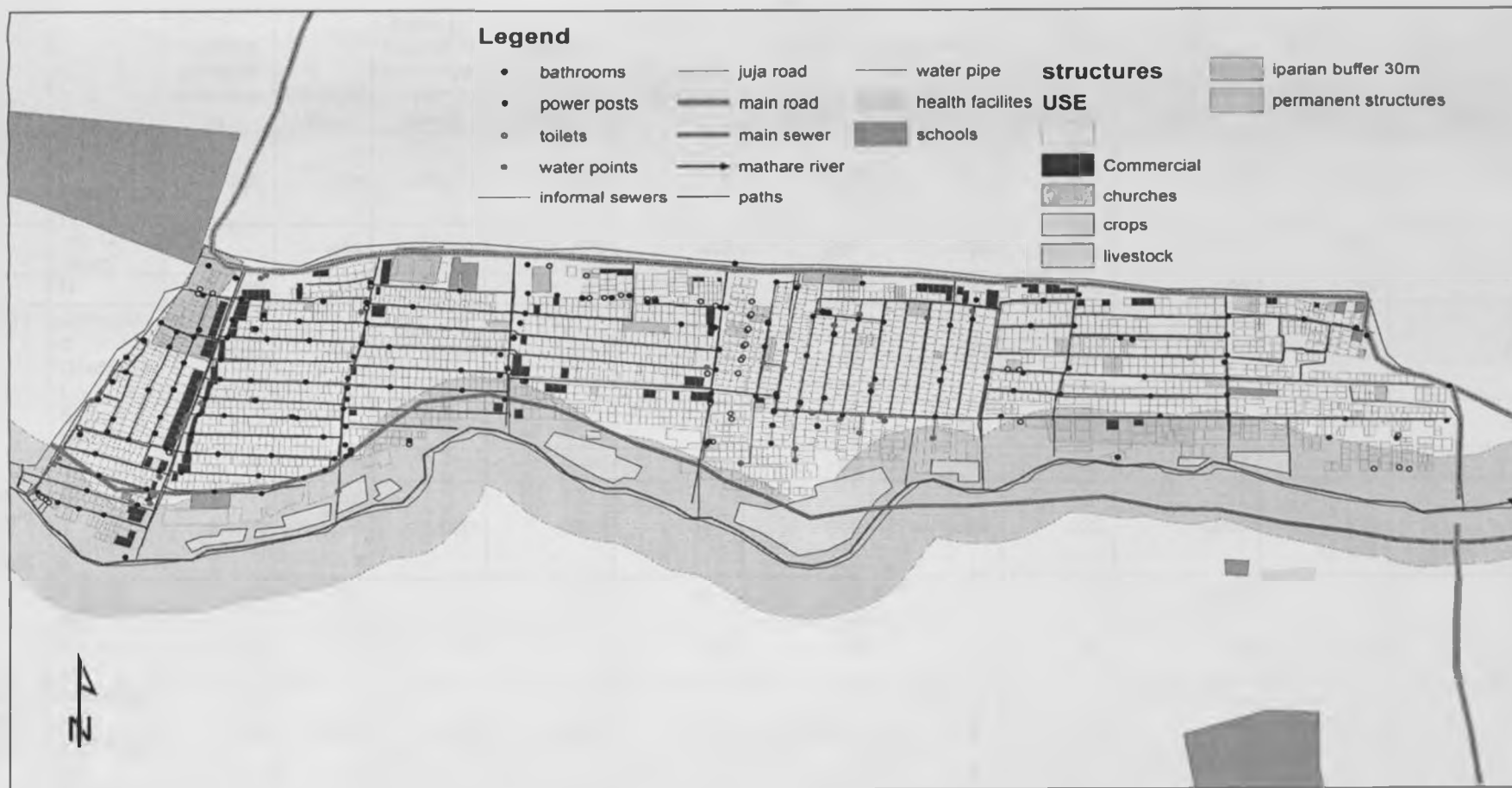
APPENDIX IV

Urban Water Supply Tariffs in Sub-Saharan Africa

Table: Domestic tariff structures in Euros – 2009 (UN-Habitat, 2009)

Country (Company)	Block	Charge (€)	Commentary
Burkina Faso (ONEA)	0-6m ³	0.29	Level of blocks lowered in 2001. Block structure with monthly service charge
	7-30 m ³	0.6	
	>30 m ³	1.59	
Kenya (NCWSC)	Monthly	1.52	Block structure with monthly meter rent charge.
	0-10m ³	0.13	
	11-30m ³	0.19	
	30- 60m ³ -	0.28	
	>60 m ³	0.35	
Mali (EDM)	Monthly meter rent	0.26	Block structure with monthly service charge.
	0-20m ³	0.17	
	21-60m ³	0.54	
	>60m ³	0.92	
Senegal (SDE)	Monthly	0.89	Block structure.
	0-20m ³	0.27	
	21-40m ³	0.88	
Tanzania (DAWASA)	>40m ³	0.92	Different tariff structures in different urban areas. Block structure.
	0-5m ³	0.24	
	>5m ³	0.34	
Uganda (NWSC)	m ³	0.35	No block structure but different tariffs for non-domestic consumption.
	Monthly	0.66-13.20	
Zambia (LWSC - Lusaka)	0-6m ³	0.14	Different tariff structures in different urban areas. Block structure.
	6-30m ³	0.17	
	30-100m ³	0.21	
	100-170m ³	0.39	
	>170m ³	0.44	

APPENDIX V: KOSOVO- MATHARE BASE MAP (Pamoja, 2009)



APPENDIX VI
SPEARMANS CORRELATION

		Highest Level of education	Occupation	Average household income per month	Cost per jerry can from the kiosk	Water bill per month for individual connections	Regularity of water supply from current source	Distance to nearest water source	Safety of water from source for drinking	How services of water supply by NWSC are rated	Knowledge of pro-poor policy by NWSC	Accessibility, affordability and pro-poor focus effect on life
Highest Level of education	Correlation Coefficient	1.000	.024	.404(**)	-.074	-.075	.110	-.072	-.064	-.144	-.043	-.098
	Sig. (2-tailed)	.	.814	.000	.478	.493	.291	.488	.536	.162	.678	.344
	N	96	96	95	93	85	94	96	96	96	96	95
Occupation	Correlation Coefficient	.024	1.000	-.196	-.006	-.062	.110	.071	.137	.084	-.102	.094
	Sig. (2-tailed)	.814	.	.056	.958	.571	.289	.489	.180	.411	.318	.365
	N	96	97	96	94	85	95	97	97	97	97	96
Average household income per month	Correlation Coefficient	.404(**)	-.196	1.000	.028	-.111	.048	-.029	.022	-.015	.029	-.045
	Sig. (2-tailed)	.000	.056	.	.790	.310	.644	.779	.828	.885	.779	.667
	N	95	96	96	94	85	95	96	96	96	96	95
Cost per jerry can from the kiosk	Correlation Coefficient	-.074	-.006	.028	1.000	.150	-.211(*)	-.081	.110	-.090	-.113	-.060
	Sig. (2-tailed)	.478	.958	.790	.	.171	.041	.433	.290	.387	.276	.569
	N	93	94	94	95	85	94	95	95	95	95	94

		Highest Level of education	Occupation	Average household income per month	Cost per jerry can from the kiosk	Water bill per month for individual connections	Regularity of water supply from current source	Distance to nearest water source	Is water from source safe for drinking	How services of water supply by NWSC are rated	Knowledge of pro-poor policy by NWSC	Accessibility, affordability and pro-poor focus effect on life
Water bill per month for individual connection	Correlation Coefficient	-.075	-.062	-.111	.150	1.000	-.025	-.144	-.145	.101	.038	-.056
	Sig. (2-tailed)	.493	.571	.310	.171	.	.823	.187	.182	.353	.731	.611
	N	85	85	85	85	86	85	86	86	86	86	86
Regularity of water supply from current source	Correlation Coefficient	.110	.110	.048	-.211(*)	-.025	1.000	-.040	.107	.116	-.138	-.041
	Sig. (2-tailed)	.291	.289	.644	.041	.823	.	.698	.300	.261	.181	.693
	N	94	95	95	94	85	96	96	96	96	96	95
Distance to nearest water source	Correlation Coefficient	-.072	.071	-.029	-.081	-.144	-.040	1.000	.052	-.054	-.062	-.071
	Sig. (2-tailed)	.488	.489	.779	.433	.187	.698	.	.612	.596	.544	.490
	N	96	97	96	95	86	96	98	98	98	98	97
Is water from source safe for drinking	Correlation Coefficient	-.064	.137	.022	.110	-.145	.107	.052	1.000	-.165	-.031	-.098
	Sig. (2-tailed)	.536	.180	.828	.290	.182	.300	.612	.	.105	.765	.337
	N	96	97	96	95	86	96	98	98	98	98	97

		Highest Level of education	Occupation	Average household income per month	Cost per jerry can from the kiosk	Water bill per month for individual connections	Regularity of water supply from current source	Distance to nearest water source	Is water from source safe for drinking	How services of water supply by NWSC are rated	Knowledge of pro-poor policy by NWSC	Accessibility, affordability and pro-poor focus effect on life
How services of water supply by NWSC are rated	Correlation Coefficient	-.144	.084	-.015	-.090	.101	.116	-.054	-.165	1.000	.187	.063
	Sig. (2-tailed)	.162	.411	.885	.387	.353	.261	.596	.105	.	.065	.539
	N	96	97	96	95	86	96	98	98	98	98	97
Knowledge of pro-poor policy by NWSC	Correlation Coefficient	-.043	-.102	.029	-.113	.038	-.138	-.062	-.031	.187	1.000	-.107
	Sig. (2-tailed)	.678	.318	.779	.276	.731	.181	.544	.765	.065	.	.298
	N	96	97	96	95	86	96	98	98	98	98	97
Rate how accessibility, affordability and pro-poor focus has affected life	Correlation Coefficient	-.098	.094	-.045	-.060	-.056	-.041	-.071	-.098	.063	-.107	1.000
	Sig. (2-tailed)	.344	.365	.667	.569	.611	.693	.490	.337	.539	.298	.
	N	95	96	95	94	86	95	97	97	97	97	97

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

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

APPENDIX VII
CROSS-TABULATION OF VARIABLES

1. Cross-Tabulation of Household Incomes, Water Quality and Quality of Life

Rate how accessibility, affordability and pro-poor focus has affected life			How quality of life has improved	Total
			Health has improved	
Life has improved	Average household income per month	< Ksh 1,000	9	9
		Ksh. 1,001 - Ksh. 5,000	13	13
		Ksh. 5,001 - Ksh. 8,000	7	7
		> Ksh. 8,000	2	2
Total			31	31
Life is the same	Average household income per month	Ksh. 1,001 - Ksh. 5,000	3	3
		Total	3	3
Life has not improved	Average household income per month	Ksh. 1,001 - Ksh. 5,000	1	1
		Total	1	1
Don't know	Average household income per month	> Ksh. 8,000	1	1
		Total	1	1

2. Cross-Tabulation of Household Incomes, Water Expenditure and Quality of Life

Rate how accessibility, affordability and pro-poor focus has affected life			How quality of life has improved	Total
			Reduced expenditure on water	
Life has improved	Average household income per month	< Ksh 1,000	3	3
		Ksh. 1,001 - Ksh. 5,000	15	15
		Ksh. 5,001 - Ksh. 8,000	3	3
		> Ksh. 8,000	1	1
Total			22	22
Life is the same	Average household income per month	< Ksh 1,000	2	2
		Ksh. 1,001 - Ksh. 5,000	2	2
		Ksh. 5,001 - Ksh. 8,000	1	1
		> Ksh. 8,000	1	1
Total			6	6
Life has not improved	Average household income per month	> Ksh. 8,000	1	1
		Total	1	1
Don't know	Average household income per month	Ksh. 1,001 - Ksh. 5,000	1	1
		Total	1	1

3. Cross-Tabulation of Household Incomes, Access and Quality of Life

Rate how accessibility, affordability and pro-poor focus has affected life			How quality of life has improved	Total
			Less time used to get water	
Life has improved	Average household income per month	< Ksh 1,000	6	6
		Ksh. 1,001 - Ksh. 5,000	14	14
		Ksh. 5,001 - Ksh. 8,000	4	4
	Total		24	24
Life is the same	Average household income per month	< Ksh 1,000	3	3
		Ksh. 1,001 - Ksh. 5,000	5	5
	Total		8	8
Life has not improved	Average household income per month	< Ksh 1,000	1	1
		Ksh. 1,001 - Ksh. 5,000	1	1
	Total		2	2

4. Cross-Tabulation of Household Incomes, Pro-poor Focus and Quality of Life

Rate how accessibility, affordability and pro-poor focus has affected life			How quality of life has improved	Total
			Better relationship with NCWSC	
Life has improved	Average household income per month	< Ksh 1,000	1	1
		Ksh. 1,001 - Ksh. 5,000	1	1
		Ksh. 5,001 - Ksh. 8,000	4	4
	Total		6	6
Life is the same	Average household income per month	< Ksh 1,000	1	1
		Ksh. 1,001 - Ksh. 5,000	1	1
		Ksh. 5,001 - Ksh. 8,000	2	2
	Total		4	4
Life has not improved	Average household income per month	Ksh. 1,001 - Ksh. 5,000	1	1
	Total		1	1
Don't know	Average household income per month	Ksh. 1,001 - Ksh. 5,000	1	1
	Total		1	1

APPENDIX VIII
RELIABILITY COEFFICIENT

***** Method 1 (space saver) will be used for this analysis *****

RELIABILITY ANALYSIS - SCALE (ALPHA)

Intra-class Correlation Coefficients
One-way random effects model (People Effect Random)

	ICC	95% Confidence Interval			
Measure	Value	Lower Bound	Upper Bound	F-Value	Sig.
Single Rater	-.0469	-.0665	-.0174	.5966	.9978
Average of Raters	-.6761	-1.279	-.1817	.5966	.9978

Reliability

***** Method 1 (space saver) will be used for this analysis *****

RELIABILITY ANALYSIS - SCALE (ALPHA)

*** Warning *** Zero variance items

Reliability Coefficients

N of Cases = 30.0 N of Items = 20

Alpha = .7428

OFFICE BOARDROOM

SCHEDULE OF FURNITURE EQUIPMENT AS AT 30TH JUNE 2011

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10
(a) ITEM		(b)SIZETYPE			© QUANTITY		(d) S/NO		(e) REMARKS
Boardroom Table		Wooden/centre glass			1				
Boardroom Chair		High Back Black			14				
Cabinet		Black Painted Glass			3				
Flip Chart					1				
Wall Clock		Pearl			1				
Projector		Sony			1				
Air Conditioner		LG			2		111X2103/101/TAULOO382		
							111X2103/101/TACZOO155		
Coffe Table		Glass			1				
Telephone Headset		Panasonic			1		8JBKJ990051		
Dust Bin		Blue			1				
D - Link		Wireless			2				

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