

**CHALLENGES OF QUALITY WATER PROVISION TO PERI-URBAN AREAS BY  
LUSAKA WATER AND SEWERAGE COMPANY: A Case of Ng'ombe Compound,**

**Lusaka.**

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## DEDICATION

I dedicate this work to my Mom, Mutumba Maboshe Namafe and Dad, Charles Mwendabai Namafe, not forgetting my dearest of all friends, Ethel Mudenda.

## DECLARATION

Namafe Namafe, hereby declare that this dissertation has been compiled by me and that the sources of all the material referred to has been specifically acknowledged. This work has not previously been submitted for a Post Graduate Diploma at this University or any other university.

Signature.....*Namafe*.....

Date.....*29/07/11*.....

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## ACRONYMS

ADB	Asian Development Bank
CBD	Central Business District
CSO	Central Statistical Office
GWP	Global Water Partnership
IWA	International Water Association
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
LWSC	Lusaka Water and Sewerage Company
MEWD	Ministry of Energy and Water Development
MS	Microsoft
NGOs	Non Governmental Organizations
NWASCO	National Water Supply and Sanitation Council
PS	Public Sector
PSP	Private Sector Participation
SADC	Southern Africa Development Community
SPSS	Statistical Package for Social Scientists
UN	United Nations
UNEP	United Nations Environmental Programme
WB	World Bank
WHO	World Health Organization
WRAP	Water Resources Action Programme

## ABSTRACT

This dissertation is a study into challenges of quality water provision to peri-urban areas by Lusaka Water and Sewerage Company: the case of Ng'ombe Compound in Lusaka, Zambia. A sample size of 100 households was used and for each of these households, interviews were carried out to especially where possible heads of households.

The major sources of water identified in Ng'ombe Compound were water kiosks servicing fifty-four percent of the population, shallow wells, a spring, boreholes and the nearby stream. Among the major challenges of quality water provision to Ng'ombe Compound, was the insufficient current supply capacity to meet the demand. The water supply capacity currently stands at 1 million litres per day, which is enough for about 50,000 people out of a total population of 80,000 people. Another cause of the frequent water shortages was the inadequate water distribution network to service the whole area resulting in other areas not having any water at all. Lawlessness on the part of the Ng'ombe residents themselves has also contributed to the area having erratic water supply. This lawlessness was evidenced from the acts of vandalism on the water pipes and taps. The low finances for the maintenance of the water equipment too impacted negatively on quality water provision to Ng'ombe Compound. Out of ZMK 230 million required for maintenance operations, the Ng'ombe Water Trust working under the Lusaka Water and Sewerage Company only has ZMK 50 million. Furthermore, the large family sizes coupled with the extended family system in Zambia have acted as challenges to quality water provision in Ng'ombe Compound as most households require more water. In Addition, there is inconsistent monitoring of the quality of the water in terms of bacterial and chemical contamination due to high laboratory costs. Other challenges faced included weak private-public participation in water service provision as well as weak interactions between the Lusaka Water and Sewerage Company and the Ng'ombe Community being served.

In view of the findings of this study, it is recommended that the residents of Ng'ombe Compound and the Lusaka Water and Sewerage Company need to be the driving parties in improving the water supply situation in the area. Additionally, there is need for well enclosed structures at standby taps to prevent vandalism. The study also recommends that government increases its budgetary allocation for maintenance operations and infrastructure development. There is also need for the Lusaka Water and Sewerage Company to increase its water supply to Ng'ombe Compound for people to be served with adequate water.

## CHAPTER 1

### 1.0 Introduction

In Zambia, one of the most challenging hurdles of sustainable development is over dependence on natural capital which culminates into over exploitation and finally depletion of natural resources. Water, as an example of a natural renewable resource, is among the most important public resources. It is the most essential necessity of life after oxygen in that, anything that disturbs the provision and supply of quality water tends to disturb the survival of humanity (Chanda, 1997). Access to sufficient and clean water is critical to the general development of any area, as it contributes to so many areas of human welfare, such as wealth creation, poverty reduction and also disease prevention. Water is usually considered as a public good, but due to its multi-purpose nature, it is also an economic good. Although Zambia boasts of having most of the water resources in the region, many areas within the country are often struck with water shortages resulting in many sectors in the country, such as agriculture, mining, energy and transport being affected. On the other hand, most of Zambia's population lives in poverty partly due to insufficient water and food resources as well as poor socioeconomic conditions. In addition, in some parts of the country, food security has adversely been affected due to water related disasters of floods or droughts (United Nations, 2006).

All peoples, whatever their stage of development and their socio and economic conditions, have the right to access drinking water in quantities and of quality equal to their basic needs. The importance of water is not only attached to drinking but also to cooking, bathing and washing. On the other extreme, diseases associated with inadequate and unsafe drinking water are a major cause of morbidity and mortality. In Zambia, access to adequate and safe water is similar to many other developing nations. Only 64% of Zambia's population has access to improved drinking water sources: that is 88% urban and 48% rural.

The main sources of water supplied in Lusaka Province come from surface and groundwater. For surface water, abstraction is from the Kafue, Chongwe and the Zambezi rivers. On the other hand, for groundwater, about 74 boreholes are spread around the city. For Lusaka City where the study was carried out specifically in a peri-urban area of Ng'ombe Township, water is mainly abstracted from the Kafue River. This study was therefore especially important in order to investigate challenges of quality water provision to Ng'ombe Compound. The provision of water related services is often characterized by monopoly situations particularly for quality water. This is the case with the Lusaka Water and Sewerage Company (LWSC) which is a

private utility company that supplies not only the city of Lusaka, but also the whole Lusaka Province with water. This company was established in 1988 under the Companies Act and commenced its' operations in 1990.

**1.1 Background of Ng'ombe Compound**

The background of Ng'ombe Compound can be understood from a brief historical development of Lusaka City. According to Schlyter and Schlyter (1980), Lusaka City was established by the colonial leadership to serve as an administrative centre for Northern Rhodesia. The original plan for the city did not mark out any land for African settlements. The indigenous people were expected not to settle permanently in the city. But, in 1933 the plan was modified to accommodate African settlements and this saw the emergence of Kabwata, Kamwala and Chilenge. The situation changed more at independence. Rapid urbanization was experienced and due to its limited accommodation, squatter compounds emerged in Lusaka and Ng'ombe Compound was one of them. Ng'ombe Compound began building up as a squatter compound next to Kalundu and Roma in 1965. The compound was initially known as 'Wanela'. The current land on which Ng'ombe lies was a farmland for the colonial settlers who kept cattle. When the white settlers left at independence, the land that was privately owned as grazing land was taken over by the homeless migrants from rural areas. The settlement eventually grew into a large illegal residential area. It was named Ng'ombe after the cattle that were reared by white settlers (Williams, 1983). Since then, the compound has kept on growing and the late 1990s saw the birth of New Ng'ombe. The compound was recognized as a legal settlement in 1995.

**1.2 Location**

Ng'ombe Compound (Figure 1), where the study was carried out, is situated to the north of the University of Zambia about two kilometers away from the Great East Road and to the north-eastern direction of the Central Business District (CBD) of Lusaka. The compound is surrounded by other built up areas of Roma, Kalundu and Chudleigh of Lusaka in which case is separated from Ng'ombe area by the Chamba Valley Stream. This stream has an approximate length of three kilometers.

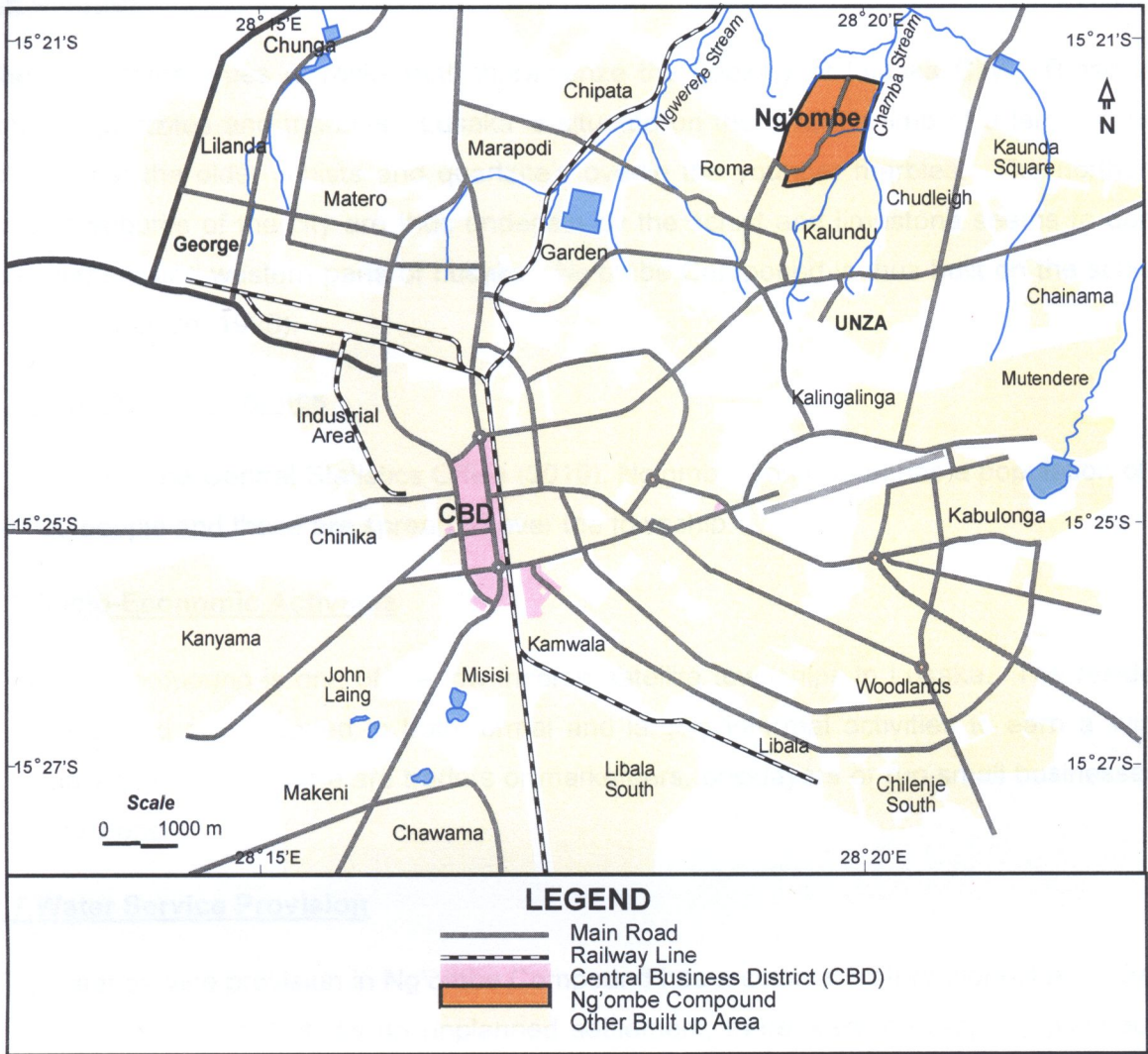


Figure 1: Location of Ng'ombe Compound, Lusaka, Zambia.

### 1.3 Climate

The climate is mild and sub-tropical, as most of the country lies on the central African High Plateau at an average altitude of 1200m above sea level. The area has three seasons: a hot dry season from August to October with temperatures between 26 and 38 degrees Celsius; a rainy season from November to April with temperatures between 27 and 34 degrees Celsius; and a cool dry season from May to August with temperatures from 13 to 20 degrees Celsius.

## **1.4 Geology**

There are three types of rocks that characterize the geology of Lusaka City. These include schists, quartzites and marbles. Lusaka is situated on the inverted limb of a large recumbent fold so that the older schists and quartzite's overlie the younger marbles. The northern and eastern suburbs of the city are thus underlain by the schist and limestone seems to dominate the southern and western parts of Lusaka. Ng'ombe Compound is thus built on the schist type of rocks (Cheatle, 1996).

## **1.5 Population Dynamics**

According to the Central Statistics Office (2010), Ng'ombe Compound has a population of about 80,000 people and these are spread all over the township.

## **1.6 Socio-Economic Activities**

Ng'ombe Compound is one of the low income satellite townships in Lusaka. The residents of the compound are engaged in both formal and largely informal activities to earn a living. In informal employment, some are traders or marketeers, bricklayers or run small businesses such as shopkeepers.

## **1.7 Water Service Provision**

The water service provision in Ng'ombe Compound has a colonial history alongside it. Because the compound started off as an unplanned settlement, there were no properly planned water infrastructure and services. Early settlers used to draw water from shallow wells but this water was certified unsafe for human consumption by the Department of Water and Sewerage at the Lusaka City Council. Later in 1974, Lusaka City Council purchased some water pipes and put them across the known extents of the compound at that time (Schlyter and Schlyter, 1980). The establishment of Lusaka Water and Sewerage Company (LWSC) as an independent cooperate entity in 1988 meant that the once free services provided by the Public Water and Sewerage Department would now be charged for. In 1995, the community under the Residents Development Committee (RDC) went into a partnership with LWSC which saw the installation of 12 standby taps with a view to expanding the system over time (Cheatle, 1996). The Ward Development Committee (previously Residents Development Committee), in collaboration LWSC, is still in control of water systems in Ng'ombe. It now has a total of 59 communal taps, 51 in Old Ng'ombe and only 8 in New Ng'ombe (Devolution Trust Fund, 2006). Despite these

changes that have taken place in Ng'ombe Compound quality water provision is still lacking as can be evidenced from the severe water shortages experienced in the area.

**1.8 Problem Statement**

Despite Ng'ombe Compound being an unplanned settlement, the Zambian Government and its associated stakeholders have formerly recognized its existence. However, the area still lacks the most basic requirements of adequate quality water supply, among other things, and while Zambia as a country has plenty and enough freshwater, most urban squatter compounds like Ng'ombe face challenges of insufficient water of the right quality, at the right place and at the right time. The majority of the people in Ng'ombe are employed by the informal sector. These people do not have access to adequate quality water and sanitation despite having comparatively high per capita income as compared to other similar areas in other provinces. These people are at high risk of suffering from diseases such as cholera, bilharzia, and typhoid and so on with children being more vulnerable than adults. These problems are as a result of a lack of quality water. The choice of Lusaka City particularly Ng'ombe township as the study area has been influenced by the author's own personal experience of prolonged water scarcity in the area, as he is a resident in one of the nearby places to Ng'ombe. With such problems faced by residents of Ng'ombe Township, it would be instructive to investigate the nature of challenges faced by the LWSC in their attempts to provide quality water to the residents.

**1.9 Aim of the Study**

The overall aim of this study is to investigate challenges faced by the LWSC in providing and delivering quality water to peri-urban areas taking Ng'ombe compound in Lusaka as a case study and to further suggest possible solutions to such challenges.

**1.10 Objectives of the Study**

The objectives of the study are fourfold, namely:

- 1) To find out major causes of the frequent water shortages in Ng'ombe area;
- 2) To identify socio-economic impacts associated with the water supply shortages to be identified;
- 3) To document public and private participation in resolving water supply problems; and
- 4) To investigate how LWSC officials relate with Ng'ombe residents.

### **1.11 Research Questions**

The research questions of the study are fourfold, namely:

- 1) What are the major causes of the frequent water shortages in Ng'ombe area?
- 2) What socio-economic impacts are associated with the water supply shortages identified?
- 3) Is there any public and private participation in resolving water supply problems?
- 4) What is the relationship between LWSC officials and Ng'ombe residents?

### **1.12 Rationale**

This research was very significant because water is fundamental to humans' way of life, at whatever point in the socio-economic spectrum a community may be situated. The research therefore sought to provide up to date first hand information on what really causes the frequent water shortages in Ng'ombe Compound. It was also vital for this research to be undertaken so as to identify what socio-economic impacts are associated with water supply shortages. In the quest for quality water provision to Ng'ombe Compound, it was also imperative to document and assess public and private participation in providing quality water to Ng'ombe Compound. This study further investigated the extent to which these activities impact in resolving the water supply problems. This study was therefore expected to increase the knowledge not only in the area of study, but also other areas and communities in Lusaka City on the peri-urban water supply situation and its accompanied adverse impacts on the urban poor. The study also aimed at being a possible reference tool not only for the present generation, but also for the future generation by providing required information to policy makers and Non Governmental Organizations and stimulating the integration of their ideas in quality water resource provision. In addition, the study sought to strengthen the local people's connection with both Government and Non Governmental Organizations involved in quality water resource provision.

## CHAPTER 2

### **2.0 Literature Review**

A substantial amount of work has been done on challenges into the provision of water by water utility companies. Additionally, there has been considerable amount of literature documenting issues relating to water resources, management, policies, regulation, supply, pricing and utilization in all fields of life (United Nations, 2006). Several international and national conferences, debates and dialogues are also held on water because of its critical importance to humanity.

### **2.1 Water Concerns Globally**

According to the United Nations World Water Report 2 (UN, 2006), water is the primary life-giving resource. Yet, one billion people world-wide are impinged by poverty due to lack of adequate, safe drinking water. This represents one-sixth of the total world population who, through sickness, hunger, thirst, destitution and marginalization, find it nearly impossible to climb out of the pit of extreme poverty. The United Nations World Water Report 2 (UN, 2006) further notes that in 1970, about two-thirds of world population lived in rural areas. By 2001, this had dropped to just over 50%. On current predictions, by 2020 this will have fallen to 44% with 56% of the population leaving in urban areas. Until recently, Africa was considered to be the least urbanized continent. However, this has changed such that, by the year 2020, Africa's population is estimated to reach 500 million from 138 million in 1990. The key challenges of quality water provision and management can only be understood within the context of the water's role in the world today as many of the world's socio-economic systems are becoming linked at an unprecedented rate. Urban populations have exploded world-wide in the last couple of decades creating unprecedented challenges, among which provision for quality water and sanitation have been the most pressing and painfully felt when lacking (European Commission, 1998). Those who suffer the most are the poor, often living in slum areas that are left out of water development schemes, due often to failure in governance at many levels.

Improving and extending provision for quality water in slums and squatter settlements therefore presents any formal service provider with difficulties. These include the uncertainty as to who within each house has the responsibility of ensuring the water payments because there are often multiple families and many tenants and sub-tenants. Cheattle (1996) further argues that for most informal settlements, there are uncertainties regarding who owns the land coupled with lack of an official map showing plot boundaries, roads and paths without which it is impossible

to design and lay piped systems. There is usually no register of households and no official addresses assigned to dwellings. Furthermore, many informal settlements have sites and site lay-outs for which it is difficult to provide piped water services.

In a separately commissioned survey for United Nations Environmental Programme dubbed GEO-2000, two-hundred leading scientists from fifty countries around the world identified a scarcity of clean water as one of the most pressing problems facing humanity. In Asia, urban water pollution has emerged as one of the critical forms of environmental degradation. According to a report of the Asian Development Bank (2008), one in three Asians have no access to a safe drinking water source that operates at least part of the day within 200 meters of their home.

The situation is not different from that in Latin America and the Caribbean. Though this region has about 13% of all the world's water supplies, water resources are distributed on a highly inequitable basis. Many people are moving to the cities and the high degree of urban population concentration means rising levels of pressure on water resources (United Nations, 2007).

According to International Water Association (2004), access to good, safe and reliable drinking water is one of the most basic needs of human society and as such requires an integrated approach, close cooperation and partnerships between all stakeholders. Research has shown that access to good, safe and reliable and sufficient water supply increases the health status of people. However, it is unfortunate that many people in the world today are lacking such quantity and quality of water needed.

Global Water Partnership (2000) has observed that although most countries give first priority to the satisfaction of basic human needs for water, one fifth of the world's population is without access to safe drinking water and the services deficiencies primarily affect the poorest segments of the population in developing countries. Additionally, the UN-Habitat (2003), in its introduction of the book 'Water and Sanitation in the World's Cities' indicated that many cities face serious water shortages and that millions of urban dwellers have inadequate provision, which contributes to very large disease burdens and thousands of premature deaths each year.

A review of schemes financed by the World Bank reports that water from the atmosphere is free: but the mounting cost of transporting it long distances to a household tap and preserving its quality is turning it into liquid gold. Water is a commodity like any other and its price is soaring.

## **2.2 Water Concerns in Africa**

At continental level, according to UNEP (2002) Africa is one of the world's driest continents. The diminishing availability of usable water in the face of rising demand creates the potential for disputes and conflicts over water resources, both within countries and between countries. The continents' water resources are scattered in that, while some areas receive more than enough water, others experience drought. This results in recurring cycles of long droughts in some parts of the continent, and sometimes followed by floods, accentuate water scarcity and imbalances across the continent. The continent has thus been stratified into areas of abundant water resources and areas of extreme water scarcity and stress. Water stress refers to economic, social or environmental problems caused by unmet water needs and that lack of supply is caused by contamination, drought or disruption in distribution. Perhaps the greatest cause of Africa's problem of lack of water is that the continent cannot effectively utilize its resources. Though approximately four trillion cubic meters of water is available every year, only about four percent of that is used. The continent and its people lack the technical knowledge and financial resources needed to access their water supplies. It should be noted that lack of access to water is a larger problem in Africa than anywhere else. Out of the 25 nations in the world with the greatest percentage of people lacking access to safe drinking water, 19 are in Africa (UNECA, 2002). As for groundwater, three out four Africans use groundwater as their main water supply. The groundwater is not always available though accounting for 15% of the continent's water supply and there are serious concerns about its quality status. One of the goals set for the year 2015 in the UN Millennium Development Goals is goal seven whose purpose is to reduce the proportion of people without adequate access to water by one half. However, according to UN-Habitat (2003), in order to meet that goal, urban Africa alone requires about six thousand to eight thousand new connections everyday. This will call for strong political commitment backed by resources and action if governments are committed to reduce the widening gap between served and unserved households.

Coming down to a regional level, World Resources Institute (1994) believes that no region anywhere in Africa and in the world has been afflicted with water stress than Sub-Saharan Africa. This region suffers overburdened water systems under increasing stress from fast-growing urban areas. Weak governments' corruption, mismanagement of resources, poor long-term investment, and lack of environmental research and urban infrastructure only exacerbate the problem. In some areas, the disruption or contamination of water supply in urban infrastructures and rural areas has incited domestic and cross border violence. Incorporating

water improvements into economic development is necessary to end the severe problems caused by water stress and to improve public health and advance economic stability in the region. Other regions experiencing these problems are parts of eastern and southern Africa particularly the Horn of Africa and the Namibian Desert respectively. Meanwhile, regions such as central, western and parts of east Africa, receive as much as four thousand millimeters annually (UNEP, 2002).

There are fourteen countries in southern Africa which are part of the Southern Africa Development Community (SADC) namely: Angola, Botswana, Democratic Republic of the Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe (SADC, 1999). The SADC region covers an area of almost 6.8 million km<sup>2</sup>. Regional estimates put the renewable freshwater resources at an annual average of 650,000 million m<sup>3</sup> distributed in the region's rivers, lakes and aquifers. The southern African climate varies from tropical rain forests in the north of the region to desert conditions in the south-west. These climatic conditions make rainfall one of the most important climatological elements in the SADC region. Large areas within the SADC region are very dry and cannot support sustainable human existence and agriculture, especially in the south-western parts of the region. A very dry period in the region can result in crop failures, food deficits and extreme starvation. Rainfall is nearly non-existent in some parts of Namibia. In 1999, for instance, 85% of the country received below average rainfall. This meant that the country could not produce the food it needed. The eastern coastal zones and northern sub-areas (Angola, Malawi, Zambia, Mozambique, Tanzania and parts of Zimbabwe) are relatively wet. In these regions the mean annual precipitation varies from 1,000 mm to 1,600 mm per year, with isolated areas receiving more than 2,000 mm. The high annual evaporation rates, (in some areas as high as 4,000 mm), means that only some 3% to 15% of all rainfall flows to rivers and lakes. Only 360 km<sup>3</sup>, out of 600 km<sup>3</sup>, are suitable for use in the agricultural, industrial and domestic sectors. Water, therefore, plays an important role in the socio-economic development of the SADC region, especially in terms of food production, health, energy and the environment. There are fifteen major rivers shared among the continental SADC member-states. All the continental SADC countries share one or more river basins, the Zambezi Basin, *the largest and probably most crucial in southern Africa, crosses eight countries.*

In addition, southern Africa is mostly semi arid, and experiences variation in rainfall. This sub-region is also expected to experience further variability in rainfall, reduced precipitation and increased evaporation, as a result of climate change. With rapidly growing population, and

demands from domestic, agricultural and industrial sectors for water, freshwater availability is a priority concern for the sub-region. Discriminatory access policies and pricing systems have also skewed the distribution of access to water resources across population groups. An additional concern in the sub-region is declining water quality due to domestic and industrial pollution, eutrophication and salinization due to agricultural pollution. According to the World Conservation Union (1996), southern Africa's annual average surface water resources are approximately 534 km<sup>3</sup>/year, but are distributed unevenly due to frequently low and variable rainfall, terrain, evaporation rates, vegetation and soil cover. Angola has average annual internal water resources of 184 km<sup>3</sup>/year and Mozambique and Zambia have 100 km<sup>3</sup>/year and 80 km<sup>3</sup>/year respectively. In addition, Botswana and Namibia have just 2.9 km<sup>3</sup>/year and 6.2 km<sup>3</sup>/year respectively (UNECA, 2002). The areas of low rainfall are in many cases also coincidental with areas of highest evaporation potential, and variability in rainfall can result in periodic episodes of severe and prolonged droughts, particularly in the south west. In these areas, groundwater resources are particularly important. These (groundwater) resources are the main source of water for about 60% of both rural and urban residents throughout southern Africa. A large part of the sub-region is characterized by small towns, villages and dispersed rural settlements. Thus, access to reticulated surface water resources has been limited because of the high costs and long distances that need to be covered in order to establish infrastructure for formal water services. The sustainable management of groundwater is, therefore, vital for rural livelihoods in the sub-region, even though the proportion of water coming from groundwater sources is relatively small (SADC, 1999). By contrast, the northern and eastern areas are subject to occasional floods, the recent example being in 1999-2000. The excessive rains of this season affected Mozambique, Botswana, Zambia, Zimbabwe and South Africa and some 200,000 hectares of cropland were flooded and more than 150,000 families affected (SADC, 1999).

**2.3 Water Concerns in Zambia**

From as early as the 1940s, the water supply and sanitation sector in Zambia had been increasingly failing to deliver an acceptable level of service to the people. The escalating poor performance of the institutions charged with the responsibility of service provision raised serious concern. Some of the key problems identified at the time included lack of a comprehensive sector policy, non-existence of a comprehensive legislative framework, unclear roles and responsibility, deteriorating infrastructure, erratic and insufficient funding as well as shortage of qualified and experienced manpower. Critical analysis of the problems revealed that they were

not necessarily technical, but rather the result of weaknesses in the institutional, legislative and organizational framework of the sector (NWASCO, 2007). To address this, there was need for the reformation of water sector which involved processes such as reviewing the country's supreme water law, the Water Act of 1948, as well as the adoption of National Water Policy.

The principal act presently governing the administration of water is the Water Act (Cap. 198) of the Laws of Zambia. The Water Act is the main statute dealing with ownership, allocation and regulation of the nation's water resources. The Act deals mainly with surface water and does not regulate groundwater, or those portions of rivers, such as the Zambezi, which constitute international boundaries. On the other hand, The National Water Policy developed in 1994 under the Water Sector Reforms provided the overall policy framework for the water sector (MEWD, 2010). The policy was aimed at promoting sustainable water resources development with a view to facilitating an equitable provision of adequate quantity and quality of water for all competing users at acceptable costs and ensuring security of supply under varying conditions but was replaced by the National Water Policy of 2010 (MEWD, 2010). According to this policy, water for domestic purposes is mainly used for drinking, cooking, washing, bathing and sanitation. In addition, water is used for subsistence gardening and support of domestic animals, subsistence fishing, the making of bricks, the dipping of domestic animals and fire fighting. CSO (2000) highlights that access to safe and adequate water supply is still low and is estimated at 49.1%. Accessibility in urban areas is estimated at 86.1% whilst in rural areas it stands at 29.5%. It is further estimated that domestic use per unit consumption rate in the urban areas is taken as 180 litres/capita/day for the larger urban areas (cities), 150/litres/capita/day for small urban areas (small towns) and 45 litres/capita/day for rural areas. The Water Sector Reforms started with the water supply and sanitation sub-sector. Here, the Water Supply and Sanitation Act No. 28 of 1997 was enacted and this saw the birth of the National Water Supply and Sanitation Council (NWASCO) in 2000 as an autonomous water supply and sanitation regulator. This further led to the subsequent establishment of eleven commercial water companies around the country to fulfill one of the basic principles of these water sector reforms, which was to separate the water supply and sanitation functions from those of the water resources. These water companies deal with water supply and sanitation to urban centres around the country and the Lusaka Water and Sewerage Company is just one of these companies. In 2001, Government launched the Water Resources Action Programme (WRAP) to complement the reforms started in 1993. This took a broader and more holistic perspective of the water sector – an approach that espouses the principles of Integrated Water Resources Management (IWRM). The WRAP aimed at establishing a comprehensive framework for the

use, development and management of water resources in a sustainable manner with strong stakeholder participation. The key achievements of the WRAP include: the development of the proposed institutional framework, the National Water Policy of 2010, the Water Resources Management Act of 2011 and the raising of awareness and capacity building amongst stakeholders on IWRM.

The Ministry of Energy and Water Development has the overall responsibility for water resources management and development. Through the Department of Water Affairs, it undertakes water resources assessment and development and through the Water Board it regulates water use allocation, diversion and development. Other entities having a role in water resources management include public, private, community groups/organizations, NGOs and individuals. (MEWD, 1995), estimates the total surface water potential at 86 800 mm<sup>3</sup> /year and a total average ground water recharge at 57 500 mm<sup>3</sup> /year equivalent to a rainfall of 78 mm<sup>3</sup> /year. Current water resource use cannot be accurately determined since comprehensive water use data is generally not adequate due to inadequate accurate records and the inadequate information and monitoring of water users. In addition the use of groundwater is not well known as it is not regulated. However, there has been growing demand on the available water resources in Zambia and groundwater use is increasing steadily. Today, some 9% of water usage is from groundwater and groundwater provides 28% of domestic water supply (MEWD, 2005). The best aquifers in Zambia occur within the Katanga, Karoo and Quaternary Systems. Yields in the Katanga System consisting of limestone and dolomite horizons, are highest in the top 30 meters or so of the sediment strata where fissures are best developed. These aquifers provide a significant proportion of the water supply for the municipalities of Lusaka, Kabwe and Ndola in particular, where boreholes yield up to 35–50 litres/second in karstic sections of the aquifers (Cheatle, 1996). In addition, the Kundelungu Limestone (part of the Katanga System, central Zambia) yields up to 40 liters/second. Typical borehole depths are around 50–70 meters below ground level. According to MEWD (1995) on the other hand, sandstones (Karoo aquifers) and alluvial sands of Western Province in Zambia, are also considered to be one of the country's largest underground storage houses for water. This is because of the high percolation exhibited by these systems. Yields are highest in the top 82 meters or so where boreholes from these aquifers (sandstones and alluvial sands) yield up to 60.6 litres/second.

Lusaka Province one of the nine provinces of Zambia, has an approximate population of over 3 million (CSO, 2010). This population is increasing at an estimated rate of 3% per annum and much of it is concentrated mostly in unplanned settlements or peri-urban areas. These

settlements are characterized by high population densities and haphazardly laid out housing infrastructure. Common features are overcrowding, poor water supply and sanitation services, and deteriorated environmental conditions characterized by poor sanitation, drainage, and uncollected solid waste which have been discharged into the environment without adequate treatment. This has major adverse impacts on the environment and the quality of human and animal life.

The increasing population and economic activities in many areas in the Lusaka City has thus, triggered increasing demand for water supply thereby introducing serious water shortages which may further have associated adverse impacts (Todely, 1974). Unfortunately, Ng'ombe Compound, the study area, found itself in this part of Lusaka.

## CHAPTER 3

### **3.0 Methodology**

This chapter gives an account of how the relevant information was gathered as well as how it was analyzed. It is comprised of the Sources of Data, Sampling Procedures and Data Analysis Techniques.

### **3.1 Sources of Data Collection**

The main sources of data comprised of both Primary and Secondary sources.

### **3.2 Primary Sources of Data**

To be able to achieve the stated objectives of this study, different types and sources of data collection were employed. To begin with, the type of data that was collected included both qualitative and quantitative and the main sources were primary in nature. Primary data collection was done through the use of structured interviews with an official from LWSC. Besides, the residents of Ng'ombe Compound too were interviewed to get more information on the challenges of quality water provision to their area. The data collection instruments were designed in such a way that there was a combination of structured and semi-structured interviews and these were of two types. The questionnaires included one administered to a key person from LWSC (Appendix 1) on one hand and the water consumers on the other hand (Appendix 2). Further, the questionnaire administered to the water consumers, was accompanied by an interview schedule coding key (Appendix 3) and a list of Ng'ombe residents (Appendix 4) interviewed. The two types of interviews contained both closed and open ended questions. The use of the questionnaires was supplemented by personal in depth interviews from the Ng'ombe Water Trust which is a community based trust as well as The Environmental Health Centre at Ng'ombe Clinic and some Government and Non Governmental Organization Officials (Appendix 5). In addition, field observations, were carried out. Field observation particularly played a vital role in identifying major challenges people face as they desperately scout for water as well as identifying some socio-economic impacts arising from these water shortages.

### **3.3 Secondary Sources of Data**

Secondary information included collection of relevant information from the Central Statistics Office and survey reports, as well as other published and unpublished documents. This

information was particularly obtained from the LWSC- Peri Urban Section, the Devolution Trust Fund at National Water Supply and Sanitation Council as well as Ministry of Local Government and Housing, Care International and Japan International Corporation Agency (JICA). In addition, physical, chemical and biological water quality data was obtained from the Environmental Health Centre at Ng'ombe Clinic.

**3.4 Sampling Procedure**

In the case of Ng'ombe Compound, out of an approximate total population of 80,000, one hundred respondents were interviewed which is about 0.125% of the total population. This number of residents was obtained from across the entire Ng'ombe Compound. Residents were sampled with the help of Ward Development Officers based on the 10 zones that the compound is divided into. The random method of sampling was used. Purposeful selection technique on the other hand was used to sample the key personnel from stakeholder institutions. The selection was based absolutely on who is in a position to provide the needed information.

**3.5 Data Analysis**

The analysis of the collected information involved coding the data of 100 questionnaires collected from residents. To aid in this, Computer Software applications such as MS Excel, and MS Word were used and the results were presented both qualitatively and quantitatively. These were in form of graphics of bar graphs and pie charts. Analysis was also done with the aid of tables supplied. Conclusions and recommendations were then made from these measures and were compared with the existing literature.

## CHAPTER 4

### **4.0 Challenges of Quality Water Provision by LWSC in Ng'ombe Compound and Discussion**

Challenges of quality water provision presented in this chapter are from data and information mainly obtained from the residents of Ng'ombe, an official each from LWSC, Ng'ombe Water Trust and the Environmental Health Centre at Ng'ombe Clinic.

#### **4.1 Major Causes of Water Supply Shortages in Ng'ombe Compound**

The major causes of water supply shortages in Ng'ombe Compound are presented in the sections that follow.

##### **4.1.1 Insufficient Water Supply to Meet the Demand**

This study revealed that among the major causes of the frequent water shortages in Ng'ombe Compound is the current insufficient water supply to meet the demand of the ever-growing population. Currently, the water supply capacity to Ng'ombe Compound stands at approximately 1 million liters per day enough to service about 50, 000 people out of an approximate population of 80,000 people resulting in LWSC having a deficit of 1.5 million liters per day. At least 54% of the population is able to meet its water demands (Figure 2). This should provide an opportunity for relevant authorities to intensify water supply by extending their networks for even more people to access safe water in order to achieve Goal 7 of the MDGs. It was observed that those who are able to meet their water demands are those people whose sources of water are wells as well as house or yard tap connections. It should be noted however, during the dry season their wells dry up and thus, they also have to walk long distances in search of water. The rest of the population however can not meet their water demands because of the reduced hours with which they are provided with water (Figure 3). According to Figure 3, most of the respondents have water available for at least 6 hours in a day which is not adequate water supply to meet their demands. This leaves the residents with very little water for use during the rest of the day. Where communal taps are available, operations are from 7 to 10hrs, and then re-opened from 16hrs on average every day (Figure 3).

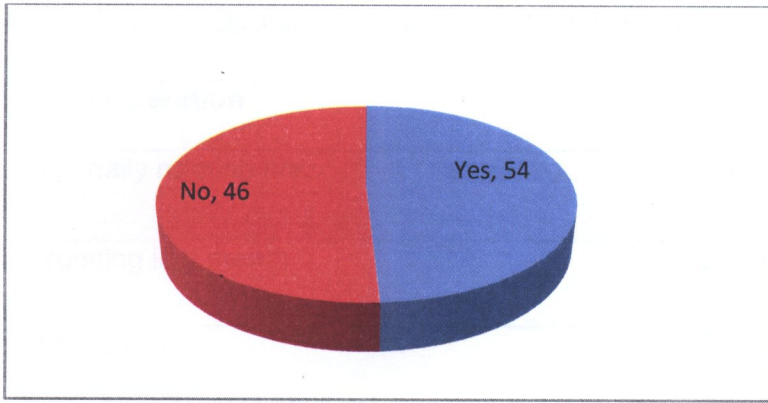


Figure 2: Respondents' opinions in Ng'ombe, Lusaka, Zambia on whether they can meet their demands or not.

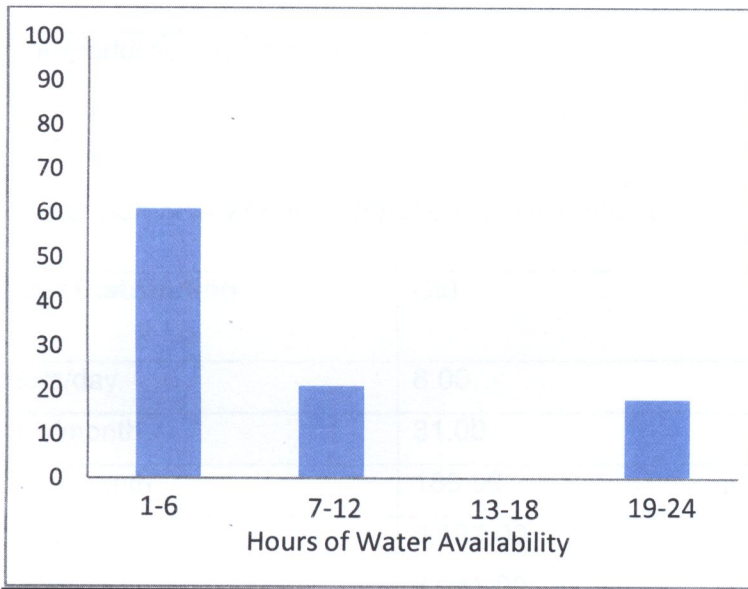


Figure 3: Frequency of Water Availability in Ng'ombe, Lusaka, Zambia.

The Tables 1 and 2 show the borehole operations and water distribution respectively in both Old and New Ng'ombe. Borehole E2 was found to produce more than borehole E1, and had more running time.

Table 1: Borehole Operations in March 2011 in Ng'ombe, Lusaka, Zambia.

Borehole Operation	E1	E2
Average daily running hrs	1.42	13.80
Days running in a month	31.00	31.00
Monthly total hrs	31,036.00	465.95
Average daily production (m <sup>3</sup> /day)	49.30	666.70
Monthly total production (m <sup>3</sup> /month)	1,480.00	20,000
Total Production (m <sup>3</sup> /month)		<b>21,480.00</b>

Table 2: Borehole Water Distributions in Ng'ombe, Lusaka, Zambia.

Water Distribution	Old	New
Hours/day	6.00	13.00
Days/month	31.00	31.00
Hours/month	186.00	403.00
m <sup>3</sup> /month	9,123.00	6,657.00
m <sup>3</sup> /day	3,041.00	2,219.00
<b>Total Monthly Distribution</b>		

#### **4.1.2 Inadequate Distribution Network**

This study revealed that the water distribution network in Ng'ombe Compound was not enough to service the whole area resulting in other areas not having any water at all. According to Figure 4, fifty-four percent represents the largest share of those being served by communal taps (Plate1) as their main source of water. Other people use wells (Plate 2), a spring (Plate 3), boreholes (Plate 4) or stream water (Plate 5) as their sources of water. The water kiosks are thus able to service a number of people with water. However, the ideal situation is that people would have preferred a personal house connection if access to an improved source of water is

to be achieved. The level of service therefore has to be improved. In the event that there is a shortage of water especially from the communal taps, the residents of Ng'ombe Compound obtain their water from the nearby low density areas of Kalundu, Roma and Chudleigh at a cost of K200 per 20 litre container. According to Figure 5, fifty five percent of people rely on alternative sources of water when their main water supply source is not available, a clear indication that there is great need of this resource. In addition to the above listed sources of water in Ng'ombe, the LWSC included their water supply line as part of the main sources of water in Ng'ombe which they described as been insufficient to service the Ng'ombe population. In view of this, they have recommended that the residents harvest rainwater by using buckets on their roof tops during the rain season.

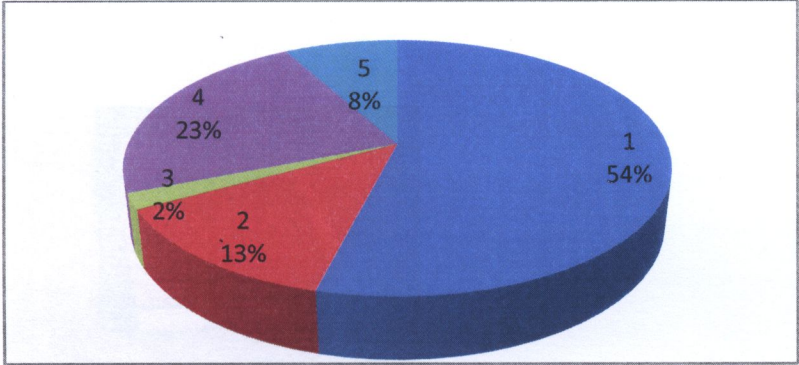
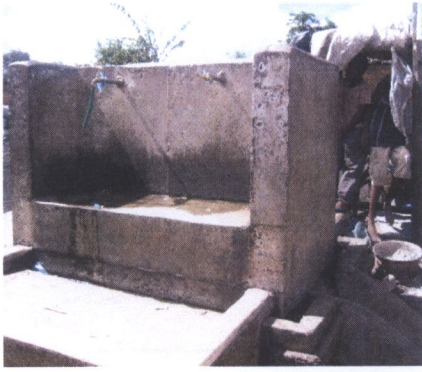
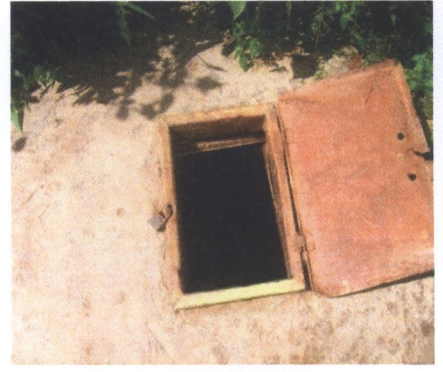


Figure 4: Respondents' Sources of water in Ng'ombe, Lusaka, Zambia.



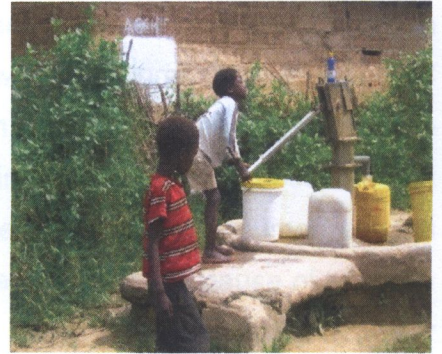
**Plate 1:** Stanby tap in Ng'ombe,  
Lusaka, Zambia.



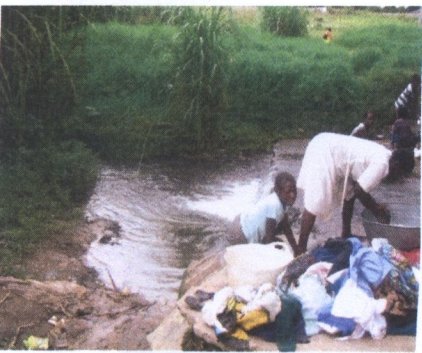
**Plate 2:** Shallow Well in  
Ng'ombe, Lusaka,  
Zambia



**Plate 3:** Spring in Ng'ombe, Lusaka, Zambia.



**Plate 4:** Borehole in Ng'ombe,  
Lusaka, Zambia.



**Plate 5:** Stream in Ng'ombe, Lusaka, Zambia.

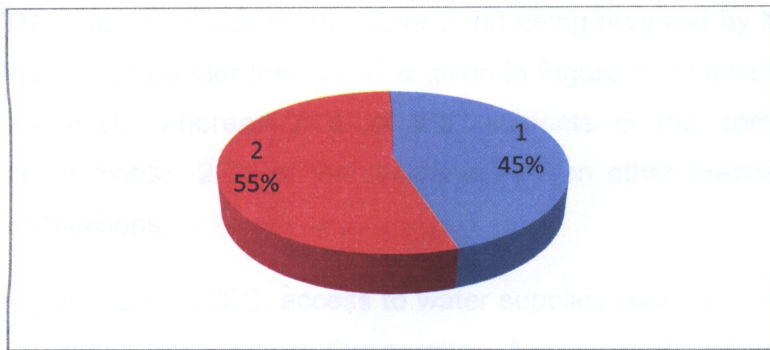


Figure 5: Respondents' alternative water sources in Ng'ombe, Lusaka, Zambia.

The study also revealed that because of the frequent water supply shortages, people have had to walk long distances in search of water. Interestingly, most of the respondents from Ng'ombe Compound have their water within a distance of about 100m especially from Old Ng'ombe where there are 51 kiosks. By contrast, this is not the case with New Ng'ombe Compound where people have wells as their main source of water and when they dry up, people may have to walk 400m in search of water. These distances represent those which the residents in Ng'ombe had to cover in the process of scouting for water (Figure 6). The LWSC acknowledged that this adversely affected the health of women and children leading to possible chest complications as a result of lifting 20 litres heavy containers. They further observed that those residents not having access to clean water, make use of alternative sources and an example they gave was that of the stream which they connected to being the cause of bilharzia infections especially in children. This again, is described as a major challenge in quality water provision by the utility company which they hope to rectify by drilling more boreholes to boost supply, lay more pipes for their distribution as well as involve other stakeholders in education campaigns through drama or school oriented programmes.

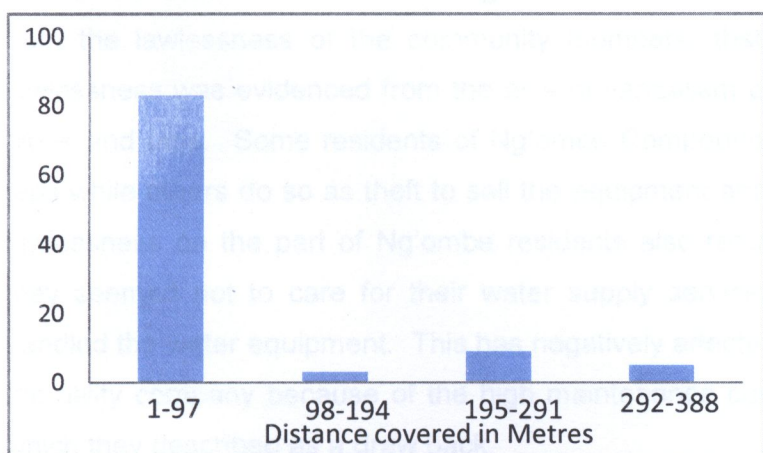


Figure 6: Distance covered by Respondents in Ng'ombe, Lusaka, Zambia.

The level of service on the other hand being received by Ng'ombe residents from the Ng'ombe Water Trust under the LWSC is given in Figure 7. House and yard tap connections account for 2% each, whereas 74% of the residents in the compound are served by standby tap connections. 22% of the residents rely on other means such as from those with individual connections.

According to LWSC, access to water supplies was mainly through the standby taps built by the Japanese International Cooperation Agency and that their current piped water distribution covers about 55% of the whole 4 km<sup>2</sup> area of Ng'ombe. This network according to LWSC is able to service an approximate population of 50,000 which they described as insufficient, and thus will need an addition of 1.5 million litres per day to their current 1million litres per day to address this problem.

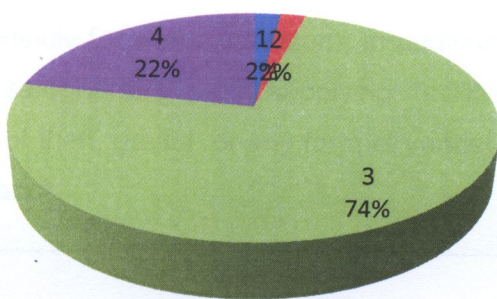


Figure 7: Level of Service to Residents in Ng'ombe, Lusaka, Zambia.

#### **4.1.3 Lawlessness from the Community**

The LWSC stated that other challenges to quality water provision in Ng'ombe Compound stem from the lawlessness of the community members, that is, the residents themselves. This lawlessness was evidenced from the acts of vandalism on the water equipment such as water pipes and taps. Some residents of Ng'ombe Compound deliberately destroy water pipes and taps while others do so as theft to sell the equipment and earn some money. Additionally, this lawlessness on the part of Ng'ombe residents also resulted from the resident's ignorance as they seemed not to care for their water supply services by being careless in the way they handled the water equipment. This has negatively affected quality water provision on the part of the utility company because of the high maintenance costs to replace the vandalized facilities which they described as a draw back.

Much of the population in Ng'ombe Compound has at least been to primary and secondary schools (Figure 8). This shows that most of the residents from Ng'ombe Compound have the basic knowledge of the water resources, its use and management. However, because very few people have attained tertiary education, the technical, specialized and expert knowledge of quality water provision is lacking in the study area, and this impacts very negatively on ensuring quality water provision to the area in a way that they are not able to contribute to decision making processes.

In this section, the LWSC representative complained that there are still a large proportion of people who need intensive education and awareness through having meetings with community based trusts and the utility company's officials. This is evident as the community participation has been described as ineffective by the utility company. They have further observed that people's mentality was that matters of water provision are the government's responsibility. Therefore, they believed that some education would erase people's perception that government is solely responsible for water provision. In addition, people would also be familiarized with the importance of safeguarding water supplying facilities such as kiosks and be ready any time to report matters of theft, graffiti, or any form of vandalism to the relevant authorities so as to bring the culprits to book.

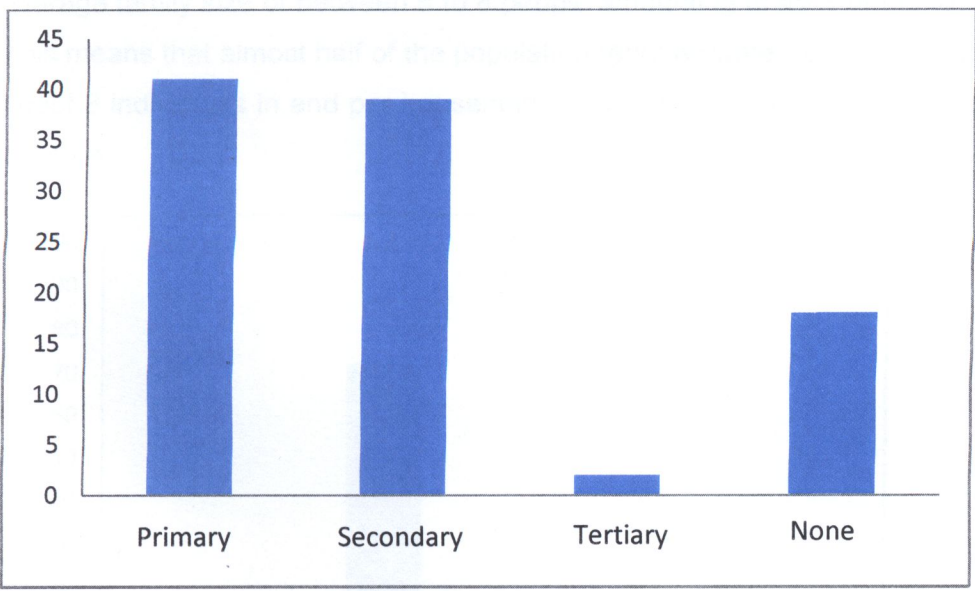


Figure 8: Level of Education Attained by Respondents of Ng'ombe, Lusaka, Zambia.

#### **4.1.4 Low Finances for the Maintenance of the Water Equipment**

This study further revealed that the low income set aside for maintaining the current water supply system capacity has added to the challenges of quality water provision to Ng'ombe Compound in that the money is not enough to cater for the maintenance cost in cases of break downs or indeed damages as well as future expansion works. The Ng'ombe Water Trust under the LWSC has set aside about 50 million Kwacha in their operations account for these maintenance operations and have a deficit of about 230 million Kwacha whereas for capital expenditure, they have set aside 70 million Kwacha and have a deficit of over 1.2 billion Kwacha. This has therefore posed a great challenge in quality water provision not only to the Trust, but also the LWSC as the Trust is currently using the utility company's license to operate.

#### **4.1.5 Marital status and Family size**

Among those who were interviewed, a large proportion of them were found to be married covering 72% (Figure 9). The implication here is that most households require adequate amounts of water because of their status. In Zambia, because of the extended family, married people care for their children as well as dependants. Their water demand therefore is high. Figure 10 shows family sizes of respondents in Ng'ombe Compound. Many households had an average family size of between 5 to 8 people amounting to 49% of the total population sampled. This means that almost half of the population requires water for their day to day uses to cater for about 8 individuals in and per household. This exerts more pressure on the limited fresh water sources.

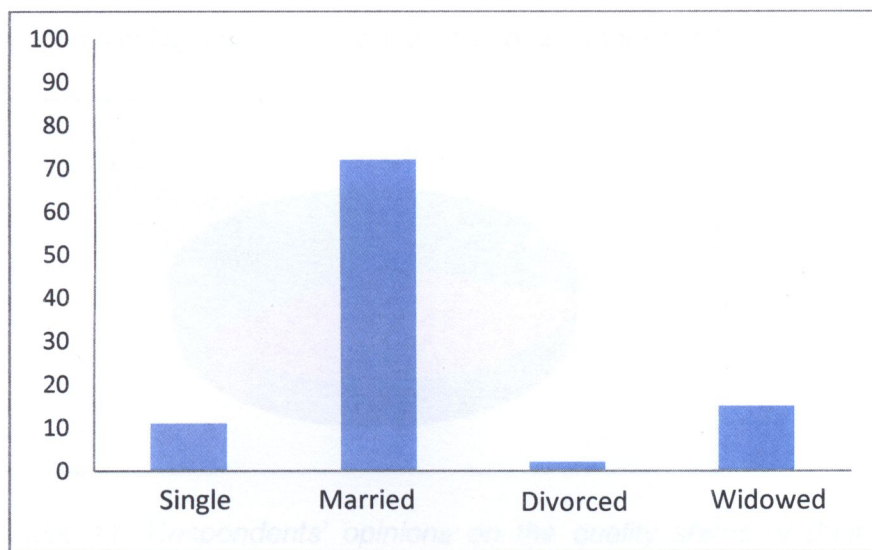


Figure 9: Marital Status of Respondents in Ng'ombe, Lusaka, Zambia.

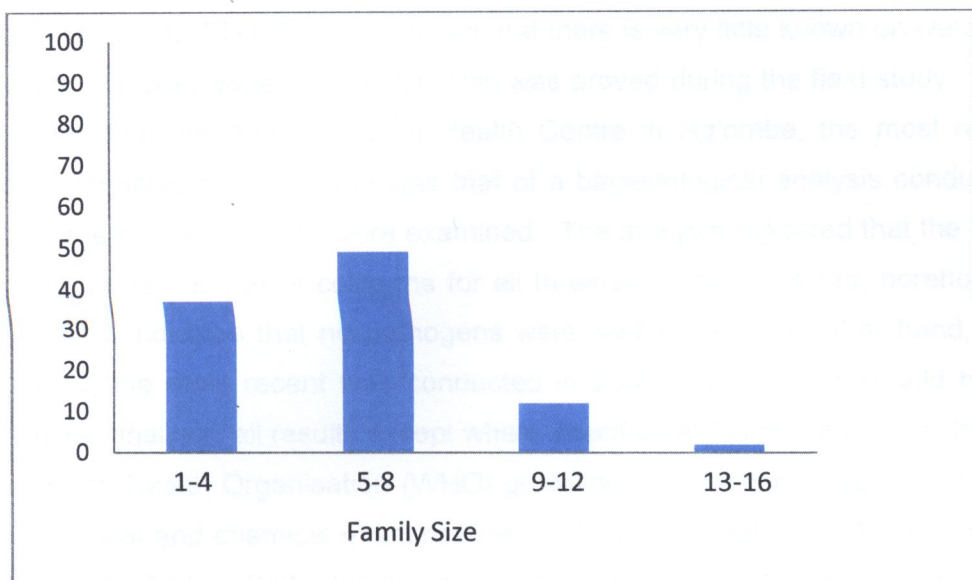


Figure 10: Family size of Respondents in Ng'ombe, Lusaka, Zambia.

#### **4.1.6 Quality status of water provided**

Besides considering the quantity status of water in quality water provision, another important aspect to consider is the quality status of water provided. The largest proportion of the residents in Ng'ombe being thirty six percent highlighted that the quality status of the water provided to them varies from time to time (Figure 11). Thirty three percent represented those residents in the compound who described the water as being dirty whereas thirty percent of them described the quality status of the provided water as being clean and this was in terms of either colour appearance, taste of the water or indeed both. In contrast only one percent proportion of the residents in Ng'ombe Compound had no comment at all.

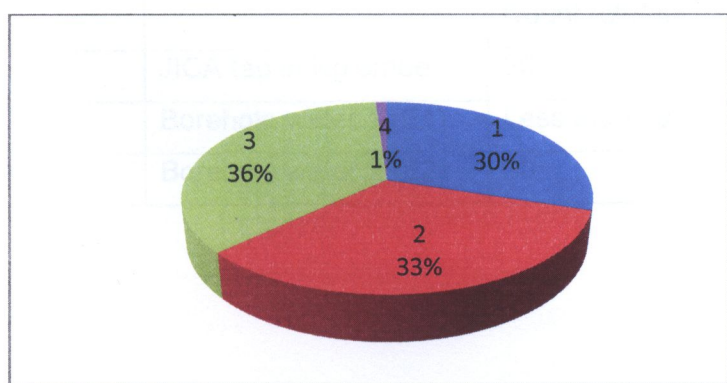


Figure 11: Respondents' opinions on the quality status of their water in Ng'ombe, Lusaka, Zambia.

According to MEWD (2005), it is a fact that there is very little known on water quality concerning most of Zambia's water resources. This was proved during the field study. According to results obtained from the Environmental Health Centre in Ng'ombe, the most recent form of water quality monitoring in Ng'ombe was that of a bacteriological analysis conducted in 2006 (Table 3). Three sample sources were examined. The analysis indicated that the bacteria *E. coli* were absent as well as faecal coliforms for all three samples (JICA tap, borehole E1, and borehole E2). This indicates that no pathogens were isolated. On the other hand, as for the chemical analysis, the most recent was conducted in 2000 (Table 4). It should be noted that for the chemical analysis, all results except where specified are in milligrams per litre. In comparison to the World Health Organisation (WHO) guidelines for drinking water, all the parameters both in the physical and chemical examinations conformed to that of the WHO, except for magnesium which was high. Both the bacteriological and chemical analyses were conducted by the Environmental Health Centre in Ng'ombe. Although these results generally show that the quality status of the water provided in Ng'ombe is within acceptable limits; however, consistent monitoring of the quality status proved to be another major constraint for the Ng'ombe Water Trust under the LWSC, hence poses a challenge on quality water provision by LWSC which they described as costly. This was evident as they acknowledged depending on the Environmental Health Centre at Ng'ombe Clinic for their water quality data.

Table 3: Bacteriological Analysis Report for selected water sources in Ng'ombe, Lusaka, Zambia.

Sample Source	Aerobic Plate Count (cfu/ml)	Faecal coliforms (cfu/ml)	<i>E. coli</i>
JICA tap in Ng'ombe	20	0	Absent
Borehole water 1 (E1)	Less than 10	0	Absent
Borehole water 2 (E2)	30	0	Absent

Table 4: Chemical Analysis of Water samples in Ng'ombe, Lusaka, Zambia.

<b>PHYSICAL EXAMINATION</b>		
Ref:	W600	Guideline values
Appearance	clear	clear
Odour	odourless	odourless
Colour (Hazen Units)	<5	20
pH	6.87	6.5-8.5
Electrical Conductivity (Micro Siemens)	139	1500
Suspended solids (parts per million)	negligible	1000
Total dissolved solids (parts per million)	66	1000
<b>CHEMICAL EXAMINATION</b>		
Calcium (Ca)	12	100
Magnesium (Mg)	102	30
Sulphate	negligible	400
Calcium hardness	30	300
Ammonia N	0.002	0.5
Total hardness (CaCO <sub>3</sub> )	480	500
Nitrate	<0.2	10

#### **4.2 Socio-Economic Impacts Associated with Water Supply Shortages**

Socio-economic impacts resulting from water shortages were impacts identified to be centered on the residents of Ng'ombe Compound.

The majority of people in Ng'ombe Compound are employed by the informal sector (Figure 12) such as running small business enterprises, bricklayers, traders and so on. It was further observed that the shortage of water affects their socio-economic activities adversely. These informal activities require water, for example, traders and marketeers have to often times wash their vegetables and other foods to keep them fresh whereas bricklayers require a lot of water for making blocks for sale. Those running restaurants too need water for cooking and also to keep their surroundings clean.

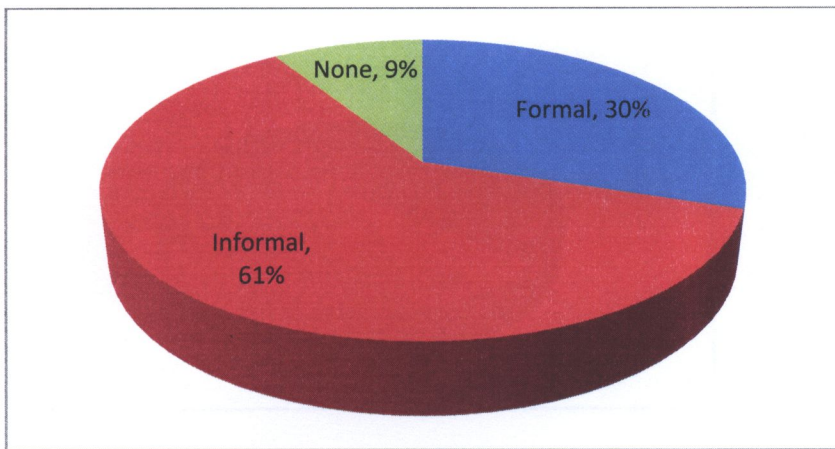


Figure12: Occupation of Respondents in Ng'ombe, Lusaka, Zambia.

#### **4.3 Private-Public Participation in Resolving Water Supply Problems**

The sole provider of water to Ng'ombe Compound is the LWSC. However, the company has partnered with the Ng'ombe Water Trust which is a community based organization within Ng'ombe itself. According to the residents this Private (LWSC)-Public (Community) participation in resolving water supply problems in the area has yielded benefits in that the supply capacity has increased compared to when the LWSC was not yet mandated with the authority of providing water to the residents of Ng'ombe Compound.

#### **4.4 Interactions between Officials and Residents**

The residents of Ng'ombe Compound generally perceive their relations with their water service providers to be generally good (Figure 13) though there is need for more interaction in order to address the ever pressing problems in the compound with regard to quality water provision. Thirty six percent of residents highlighted that they were pleased with service being received. By contrast, ten percent described their relationship as being bad in terms of attitude. Some tap attendants for instance were rude whereas others were not.

LWSC through their representative on the other hand, have complained of unavailability of land for location of water facilities as the area is so congested. Some Ng'ombe residents don't cooperate with LWSC officials to allow them set up water distributing facilities such as pipes and this further poses a challenge in expanding their networks leading to an ultimate challenge in providing more water.

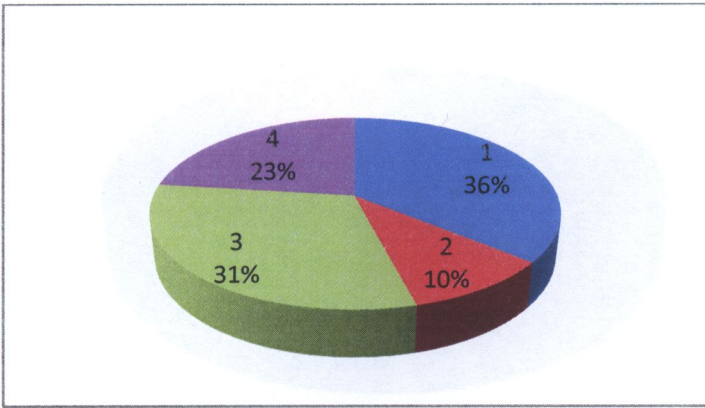


Figure 13: Respondents' Relationship with their Providers in Ng'ombe, Lusaka, Zambia.

Relationship between the Ng'ombe Water Trust operating in partnership with LWSC and the residents in Ng'ombe residents in terms of payments was generally within acceptable means. It was found that 87% of the residents in the compound pay for their water of which these payment modes vary. Only 13% of them don't pay because they own wells, boreholes and so on (Figure 14). Concerning the modes of payment, Figure 15 shows that 81% of these residents pay for their water through a fixed system of K100 per 20 litre container, 4% of these residents use a metered mode of payment through either house or yard tap connections, 3% of the residents pay to those owning wells and boreholes while the rest of the 13% don't make any payments. Based on these payments, according to Figure 16, sixty percent of the respondents in Ng'ombe are comfortable with the amount of money paid for their water. On the other hand, 24% of the individuals felt that the water pricing was expensive and most of these respondents were widows and often they highlighted that it was not easy sourcing for funds on their own.

The Ng'ombe Water Trust under the LWSC charges its clients through various schemes. Under metered clients, they split it into two groups, the commercial clients (Table 5) and the domestic clients (Table 6). These schemes according to the utility company did not skew much of the population into lack of payment for their water, hence, it was observed that 87% of residents were able to pay for their water and in turn return revenue to the utility company who would use this in its operations. The LWSC described this as a plus towards their quality water provision task. It should be noted that these charges are monthly.

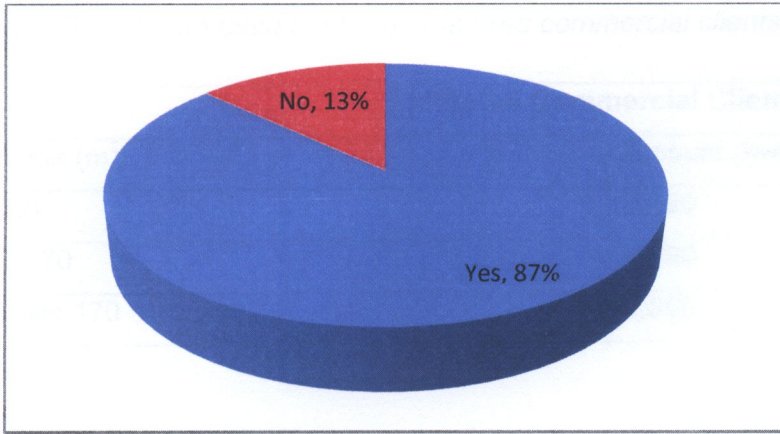


Figure 14: Residents' response in Ng'ombe, Lusaka, Zambia on whether they pay or not.

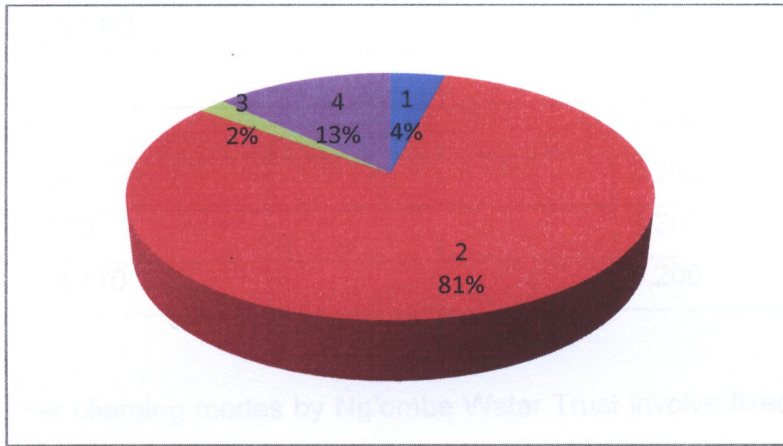


Figure 15: Mode of payment by respondents in Ng'ombe, Lusaka, Zambia.

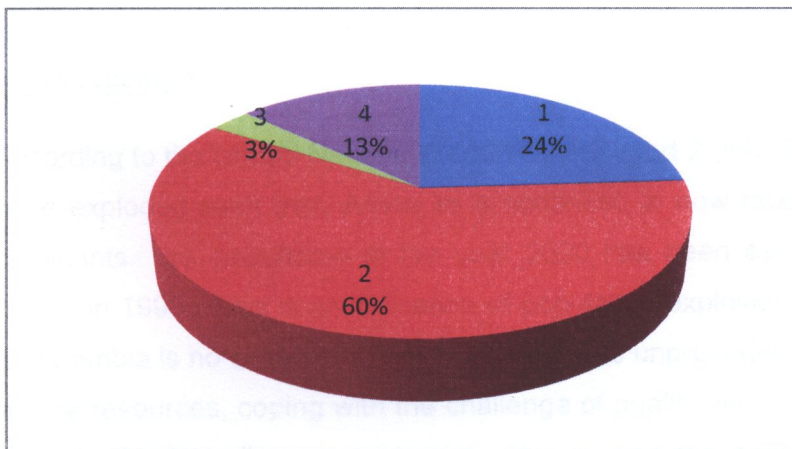


Figure 16: Respondents' opinions on the price of water in Ng'ombe, Lusaka, Zambia.

Table 5: Scheme used to charge metered commercial clients in Ng'ombe, Lusaka, Zambia.

<b>Metered Commercial Clients</b>	
Range (m <sup>3</sup> )	Amount (kwacha)
0-30	3,250
30-170	4,680
Above 170	5,590

Table 6: Scheme used to charge metered domestic clients in Ng'ombe, Lusaka, Zambia.

<b>Metered Domestic Clients</b>	
Range (m <sup>3</sup> )	Amount (kwacha)
0-6	2,100
6-30	2,400
30-100	2,700
100-170	3,300
Above 170	4,200

Other charging modes by Ng'ombe Water Trust involve fixed modes which are 97,500 Kwacha and 795,600 Kwacha per month as first and second fixed category respectively for commercial clients. By contrast, for metered domestic clients, there is only one charge mode which is 76,608 Kwacha per month.

#### **4.5 Discussion**

According to the United Nations World Water Report 2 (UN, 2006), urban populations worldwide have exploded such that, Africa as a continent, is now rated as one of the fastest urbanizing continents. Its' population in the year 2020 has been estimated to be 500 million from 138 million in 1990. This is an indication of population explosion especially in urban areas of Africa and Zambia is no exception. This in turn creates unprecedented challenges such as depletion of scarce resources, coping with the challenge of quality water provision and unsanitary conditions that can lead to disease epidemics. This is also the case with Ng'ombe Compound whose population has also increased and is faced with the challenge of quality water provision. According to CSO (2000), Ng'ombe's population stood at 30,000, but however, rose to about 80,000 people spread across the township (CSO, 2010). According to International Water

Association (2004), access to good, safe, reliable and sufficient water supply increases the health status of people. In comparison to this, in Ng'ombe Compound results show that in terms of quality status of the water provided, it is generally within acceptable means, although water quality monitoring in the compound has proved to be inconsistent. By contrast, despite having close to 60 water kiosks supplemented by the presence of shallow wells, boreholes, a spring and a stream, the water supply is still far from being sufficient. Having a total approximate population of 80,000, the current water supply system of 1 million litres per day can only manage to service an approximate population of about 50,000 and there is a deficit of about 1.5 million litres per day to be able to ensure healthy living standards to the people of Ng'ombe. Cheatles (1996) further argues that most squatter settlements lack adequate land for designation of piped systems. This was found to be true with Ng'ombe Compound especially in old Ng'ombe. Most houses in the compound are very close together, thereby leaving no space for the LWSC to set-up water pipes. This has resulted in the area having an inadequate water distribution network which has further, introduced a great challenge to quality water provision in the township.

## CHAPTER 5

### Conclusion

Based on the findings of this study, the challenges of quality water provision to Ng'ombe Compound are:

- Insufficient water supply to meet the demand for domestic as well as small businesses such as restaurants and bricklaying. Currently, the water supply capacity to Ng'ombe Compound stands at approximately 1 million litres per day enough to service about 50,000 people out of approximately 80,000;
- Inadequate distribution network. Being a peri-urban area, it has proved to be difficult for the service providers to facilitate expansion works through proper pipe installation due to overcrowding in Ng'ombe. The utility company has found it difficult to negotiate with some residents over network expansion as some of these pipes have to pass through residential buildings;
- Lawlessness from Ng'ombe Community. This lawlessness was evidenced from acts of vandalism on the water equipment such as water pipes and taps. Some residents of Ng'ombe Compound deliberately destroy water pipes and taps while others do so as theft to sell the equipment and earn some money;
- Lack of funds for maintenance of water equipment. The Ng'ombe Water Trust under the LWSC has set aside about 50 million Kwacha in their operations account for these maintenance operations and have a deficit of about 230 million Kwacha. Additionally, for capital expenditure, they have set aside 70 million Kwacha and have a deficit of over 1.2 billion Kwacha;
- Large family sizes coupled with the extended family system in Zambia which has resulted in increased water demand;
- Inconsistent monitoring of the quality of water. The last analyses on water were conducted in 2006 by the Environmental Health Centre in Ng'ombe due high laboratory costs;
- Weak private-public participation in water service provision; and
- Weak interaction between LWSC and the Ng'ombe Community being serviced.

## **5.1 Recommendations**

In order to ensure quality water provision to Ng'ombe Compound, the following are the recommendations:

- Residents and their service providers need to be the driving efforts in improving the water supply situation in their areas;
- There is need for NWASCO to increase its monitoring activities of the private sector to make sure they are committed to the affordability, sustainability and improvement of the water service provision;
- The Lusaka City Council should ensure that it develops proper residential areas to make the work of the water service providers easy for water service provision;
- Community participation through the bottom up approach should be encouraged and the existing women's groups like religious, trade and professional associations should be involved to enable them discuss how to use water with care;
- There is need for well enclosed structures at standby taps as the surrounding is too exposed where either children or drunken people can litter near or at the communal taps themselves;
- Government should review its budgetary allocations, so as to direct sufficient financial resources to the water sector which will further empower the LWSC and the Ng'ombe Water Trust;
- There is need to enforce laws on the safeguarding of the water supply equipment by setting up community watch groups to reduce vandalism on the water equipment. This may require the LWSC to conduct public forums and discussions with the residents of Ng'ombe Compound to educate them on the value of protecting their water equipments and the demerits of vandalism; and
- The LWSC need to increase its water supply capacity to Ng'ombe Compound if people are to be served with adequate amounts of water. This would also include increasing the number of water distribution points in the area so that people can have near access to water and also drilling more boreholes to boost the water supply.

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**Appendices**

**APPENDIX 1: INTERVIEW SCHEDULE FOR LUSAKA WATER AND SEWERAGE COMPANY  
IN LUSAKA, ZAMBIA.**

**THE UNIVERSITY OF ZAMBIA**

**SCHOOL OF MINES**

**DEPARTMENT OF GEOLOGY**

**INTEGRATED WATER RESOURCES MANAGEMENT CENTER**

**RESEARCH TOPIC:**

**AN INVESTIGATION INTO CHALLENGES OF QUALITY WATER PROVISION BY LWSC:**

**The Case of Ng'ombe Compound in Lusaka.**

Dear Respondent,

I am Namafe Namafe, a Post Graduate Diploma student in Integrated Water Resources Management from the University of Zambia conducting a study on challenges of quality water provision by the LWSC in Ng'ombe compound. You have been chosen to participate as a respondent in this study. Please answer the questions as appropriately and honestly as required. This study is for academic purposes only and so the information you will give will be treated as strictly confidential.

Date.....

1. What is the office held by the respondent? .....
2. What are the sources of water for the city of Lusaka?  
.....  
.....
3. Are you able to provide enough water to meet the demands of Ng'ombe residents?  
Yes.....No.....
4. If your answer to question (3) is no, give reasons why.....  
.....  
.....
5. When was the present water system commissioned /established?  
.....
6. What was its capacity then?  
.....
7. Have you ever expanded its capacity since then?  
Yes.....No.....
8. What is the capacity of the system at present?  
.....
9. How do you charge for water to Ng'ombe residents?  
Metered.....Fixed.....Others.....
10. Do you face any challenges in providing water to Ng'ombe residents?  
Yes.....No.....

1. If yes, what are those challenges?

.....  
.....  
.....

To what extent do those challenges affect water provision to Ng'ombe residents?

.....  
.....  
.....  
.....

What has been your response to those challenges?

.....  
.....  
.....

*What are your future plans for improving water provision to Ng'ombe compound?*

.....  
.....  
.....

Do you have any water provision partnerships with Ng'ombe community or any other private organizations? Yes..... No.....

If yes, does your partnership have any importance or relevance in quality water provision to Ng'ombe compound?

.....

**THANK YOU FOR YOUR COOPERATION!**

**THE UNIVERSITY OF ZAMBIA**

**SCHOOL OF MINES**

**DEPARTMENT OF GEOLOGY**

**INTEGRATED WATER RESOURCES MANAGEMENT CENTER**

**RESEARCH TOPIC:**

**AN INVESTIGATION INTO CHALLENGES OF QUALITY WATER PROVISION BY LWSC:**

**The Case of Ng'ombe Compound in Lusaka.**

Dear Respondent,

I am Namafe Namafe, a Post Graduate Diploma student in Integrated Water Resources Management from the University of Zambia conducting a study on challenges of quality water provision by the LWSC in Ng'ombe compound. You have been chosen to participate as a respondent in this study. Please answer the questions as appropriately and honestly as required. This study is for academic purposes only and so the information you will give will be treated as strictly confidential.

Date.....

**SECTION A: PERSONAL INFORMATION**

Sex: Male..... Female.....

Age .....

Level of Education: Primary.....Secondary.....

Tertiary..... None.....

Marital status: Single..... Married.....

Divorced..... Widow(ed).....

Occupation Formal..... Informal.....

Family Size.....

**SECTION B: ACCESS TO WATER**

For how long have you lived in Ng'ombe compound?.....

What is your source of water? Taps (piped)..... Wells.....Others.....

What is the level of service?

House connection..... Yard connection..... Stand-by connection.....

Do you pay for your water? Yes..... No.....

If yes, what is the mode of payment?

Metered..... Fixed..... Others.....

What is your comment on the price you pay for your water?.....

.....  
.....

13. If your water is not piped, what is the distance to the source of water?.....  
.....  
.....

14. How long in terms of hours do you have water in Ng'ombe?  
.....

15. Do you manage to meet your water demands with the water provided to you?  
Yes..... No.....

16. When the water supply is shut down, what alternative sources of water do you use?  
.....  
.....

17. What is the quality of the water provided to you?.....  
.....

18. How do you relate with your water service providers?.....  
.....  
.....

19. Do you face any challenges with your water service providers?  
Yes..... No.....

20. If yes, state the challenges.....

.....  
.....  
.....

21. How do you hope to resolve these challenges?.....

.....  
.....  
.....  
.....

**THANK YOU FOR YOUR COOPERATION!!**

**APPENDIX 3: INTERVIEW SCHEDULE CODING KEY FOR NG'OMBE RESIDENTS,  
LUSAKA, ZAMBIA.**

<b>Q1</b>	<b>Sex</b>			
	Male	[1]	Female	[2]
<b>Q2</b>	<b>Age in Years</b>			
	16-34	[1]		
	35-53	[2]		
	54-72	[3]		
<b>Q3</b>	<b>Level of Education</b>			
	Primary	[1]	Secondary	[2]
	Tertiary	[3]	None	[4]
<b>Q4</b>	<b>Marital status</b>			
	Single	[1]	Married	[2]
	Divorced	[3]	Widow(ed)	[4]
<b>Q5</b>	<b>Occupation</b>			
	Formal	[1]		
	Informal	[2]		
	None	[3]		
<b>Q6</b>	<b>Family Size</b>			
	1-4	[1]	5-8	[2]
	9-12	[3]	13-16	[4]
<b>Q7</b>	<b>Years lived in Ng'ombe</b>			
	1-10	[1]	11-20	[2]

	21-30	[3]	31-40	[4]
Q8	<b>Source of water</b>			
	Taps (piped)	[1]		
	Wells	[2]		
	Others	[3]		
Q9	<b>Level of service</b>			
	House connection	[1]	Yard connection	[2]
	Stand-by connection	[3]	Others	[4]
Q10	<b>Do you pay for your water?</b>			
	Yes	[1]		
	No	[2]		
	None	[3]		
Q11	<b>Mode of payment</b>			
	Metered	[1]	Fixed	[2]
	Others	[3]	No Payment	[4]
Q12	<b>Comment on the price</b>			
	Expensive	[1]	Acceptable	[2]
	It depends	[3]	None	[4]
Q13	<b>Distance to source of water in Metres</b>			
	1-97	[1]	98-194	[2]
	195-291	[3]	292-388	[4]
Q14	<b>Hours of Water</b>			
	1-6	[1]	7-12	[2]

13-18 [3] 19-24 [4]

Q15 **Are your water demands met with the water provided to you?**

Yes [1] No [2]

Q16 **Any alternative sources of water when reliable source is unavailable?**

Wait for water availability [1] Draw from other sources [2]

Always there [3] None [4]

Q17 **Quality Status of the water provided**

Clean [1] Dirty [2]

Quality is dynamic [3] None [4]

Q18 ***How do you relate with your water service providers?***

Good Relationship [1] Bad Relationship [2]

It Depends [3] No Relationship [4]

Q19 **Any challenges with your water service providers?**

Yes [1] No [2]

Q20 **Challenges listed**

Water Quantity related [1] Water Quality related [2]

Costs related [3] Long Distance to source [4]

Q21 **Suggested Resolutions**

Water Quantity related [1] Water Quality related [2]

Cost related [3] Distance related [4]

APPENDIX 4: LIST OF NG'OMBE RESIDENTS INTERVIEWED.

Serial No.	Sex	Levels of Education	Marital Status & Family Size	Occupation	Source of water, alternative sources & distance to source	Level of service	Pay for water, mode of payment & comments	Demand vs supply and frequency	Quality of water provided	Interactions between officials and residents
1	2	1	2,1	2	(1,2),2,1	3	1,2,2	1,1	3	4
2	2	2	2,1	2	(1,2),2,1	3	1,2,2	1,2	1	3
3	2	2	1,1	2	(1,2),2,3	3	1,2,3	2,2	1	3
4	2	1	2,2	2	1,1,3	3	1,2,2	1,2	1	3
5	2	1	2,2	2	1,4,4	3	1,2,2	1,2	1	1
6	1	2	2,3	2	(1,2),2,4	3	1,2,2	2,2	2	1
7	2	4	4,1	2	(2,3),2,1	4	2,4,4	2,4	1	1
8	2	1	2,1	2	2,4,1	4	2,4,4	1,4	2	1
9	2	3	2,2	2	(2,3),4,1	4	1,3,1	1,4	1	4
10	1	2	1,1	1	(2,3),2,1	4	1,3,2	1,4	3	1
11	2	1	2,2	2	(2,3),4,1	4	2,4,4	2,4	2	1
12	2	4	2,2	2	2,4,1	4	2,4,4	1,4	1	4
13	1	3	2,1	1	1,4,1	1	1,1,2	1,4	1	4
14	2	1	2,3	1	2,4,1	4	2,4,4	1,4	1	4
15	2	2	2,2	1	(1,2),2,1	3	1,2,1	1,4	1	1
16	2	2	2,1	2	(2,3),2,1	4	1,2,2	2,1	2	1
17	2	2	2,1	2	(1,2),2,4	3	1,2,2	1,4	2	4
18	2	1	4,1	2	(1,2),2,4	3	1,2,2	1,1	3	1
19	1	2	2,1	2	2,4,1	4	1,2,2	1,1	3	1
20	2	1	2,1	2	(1,2),2,3	3	1,2,2	2,4	1	3
21	2	2	4,2	2	1,1,4	3	1,2,2	2,1	2	3
22	2	2	2,2	2	2,4,1	4	1,2,2	1,1	2	2
23	1	1	2,2	2	2,4,1	4	2,4,4	1,2	1	4
24	2	4	2,2	2	2,2,1	4	2,4,4	1,2	1	4
25	2	1	2,2	2	2,4,1	4	2,4,4	1,4	2	4
					2,4,1	4	1,2,1	2,2	1	1

26	2	2	4,2	2	2,4,1	4	2,4,4	1,2	1	4
27	2	1	2,2	2	2,4,1	4	1,2,2	1,2	2	1
28	2	2	2,1	2	1,2,1	3	1,2,2	1,1	3	3
29	2	2	3,2	1	1,1,1	3	1,2,2	1,1	3	3
30	2	4	4,2	2	2,4,2	4	1,2,1	1,2	2	1
31	1	1	2,2	2	(1,3),2,3	3	1,2,2	1,1	3	1
32	2	1	4,2	2	1,1,3	3	1,2,2	1,1	3	3
33	2	2	2,1	1	3,4,1	4	1,2,2	2,4	2	3
34	2	2	4,2	1	3,4,1	4	1,2,1	2,2	1	3
35	2	2	2,2	1	2,4,1	4	2,4,4	1,4	1	4
36	2	1	2,2	2	(2,3),4,1	4	2,4,4	1,4	2	4
37	2	2	2,1	1	(1,2),2,2	3	1,2,2	1,2	3	1
38	2	1	3,1	3	1,4,3	3	1,2,2	2,2	3	3
39	2	1	2,3	1	1,4,1	2	1,1,3	1,4	3	4
40	1	4	2,4	1	1,1,1	3	1,2,1	2,1	2	1
41	1	2	1,2	3	(2,3),2,1	4	2,4,4	2,1	1	4
42	2	4	2,2	3	1,1,3	3	1,2,2	1,2	1	3
43	2	4	2,1	1	1,4,1	3	1,2,1	4,2	3	1
44	1	1	2,2	1	(1,2),2,1	2	1,1,2	2,1	1	1
45	2	1	2,2	1	1,4,1	3	1,2,1	4,2	1	1
46	1	2	2,1	2	1,4,1	3	1,2,2	4,2	1	4
47	1	2	2,2	2	(1,2),2,1	3	1,2,2	2,1	3	1
48	2	2	2,2	2	1,2,1	3	1,2,2	2,2	2	1
49	2	1	2,2	2	1,2,1	3	1,2,2	2,2	3	2
50	2	1	2,1	2	1,2,1	3	1,2,2	2,2	2	1
51	1	1	2,3	2	1,4,1	1	1,1,3	4,1	3	4
52	1	1	1,2	2	(1,2),2,1	3	1,2,2	2,1	3	3
53	2	2	2,2	2	(1,2),2,1	3	1,2,2	2,2	3	3
54	2	1	1,2	2	(1,2),2,1	3	1,2,1	2,2	3	4
55	2	1	2,2	1	1,2,1	3	1,2,2	2,2	3	3
56	1	2	2,1	2	1,2,1	3	1,2,1	2,2	4	1
57	2	2	1,2	2	1,2,1	3	1,2,2	2,1	1	1
58	2	2	1,2	1	1,2,1	3	1,2,2	2,1	3	3

59	2	4	2,1	2	1,4,1	3	1,2,2	4,2	3	3
60	2	1	2,3	2	1,2,1	3	1,2,1	2,2	2	3
61	2	1	4,1	2	(1,2),2,1	3	1,2,2	2,2	1	3
62	2	4	2,2	2	1,2,1	3	1,2,1	2,2	3	1
63	2	2	2,2	1	(1,2),2,1	3	1,2,2	2,2	3	3
64	2	1	2,4	3	(1,2),2,1	3	1,2,2	2,2	2	3
65	2	1	2,2	2	1,4,1	3	1,2,1	4,2	2	1
66	2	2	1,3	3	2,4,1	4	2,4,4	4,1	1	4
67	1	2	2,1	2	(1,2),2,1	3	1,2,2	1,2	1	1
68	2	2	1,3	3	1,2,1	3	1,2,2	2,1	3	1
69	2	4	4,2	2	1,4,1	3	1,2,1	2,1	2	3
70	2	4	4,2	3	1,2,3	3	1,2,1	2,1	2	2
71	2	1	2,2	1	1,2,1	3	1,2,2	2,1	2	2
72	2	4	4,1	3	1,4,3	3	1,2,1	2,1	3	2
73	2	1	2,1	2	1,2,1	3	1,2,1	2,1	1	1
74	2	2	2,1	2	1,1,1	3	1,2,2	1,1	2	3
75	2	4	1,2	1	1,1,1	3	1,2,2	1,1	1	1
76	2	1	4,2	2	1,1,1	3	1,2,1	1,1	2	1
77	1	2	2,1	2	1,4,1	3	1,2,2	1,1	2	2
78	2	2	4,2	2	1,2,1	3	1,2,2	1,2	2	3
79	2	1	2,3	2	1,2,1	3	1,2,2	1,1	2	3
80	2	4	4,2	3	1,2,1	3	1,2,1	1,1	2	3
81	2	1	2,1	2	1,4,1	3	1,2,2	1,2	3	3
82	1	2	2,2	2	(1,2),2,1	3	1,2,2	1,1	2	2
83	2	1	2,1	1	1,1,1	3	1,2,2	2,1	3	3
84	1	1	2,3	2	1,1,1	3	1,2,2	1,1	3	1
85	2	2	2,1	1	1,1,1	3	1,2,2	1,1	2	2
86	2	1	2,3	1	1,2,1	3	1,2,2	1,1	2	2
87	2	2	2,1	1	1,2,1	3	1,2,1	1,1	3	4
88	2	2	2,1	1	1,4,1	3	1,2,2	2,1	1	1
89	2	1	2,1	1	1,2,1	3	1,2,1	2,1	3	4
90	2	4	2,1	2	1,4,1	3	1,2,1	1,1	3	1
91	1	2	2,2	1	(1,2),2,2	3	1,2,2	1,1	3	3

92	1	4	2,2	2	1,2,1	3	1,2,2	2,1	3	4
93	2	1	2,1	1	(1,2),2,1	3	1,2,2	2,1	3	4
94	2	2	1,2	2	(1,2),2,1	3	1,2,2	1,1	3	1
95	2	1	2,2	1	(1,2),2,1	3	1,2,2	2,1	3	1
96	2	1	2,2	1	1,2,1	3	1,2,2	2,1	2	3
97	2	4	2,3	1	1,2,1	3	1,2,1	2,1	2	3
98	1	1	2,1	2	1,2,1	3	1,2,2	2,1	2	3
99	2	4	4,1	2	1,2,1	3	1,2,1	2,1	1	4
100	1	2	2,3	2	1,2,1	3	1,2,2	1,1	1	2

**APPENDIX 5: LIST OF OFFICIALS INTERVIEWED DURING THIS STUDY.**

<b>Name</b>	<b>Position/Place of work</b>
(1) Mr Yoram Sinyangwe	Principal Engineer/LWSC.
(2) Mr Geoffrey Banda	Scheme Manager/ Ng'ombe Water Trust.
(3) Mrs Chileshe C.	Environmental Health Technologist/ Ng'ombe Clinic
(4) Mr Nicholas Chitulang'oma	Programmes Officer/JICA.
(5) Mr Peter Mutale	Council Member/NWASCO.