The International Journal of Multi-Disciplinary Research
ISSN: 3471-7102, ISBN: 978-9982-70-318-5

AN ASSESSMENT OF THE EFFECTIVENESS OF KIOSK WATER SUPPLY SYSTEM IN PERI-URBAN AREAS:

A Case Study of Mchini Compound in Chipata City, Eastern Province, Zambia

(Conference ID: CFP/978/2018)

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ABSTRACT

The purpose of this study was the assessment of the effectiveness of kiosk water supply system in peri-urban areas- A case study of Mchini Compound in Chipata city in Eastern Province of Zambia. The study inspired by the persistence of the people from peri-urban areas accessing the clean portable water from the kiosk water supply system and the outbreaks of the water borne diseases which could be so due to most of the peri-urban areas in Zambia and world over seems to be underserved or unserved as the peri-urban areas have little limitation and order to growth world over. The study aimed at assessing the effectiveness of the kiosk water supply system in per-urban areas. The study aimed at helping the stakeholders and the government in reducing and stopping out completely the water borne diseases in peri-urban areas of Zambia. Water kiosk is a point of sale of portable clean water used in peri-urban areas in Zambia. According to the (JMP, 2012) estimates, access to improved water supply in urban areas of Zambia is around 87% and, out of which 36% are individual household connections.

Data for the study was collected from ten (10) kiosk water points. The researcher used two types of data to be analysed and this was comprising of quantitative as well as qualitative data. Quantitative data was analysed using SPSS version 16. Univariate, Bivariate and Multivariate Analysis was used to present the data. As for qualitative data, since the data was in textual form, the data was analysed on the computer using N vivo computer package. Data were analysed in phases. Qualitative data was analysed using phenomenological interpretive analysis. Quantitative data was be analysed using correlation, association and regression analysis.

The study was done in two phases. Phase I was the quantitative study and phase II was the qualitative study. In the first phase of the study, Household most specifically mothers were sampled using random sampling based on the sampling frame that was provided by the ward's chairperson. This mode of sampling was linked to the administration of the survey questionnaire to collect sample estimates. The sampling frame was said to be 100% reliable

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

ACKNOWLEDGEMENTS

I wish to thank God Almighty for the enormous insurmountable blessings He has granted unto me this far in my life. By His grace, pipe dreams can only become realities laid bare for all to witness. I wish to extend my appreciation and convey my gratitude to my supervisor Dr Ommedy Mweene for his insight, invaluable guidance, enthusiastic interest, constructive criticism and encouragement during this study period. Am also heavily indebted to my Lecturers Dr Serah Mbetwa, for her guidance, helpful comments and support in my study. To my family friends Mr. Daniel.F. Banda and Mr. Emmanuel. F. Banda, I say thanks for encouragement, editing and various support in most of the work in this research.

To my fellow students Col. Bernard J Chileshe, Andson Muyaba and Elizabeth Tembo, I say thanks for the great encouragement we gave to each other throughout this research.

May I humbly acknowledge and convey my sincere gratitude to my former workmate Ms. Veronica. M. Banda, who also encouraged me to pursue my studies to this level with her good experience in the research studies.

I wish to sincerely thank my employer, the management of Eastern Water and Sewerage Company limited (EWSCO) for granting me the pioneer long course study leave opportunity that I cannot take for granted. I also thank National Water and Sanitation Council (NWASCO), Germany Development Bank (KFW), Germany International Co-operation (GIZ) and Devolution Trust Fund (DTF) for their important literature materials I used during my research. God bless you all.

I wish to sincerely appreciate and acknowledge the support I got during my research from Mchini community where the leaders could organize their community members and kiosk vendors who participated fully during my research period.

Finally, I register my special gratitude to my wife Memory Phiri Mzyece, entire family and friends and all those that I did not mention by name not deliberately for their great support and encouragement. May the good Lord bless you all and always.

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LIST OF ABBREVIATIONS

ADB	African Development Bank
CSO	Central Statistics Office
CU	Commercial Utility
CWF	Communal Water facilities
DFID	Department for International Development
DTF	Devolution Trust Fund
EWSC	Eastern Water and Sewerage Company
GIZ	Germany International co-operation
GRZ	Government of Republic of Zambia
GTZ	Germany Technical co-operation
JMP	Joint Monitoring Programme
KFW	Germany Development Bank
Las	Land Authorities
MD	Mobile Distributors
MLGH	Ministry of Local Government and Housing
NWASCO	National Water and Sanitation Council
PNO	Piped Network Operators
PSO	Point Source Operators
SI	Statutory Instrument
SPSP	Small scale Private Service Providers
UNICEF	United Nations International Children`s Education Fund.
WBG	World Bank Group
W H O	World Health Organisation
WSP	Water and Sanitation Program
WSS	Water and Sanitation Services
WUP	Water Utility Partnership
ZMK	Zambian Kwacha

1.0 CHAPTER ONE

1.1 Overview

Chapter one presents the background to the study, the statement of the problem, the purpose of the study, research objectives including the research questions, the significance of the study, the theoretical framework and the operational definitions.

1.2 Introduction

Zambia is not spared to unplanned settlements like the rest of the world hence the service delivery in low income areas face their own a challenges. The kiosk water supply system in peri-urban areas in Zambia was initiated in 1992. Chipata comprises of nine (11) peri-urban areas of which all these are serviced through kiosk water supply system. Water kiosk is a point of sale of portable clean water used in peri-urban areas in Zambia. According to the (JMP, 2012) estimates, access to improved water supply in urban areas of Zambia is around 87% and, out of which 36% are individual household connections. The Kiosk water supply system in Zambia is viewed to be the solution for reliable and safe drinking water supply to the densely populated low-income of peri-urban areas at affordable prices; it spars economic development and has very high positive environmental health impacts on the community as a whole. The kiosk water supply system in Zambia is targeting the pro-poor and high-density populated areas and in unplanned settlements in order to reduce or stop completely the communicable water borne diseases. The operational challenges of kiosk water supply system have emerged in all water utilities forcing the community going back to shallow and unprotected wells. The kiosk water supply system is faced with profligate sustainability as the system is not able to support the full maintenance cost.

1.3 Background

Peri-urban areas are the ones which grow with little or no limitations and order world over, hence the increase in population and making it difficult to provide a number of services; water inclusive. The kiosk water supply system was adopted in order to accelerate the clean water access to areas where it has difficulties to plan for and it is being viewed as the solution to improve access to drinking water

and was an appropriate method to achieve the millennium development goal on drinking water supply -- Goal 7 (DTF and NWASCO, 2005).

The kiosk water supply system is the most common method used to supply clean water in peri-urban areas and are the most reported common provision provided by water utilities. About 30 litres per capital in peri-urban is to be met and a walk able distance of 200 meters for effective provision of clean water (EWSC, Peri-urban policy, 2011)

The most recent authoritative data, released in report shows that access to clean water continues to improve steadily as Chipata city has increased to 67%, includingPeri-urban areas, which are relatively high-density, unplanned neighbourhoods largely comprised of poor residents (NWASCO sector report, 2015), (Ministry of Local Government and Housing,2015).

The census shows that there are 1,592,661 people in Eastern province but Chipata city alone has 455,783 people. The population of study is made up of peri-urban areas.

As per 2015 data, one of the compounds in Chipata, Mchini compound has 18,519 people, hence Peri-urban policy states that one water kiosk must service 1,200 people, therefore it's evidently seen that the water kiosk supply system is not enough (CSO2010).

1.4 Statement of the Problem

In Zambia currently, the situation for water supply system as regards to the source of clean portable water in peri-urban areas is a concern. Current conventional benchmarking system therefore requires expansion so that water provisional services to the urban poor can be incorporated for tracking progress on its effectiveness. There is evidence that the majority of the peri-urban areas lack effective water supply systems of portable clean water in the unplanned settlements. The plight of the poor has been ignored in society who is either underserved or unserved. However, currently efforts to offer clean water supply systems through kiosks water supply management in peri-urban areas is the step in the right direction as far as the provisions of reliable source for clean water supply service. Hence, the research was undertaken in order to examine the effectiveness of kiosk water supply system in peri-urban area in Mchini compound of Chipata city of Eastern province of Zambia.

Despite, the huge support from cooperating partners to try and alleviate the accessibility of clean portable water supply, the approach has not been assessed on its effectiveness. For the water utilities,

who have taken the provisions of relevant water supply services, are concerned, hence worthwhile efforts ought to be accompanied equally with efforts to ascertain their effects. In regards to the water kiosk provision in peri-urban areas, currently there is no solid base of empirical research to inform the stakeholders and the funders on how effective the water kiosk supply system is performing in all peri-urban areas of Chipata City.

Therefore, we do not know whether the water kiosk supply system in peri-urban areas provided for the communities have shown some significant effectiveness and providing desired effects in positive direction.

1.5 Aim

The overall aim of the study is to assess the effectiveness of the kiosk water supply system in peri-urban areas of Chipata city with a focus on Mchini Compound.

1.6 Research Objectives

The study is guided by the following objectives

1.6.1 General Objectives

The general objective of this research is to assess the effectiveness of kiosk water supply system in peri-urban areas- A case study of Mchini Compound.

1.6.2 Specific Objectives

The specific objectives of the study are:

The specific objectives are:

1. To examine the effectiveness of the kiosk water supply system in peri-urban areas of Chipata city focusing on Mchini Compound.
2. To Explore socio-economic effects associated with the kiosk water supply system in peri-urban areas.
3. To document operational improvements of kiosk water supply system in peri-urban areas of Chipata city.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

4. To Determine and tabulate lessons from the research, for possible application to other peri-urban areas.

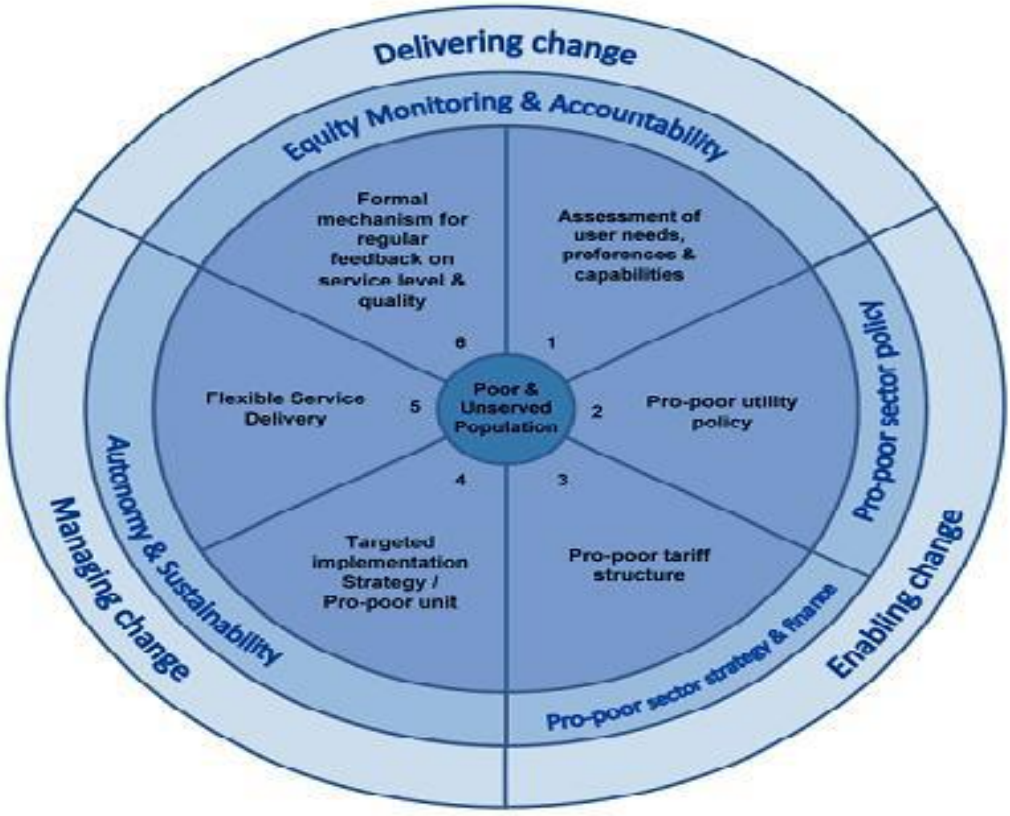
1.6.3 Research Questions.

1. The following were the research questions of the study: How effective is the kiosk water supply system in peri-urban areas of Chipata city especially Mchini Compound?
2. What are the socio-economic effects of the kiosk water supply system of Mchini Compound?
3. Which operational improvements of kiosk water supply system are needed in peri-urban areas?
4. How to determine and tabulate lessons from the research for possible re-application to other peri-urban areas?

1.7 Conceptual Framework

Conceptual framework is a collection of interrelated ideas based on the concepts attempting to clarify why things are the way they are based upon theories introducing new views of the research problem allowing understanding realms of the problem helping to conceptualize topic. It's entirely and also to acknowledge problem from wider perspective for objectives (Kombo and Tromp, 2006)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5



Source: Adopted from Water Utilities that Work for Poor People by Velleman Yael (2009).

The first building block is **enabling change** which is the operational environment of a water utility constituting of political will, leadership and regulation. **Managing change** as the second block are the utility domiciled processes comprising of clear roles and functions, as well as management competence and community leadership. The third block is **delivering change** through social (downward) accountability in enabling the previous blocks either singly or in combination (Velleman 2009). Their adoption and implementation by the water utilities and affiliate actors materializes effectively to the advantage of the peri-urban residents accessing the much sought-after kiosk water supply services.

1.8 Significance of the Study

There have been several studies conducted on water supply in low-income urban and peri-urban areas in developing nations but the majority of these studies, however, have focused on the characteristic of delivery system of drinking water supply to low-income urban and peri-urban areas of

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

developing countries, with very little, if any at all, studies that have been conducted focusing on the effectiveness of the various delivery interventions of water supply to these neglected locations of the towns and cities. Majority of these studies, in particular, have focused on the typology of the small private service providers as well as the general prices charged for water by these small private service providers. Water kiosks system in Zambia is being promoted as an effective way of providing drinking water supplies to low-income urban and peri-urban areas in towns and cities. The water kiosks system is viewed to be a cheap and sustainable water supply solution, from the utility point of view and thus easy to scale-up in all low-income urban and peri-urban areas in towns and cities. This is despite the fact that there are critical decisions that influence the consumers' choice and use of any particular source of water supply. Amongst these include: the ease of access; adequacy (in terms of quantity and quality); availability, among others.

These critical decisions need to be incorporated if effectiveness has to be realized.

This research is very significant because water is the fundamental right of people in life and as such the community which cover the socio-economic spectrum and in the development of human activities in such it is very cardinal to handle the management of the provision of water supply system well and effectively.

The research is therefore, sought to provide up to date firsthand information on what challenges really are associated with the kiosk water supply system in Mchini Compound. It is very vital for this research to be undertaken so as to identify what socio-economic impacts are associated with the kiosk water supply system. In quest for the kiosk water supply system in Mchini compound, it was also imperative to document and to assess public and private participation in ensuring effective water supply system.

This study was therefore, expected to increase the knowledge not only in the area of study, but also other areas and communities in Chipata city on the peri-urban water supply system and its accompanied adverse impacts on the urban pro-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, funders and other stakeholders including non-government organization and strengthens the integration of the ideas in the provision of kiosk water services in per-urban areas effectively.

In addition, the study sought to strengthens the local people's links with the government and other stakeholders involved in the management of the water provisions through kiosk water supply systems in peri-urban areas.

1.9 Operational Definitions

Water kiosk: are booths for the sale of tap water.

Effectiveness: The capability of producing a desired result or the ability to produce desired output.

Peri-urban areas: The structure resulting from the process of peri-urbanization.

Affordable: Able to be afforded, having a cost that is not too high.

Settlement: An official agreement intended to resolve a dispute or conflict.

Commercial utility: Large firm owns and /or operates facilities used for generation and transmission or distribution of electricity, gas or water to the general public.

Quality: The standard of something as measured against other things of the similar kind; the degree of excellence of something.

Pro-poor: Growth is a term used for primarily national policies to stimulate economic growth for the benefit of poor people (primarily) in the economic sense of poverty

Tariff: Fix the price of (something) according to a tariff

Philosophical: Relating or devoted to the study of fundamental nature of knowledge, reality, and existence**.**

Communal water facilities: Water supply facility composed of a source, reservoir, a piped distribution network with adequate treatment facility, and communal faucets.

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2.0 Chapter Two

Literature Review

2.1.1 Overview

This chapter presents the literature relevant to the study, the global perspective, will be presented first followed by Zambian perspective, and later on attention to the comparative studies and the personal critique will be given.

2.1.2 Global Perspective

Water is both a social and an economic but finite good (Rogers, Bhatia, et al., 1998; Solanes and Gonzalez-Villarreal, 1999; Gleick, Wolff, et al., 2002). It is irreplaceable for survival, human health and economic growth and has vital cultural and religious value. Therefore, clean water improves the individuals' welfare and generally benefits society as a whole; as such, access to clean water is a basic right for all (Assimacopoulos, 2002).

A huge knowledge of literature on management of this finite but precious resource exits and this continues to grow to date. Amongst these include the application of economic tools and principles on water leading to the full commodification of water. Whilst it is necessitated, and rightly so, that water should be treated as 'an economic good' (see the Dublin Principles in Rogers, Bhatia, et al., 1998; Solanes and Gonzalez-Villarreal; 1999) economists have seized the idea and argued that water should be treated as a private good, subject to corporate control, financial rules, markets forces, and competitive pricing (Gleick, Wolff, et al., 2002). Nonetheless, since water is such an important resource with immense value to life, leaving it to the fate of full-markets forces will spell doom to mankind.

In spite of the fact that management of water has evolved -- since the dawn of civilization in Mesopotamia and Egypt to the present 21st Century amid swelled global water utilization –access to safe water supply is still a global challenge.(WHO/ UNICEF JMP, 2008) projects that 1 in every 8 people currently lack access to safe water supply and the rapidly increasing urban population which is projected to constitute at least 60% of the total global population by 2030 will further exacerbate this situation. Global urban water utilization by people increased over 20 times in the last century (Liang, 2011) and this consumption will outstrip the 2004 global water utilization by the year 2050.

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

While data on access for the poor are not available continent-wide, the analysis and discussion in this document supports the view that poor people are almost certainly worse off than the average access statistics imply. 'Access' (distance to the nearest water-point and per capita availability) and safe (water quality). (World Bank Group, 2016), (DFID, UK, 1998)

Whatever the means, good practice in water supply and sanitation provision involves the active participation of communities or their representatives in planning, construction, operation, and maintenance. (DFID, UK, 1998)

Especially in unplanned settlements, relies on small-scale informal service providers and the challenge with such an arrangement, however, is that it has been associated with high charges, provision of poor-quality water, unreliable and intermittent water supply, and a general deterioration of water infrastructure. Kiosks do not provide a 24-hour service (B. U. G. Mughogho and I. B. M. Kosamu, Mtafu A. Zeleza Manda, UK, 2009)

Water Utility partners 5 agree to say, low-income households rely on more than one source to obtain the water they need to survive. There is a need for review and reform of relevant policies and strategies to focus attention on the needs of low-income communities and to create an enabling environment for service delivery. (WUP 5, Kenya 2003)

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Water supply service area in most cities is not well defined, and where the coverage is set, the utilities are not providing services to all households in the set boundaries (GFA Tanzania, 2010).

The companies that are mandated to supply water have no capacity to satisfy demand resulting in inhabitants looking for alternative water sources (Mumma et al., 2011); (ADB, 2015). Hence, many countries in Africa rely on ground water (Cape Cod Commission, 2014).

Water kiosk system has been found to be the most appropriate for scaling up improved water supply to low-income urban areas. Forcing people to come and draw water from a centralized system like a water

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kiosk is not a measure of efficiency of the water utility company. The water kiosks have to be accepted by the local communities. (Sankwe Michael Kambole, 2012), (DTF and NWASCO, 2005)

(Nwasco Inspector, Sector Report, 2015)

2.1 Drinking Water System in Zambia

All functions related to provision of water supply and sanitation services are a responsibility of the Local Authorities (LAs) under the overall supervision and support of Ministry of Local Government and Housing (MLGH). Nonetheless, through commercialization, the Las outsourced the management of WSS services to private enterprises formed by joint ventures with other LAs which are commonly referred to as the Commercial Utilities (CUs). Financial Sustainability of Kiosk Water Supply: A Case of Kanyama Township of Lusaka 12 Commercial Utilities are thus responsible for urban water supply in Zambia. The CUs are regulated by the National Water and Sanitation Council (NWASCO), a statutory body established by the Water Supply and Sanitation Act No. 28 of 1997. This Act prescribes

the powers and functions of NWASCO which include licensing of the services providers; developing sector guidelines (which include setting of tariff, establishment of service providers); establishing and enforcing sector standards (The Water Supply and Sanitation Act, 1997), among others.

Amongst the guidelines developed by NWASCO, include (NWASCO, 2011):

- Minimum service level guidelines which elucidate the minimum services that the CU should strive to provide.
- Water quality monitoring guidelines which defines the water quality tests to be conducted and the acceptable standard.
- Tariff setting guidelines which shows the process that CUs should follow when setting water and sewerage tariffs.
- Water supply for peri-urban areas guidelines which details the strategies for water supply delivery to peri-urban areas through the Devolution Trust Fund (DTF).

Unfortunately, CUs tend to concentrate their efforts in developing and improving water supply services to high income areas at the detriment of peri-urban and low-income urban areas. NWASCO (2011) observed that the majority of the CUs tended to concentrate in the high income areas for development and improvements of water supply and sanitation infrastructure where there was a higher rate of return on their investments, the orientation which has to a larger extent disadvantaged many communities in the low-income urban areas as well as those in peri urban areas. The DTF was thus established to '…promote among others the extension of public water distribution systems and onsite sanitation in low income urban and peri-urban areas (NWASCO, 2011). The Government of the Republic of Zambia (GRZ), through the provisions of the Water Act No. 28 of 1997, issued Statutory Instrument (SI) No. 50 of 2001 to establish the DTF as a basket fund for extension of service in the low-income areas and only became operational in 2003 (NWASCO, 2011).

EWSC has only managed to connect to a partly 36% of the total households to the City Water Supply Network System, leaving the majority of the households without piped water connection with the worst hit being peri-urban areas and low-income urban areas. Whilst residential areas have continued to expand, these have not been matched with the expansion in the water supply network system -- in fact,

the water supply network system has remained static (never expanded) -and this state of affair is not likely to change in many years to come. It does not seem possible and later on feasible both in the medium term (10 years) and long-term (20 years) and beyond to have a project that will embark on connecting households in low-income and peri-urban areas to the main water supply network system of the city.

NWASCO (2005) classified water supply systems in peri-urban areas into three (3) namely communal taps, public taps and water kiosks. This classification is based on two (2) attributes namely how the water outlet is managed and who has access to the water supply and how. Communal taps are managed by the community and access is usually restricted to a specific user group. However, access to water supply from a communal tap is further restricted through a user fee. Public taps on the other hand provide water free of charge and there is no defined user group. Water kiosks are managed by the Commercial Utility (CU) and access to water supply is open but at a fee. Kiosks are metered and customers have to pay according to consumption (DTF and NWASCO, 2005)

2.2 Drinking water tariff system in Zambia

NWASCO approves all drinking water tariff adjustments in Zambia. All proposals in connection with adjustments to the drinking water tariffs made by the CUs are submitted to NWASCO for review and consequent guidance prior to approval and effecting. In principle there are three (3) types of tariffs plans offered by the EWSC for water consumption, namely:

1) The metered domestic consumption; 2) unmetered domestic consumption, and 3) metered non-domestic consumption.

Metered domestic and nondomestic consumption tariff is based on the increasing block tariff (IBT). The unit of water consumption is a cubic meter (m3).

Table 1 gives the approved tariffs for 2017 for the metered domestic consumptions within the City of Chipata.

Table 1: Approved tariffs of domestic metered consumption for 2017 Consumption block (m3) Tariffs (ZMK)

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Consumption block(m)	**Tariffs (ZMK)**
0-6	**5.04**
6-20	**7.80**
20-40	**10.45**
40 & Above	**11.74**
Kiosk	**5.00**

Source: (EWSC, Undated)

Non-metered domestic consumption tariffs are based on non-uniform volumetric charges. Thus, a fixed monthly charge is levied on customers regardless of the quantity of water consumed. These tariffs are also different from one residential area to the other - low cost residential areas pay the lowest cost per month while the high cost residential areas pay highest water consumption charges per month. The monthly tariffs for water consumption applicable for metered consumptions are presented in table 2.

Table 2: Approved tariffs of domestic metered consumption for 2016 Consumption block (m3) Tariffs (ZMK)

Consumption block(m)	**Tariffs (ZMK)**
0 -6	3.37
7-20	5.37
21-40	7.20
41 & above	8.08
Water kiosks	4.00

Source: (EWSC, Undated 2016)

2.3 Trends in Water Supply to Low-income Urban Areas in Developing Nations

Water supply is capital-intensive compared to other utilities like telecommunications and electricity, water production is very capital-intensive. Moreover, assets used in water supply cannot be moved to another location and are generally unusable for any other purpose; they represent an extreme type of fixed capital, associated with sunk costs' (Le Blanc, 2008). Komives, Foster, et al. (2005) showed that investments associated with capital costs in the network components of electricity and water services range from 70 percent to 90 percent of the total costs and these have asset life ranging between 20 and 40 years while the network components of telecommunication has a much lower level of capital intensity (25-45%) and substantially shorter asset life (10-20 years).

Low-income urban and peri-urban areas are the least served areas and the last to receive any basic services such as drinking water supply from the water utilities (Snell, 1998). This is despite the areas being resident to majority of the population of the towns and cities. The failure by the government to provide these basic services, especially drinking water supply, exposes the residents to undesirable exploitation by providers of such services and ultimately ends up paying more for drinking water, in terms of unit price, than the other income class (middle and high income) residents who basically have household piped water connection supplies (Snell, 1998; Goldblatt, 1999; WSP, 2005; Kariuki and Schwartz, 2005; Ringskog, Hammond, et al., 2006; Le Blanc, 2007). In general, standpipes and water kiosks as medium priced and 'the next most expensive' to the high-priced water supplied through 'water truckers, carters and carriers', with the home connection based on the volumetric tariff being the least expensive (Snell, 1998).

Drinking water delivery in low-income and peri-urban areas is commonly characterized by small scale and informal private sector, ranging from individuals and sole proprietorship to small business enterprises. (Snell, 1998) broadly called these water service providers as small private providers and classifies them according to the following dichotomies: piped water vs. water delivered by vehicle or on foot; water supplied from a water company vs. water from a source controlled by a small provider; systems managed by a community vs. systems run by a private entrepreneur; and whether construction is financed by the system's owner/operator, the community receiving services, or the principal donor, to give the following categories of small private providers, thus:

 Providers in permanent partnership with water utilities, whose water they distribute eat kiosks or standpipes: water kiosks in Nairobi, Kenya; standpipes managed by communities in Dakar, Senegal,

Mopti, Mali, Port-au-Prince, Haiti, and Dhaka, Bangladesh; and a micro-enterprise-community-association standpipe partnership in Segou, Mali.

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Pioneers who bring piped water from their own sources to communities where water utilities have not yet expanded their networks: Aguateros in Asuncion, Paraguay; community-built water systems in Buenos Aires, Argentina, (and El Mezquital, Guatemala City, Guatemala); entrepreneur-built water systems in Guatemala City, Guatemala, (and Cuzco, Peru); and water centers selling UV-purified river water in Manila, Philippines.

Mobile water truckers, carters and water carriers who provide water (mostly drawn from water company taps) at times and places that water utilities are unable to serve: in

Dakar, Senegal, Port-au-Prince, Haiti, (and Lima, Peru).

Community-managed water system in Dhulikel, Nepal. In their work, Kariuki and Schwartz (2005) termed these service providers as 'Small-scale Private Service Providers (SPSPs)' and classified them generally according to the 'relationship to the sources of water (whether dependent or independent)' and type of 'technology employed' and further categorization the SPSP based on piped network operators (PNO), point source operators (PSO) and mobile distributors (MD).

2.4 Water Kiosk System in Zambia

A water kiosk is an outlet through which formal water providers deliver safe and reliable water at affordable prices to residents in low-income areas (GTZ, 2009). The concept of water kiosks was developed upon realizing that there exist not many technically feasible options for the provision of drinking water supply to the low-income urban areas due to lack of funds for large-scale rehabilitation and extension of existing central water supply systems. Commercial utilities (CUs) own the water kiosks and are responsible for their construction, operation and maintenance, although the day-to-day operation is delegated to a water kiosk vendor recruited from within the community. All water kiosks are metered to allow proper accounting for the water supply by the formal water provider with the exact location of a particular water kiosk being determined by the number of customers, the per capita average consumption and as well as their ability and or willingness to pay -- 'using these criteria

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

ensures the sustainability of the system and allows the water provider to cover the operating and maintenance costs of the kiosk' (GTZ, 2009).

Investment capital for the water kiosks is financed through the DTF (poverty fund) – a multi donor basket fund -- with the majority of the funds coming from the governments of Denmark, Germany and the European Union. The DTF is an instrument specifically designed to provide financing to the CUs to enable them to extend WSS services to low income urban areas (GTZ, 2009).

The number of kiosks built in any given area is determined by assessing the potential income for the kiosks operators which in turn is dependent on the number of customers, average daily consumption as well as the ability and/ or willingness to pay. Thus, sustainability of the water kiosk system in Zambia is ensured by these four variables adequate income for the operator; average daily consumption; ability to pay and willingness to pay which in turn necessitates the water provider to cover the operating and maintenance costs of the kiosks (GTZ, 2009).

The water Kiosk system in Zambia is viewed as an effective solution for reliable and safe drinking water supply to the densely populated low-income urban and per-urban areas at affordable prices; it spars economic development and has very high positive environmental health impacts on the community has a whole. The price for a 20 litres of safe water from the Zambian water kiosks has been fixed at the equivalent of about one-hundredth (0.01) of a Euro, although this tariff system does not include the replacement cost of the entire system, a burden which is borne through cross subsidies by consumers with household connections (GTZ, 2009). This tariff is based on Zambian social tariff structure. Nonetheless, the cost recovery tariff of the water kiosk system which includes the replacement cost of the entire system is estimated to be 0.15 Euro. Furthermore, the structural design of the water kiosks has been found to be a critical component for the successful and sustainable operation of the kiosk and therefore a provision is made for the kiosks to be used for additional income generating activities such as the selling of other goods by including shelves and adequate space since these have been seen to be fundamental to keeping the motivating of the vendor high because the income generated from the sale might be enough to cover a provider's costs although insufficient to keep the kiosk vendor motivated (GTZ, 2009).

Water kiosk vendors work on a commission this commission ranges between 30% and 40% of the monthly water sales and since the sale of water only provides the water kiosk vendors with a small

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income which obviously needs to be supplemented and this is achieved through the sale of other goods at the kiosk. These goods sold at the kiosks are provided by the kiosk vendors and the only contribution from the water providers is the space within the kiosk which is rented-out to the kiosk operator at no-cost (GTZ, 2009). A special department known as the peri-urban unit has been established within the CUs with the sole responsibility to manage and ensure proper functioning of the water kiosks. Peri-urban units introduce the necessary measure, guidelines, procedures and sanctions (GTZ, 2009).

2.5 Water Kiosk System in Arusha, Tanzania

Public water kiosk system in Tanzania has been in use for over 30 years as a means of providing drinking water services to the poor majority and they originally provided free water services in line with the socialist policies that the Tanzanian government was pursuing at that time (Wandera, 2000). (Wandera, 2000) identified two (2) types of communal water facilities (CWF) in Arusha, namely the kiosks and a mixture of standpipes as well as domestic points. All these CWF are owned by the utility but operated by various local administrative units acting through the street chairpersons for day to day operation of the water sale. All operation and maintenance including the meter and the kiosk structure are the responsibility of the water utility company whilst the street chairperson is responsible for the operational needs of the kiosks including maintenance of the service pipelines between the water meter and the taps, as well as repair and/ or replacement of worn out taps and the supervision of the service delivery. All the water kiosks are metered and are billed according to consumption.

The kiosks were constructed by the utility through a grant from the KfW, a Germany development bank, in 1993 (Wandera, 2000), and since then no new CWF has been constructed. Water is sold to the public water kiosks at the price of $0.20 per m3 by the public service provider (water utility company) and the utility recommended retail price is $0.31 per m3 but according to (Wandera, 2000) the market price of the water from the public water kiosk was $0.63 per m3 -- none of the kiosk was selling the water at the utility recommended price of $0.31 per m3.

An important conclusion drawn by (Wandera, 2000) with regards the sustainability of the public water kiosks in Arusha, Tanzania is that the public water kiosks were not sustainable in the long-term for a number of reasons, one such reason the kiosks are in permanent construction format and yet the retail water trade is ideally in a state of flux thereby establishing a fundamental conceptual contradiction since the retail water business is particularly a function of the municipality's development and their use

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

rendered redundant in areas where residents have since acquired private water connections and hence closing down -- thus, the market of kiosk water diminishes with the increase in private water connection. The other reason attributed to the lack of sustainability of the public water kiosks was the outrageously low price of the water.

2.6 Water Kiosk System in Kibera, Kenya

Water kiosks are the main means for the supply of water to the more than half a million poor people with little or no access to the utility water supply in the informal settlement of Kibera in Nairobi, Kenya. This burgeoning informal water market has more than 650 local entrepreneurs selling water through kiosks scattered throughout the settlement (WSP, 2005). The water that is sold from the kiosks, in majority of the cases, is supplied from the Nairobi City's main distribution water supply network system, although some of the kiosk operators have their own tube-wells. Access to the main water distribution network is gained through laying lengths of pipes by operators of kiosks, in some cases up to 1.5 km long, to reach the few trunks main. This informal network is connected to the storage tanks which are commonly constructed from corrugated galvanized irons sheets and have storage capacities ranging from 2 m3 to 6 m3. It is from these tanks where the water is sold by the kiosk operators to the customers, who collect it using 20 litres jerry cans.

Poor quality of the water sold at the kiosk is one of the major problems for the water kiosk system in Kibera, Nairobi. The contamination of the water occurs on two fronts -- along the informal network due to poor quality of materials used as pipe network and at the kiosk because of poor maintenance of the storage tanks coupled with unhygienic handling of the water. The very fact that kiosk operators lay pipes along existing channels which include open sewers full of solid waste and contaminated water coupled with the use of low quality plastic pipes allows contamination of water during its transportation from the utility network to the kiosk -- the majority of the kiosk operators use low quality plastic pipes to reduce costs, as metal pipes are much more expensive and could be stolen and intrinsically because plastic pipes have the added advantage of being flexible enough to follow the winding and irregular paths found in most of Kibera (WSP, 2005).

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

In general water kiosk users in Kibera, Nairobi pay higher prices for the water. WSP (2005) associated this high price of water to the costs of establishing and running the kiosks. The typical costs of the water are eight (8) times higher than the lowest block of tariff at domestic connections and four (4) times higher than the average tariff in Kenya (WSP, 2005). The lowest block of water at domestic connection (0-10m3) is charged at $0.16 per m3. One of the reasons for the high price of water is the fact that the kiosks are usually registered as domestic connections and hence are charged the tariffs according to the prevailing tariff structure, the increasing block tariff. Therefore, this means that at higher consumption rates they end up paying high retail rates and ultimately at the highest block of the tariff, each additional cubic meter purchased by the operator costs $0.47 per m3 and as such this pushes the price of water into the highest blocks of the tariff (WSP, 2005). Consequently, these costs, together with the investment costs as well as the overheads incurred by the kiosk operators, translate into very high-water prices at kiosks.

3.0 CHAPTER THREE

3.1 Research Methodology

3.1.1 Introduction

This chapter highlights the methodology that was used in collecting data and how data was analyzed; the chapter presents the research design, the target population, the sample size, sampling procedures as well as the data collection procedure and analysis and the instruments that were used.

3.1.2 Research Design

In order to demonstrate the methods or techniques that was used in this study and to weave the methodology, the researcher intends to outline the overall frame which is depicted as a research design. In terms of mirroring the research questions and objectives, the design does not conform to this rule of thumb as it is not philosophical. This is because research methodology is a philosophical stance linked to the nature of being or reality that underlies and informs the style of research (Sapsford & Jupp, 2006). Several authors have argued that because philosophy and methodology are intertwined, it is not possible to explicate methodology without philosophical clarity (Collis and Hussey, 2003; Creswell, 2003; Alise & Teddlie, 2010; Hesse-Biber, 2010).

It could be deduced from the research design that this is a mixed methods study design. A mixed method type of research design therefore is appropriate to answer the research questions because each question has an underlying differing ontological and epistemological position. This mixed methods design will be sequential beginning with the quantitative and ending with the qualitative phase of the inquiry.

3.1.3 Target Population

This case study was about assessing the effectiveness of Kiosk Water supply system in Peri-Urban Areas, the case of Eastern Province and Chipata in particular Mchini compound. The study was done in two phases. Phase I was the quantitative study and phase II was the qualitative study. In the first phase of the study, Household most specifically mothers were sampled using random sampling based on the sampling frame that will be provided by the ward's chairperson. This mode of sampling is linked to the

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

administration of the survey questionnaire to collect sample estimates. The sampling frame is said to be 100% reliable. The sample size will be determined using Yamane's formula described below;

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

Where: ***n*** is the anticipated sample size

a) ***N*** is the known population size
b) ***e*** is 95% confidence level and
c) ***p*** = 0.5 are assumed for this equation.

Purposive sampling will be used in the second phase to enlist Households/ community leadership for in-depth interviews who would exhibit particular characteristics and helping behaviours in the manner they would've answered the survey questionnaire.

3.1.4 Sample Size

This case study will be about assessing the effectiveness of Kiosk Water supply system in Peri-Urban Areas, the case of Eastern Province and Chipata in particular Mchini compound. The study will be done in two phases. Phase I will be the quantitative study and phase II will be the qualitative study. In the first phase of the study, Household most specifically mothers will be sampled using random sampling based on the sampling frame that will be provided by the ward's chairperson. This mode of sampling is linked to the administration of the survey questionnaire to collect sample estimates. The sampling frame is said to be 100% reliable. The sample size will be determined using Yamane's formula described below;

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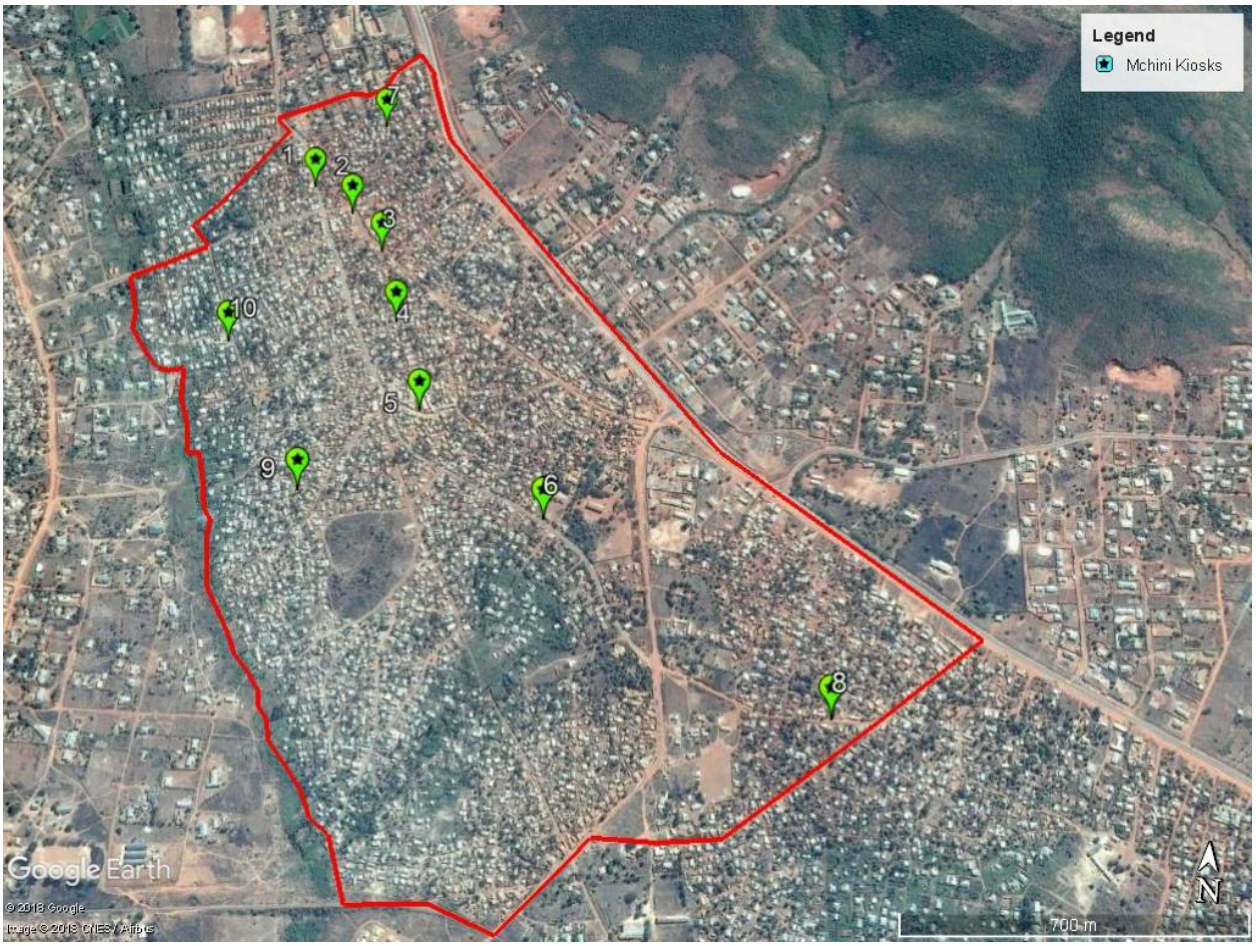
3.1.5 Sampling Technique

Data was collected using a survey questionnaire and in-depth interviews as the case was to be. Data was collected in two phases. Phase I included the administration of a survey questionnaire. Phase II involved the use of in-depth interviews. A survey questionnaire assessing various issues about Kiosk Water Supply system was developed. In-depth interviews were unstructured allowed the respondent expression and that allowed the researcher to home in on specific issues that would be raised.



Source: pro- Google Earth 2016

These water kiosks were accessed using smart phone and the following are coordinates in reference:

1.	Mchini kiosk 1	latitude: -13.6581943466	longitude: 32.6509521157
2.	Mchini kiosk 2	latitude: -13.6587898992	longitude: 32.6518741250
3.	Mchini kiosk 3	latitude: -13.6596532524	longitude: 32.6526476070
4.	Mchini kiosk4	latitude: -13.6612268276	longitude: 32.6531619206
5.	Mchini kiosk 5	latitude: -13.6631978543	longitude: 32.6539082453
6.	Mchini kiosk 6	latitude: -13.6653379470	longitude: 32.6567269117
7.	Mchini kiosk 7	latitude: -13.65664381291872	longitude: 32.65236165267457
8.	Mchini kiosk 8	latitude: -13.6688733415	longitude: 32.6626867801

9. Mchini kiosk 9	**latitude: -13.6650251930**	**longitude: 32.6515864581**
10. Mchini kiosk 10	**latitude: -13.6618894854**	**longitude: 32.649596929**

3.2 Instruments for Data Collection

Data for the study was collected through interview schedules, Questionnaires, and review of policy documents.

3.3 Procedure for Data Collection

Questionnaires

In the study forty-one (81) questionnaires were distributed as follows:

Interviews

The researcher conducted interviews with sectional leadership, an interview guide was used in an initial interview. This style was selected because of the need to probe deeply and to allow the participants to express their thoughts.

Review of policy documents

The researcher also conducted some review on the policy documents.

3.4 Data Analysis Techniques

There were two types of data to be analysed and that was comprised of quantitative as well as qualitative data. Quantitative data was analysed using SPSS version 16. Univariate, Bivariate and Multivariate Analysis was used to present the data. As for qualitative data, since the data was in textual form, the data was analysed on the computer using N vivo computer package. Data was analysed in phases. Qualitative data was analysed using phenomenological interpretive analysis. Quantitative data was analysed using correlation, association and regression analysis.

3.5 Triangulation

The data for qualitative research were drawn from several sources, including interviews, kiosk observations, field notes, and questionnaires. Triangulating the methods of data collection in this way allowed the researcher to compare different perspectives and ensure validity of the findings. Quantitative data was also interpreted using descriptive statistics in form of frequencies and percentages. Triangulation was achieved through the use of field observations and analysis of policy documents in the follow up interviews.

3.6 Ethical Considerations

A range of ethical issues were considered in the research. Prior to any interview an introductory letter was obtained from the Information and Communications University which was used to get permission from the community leadership as the only to enter the community.The study was guided by the following ethical considerations: participants were allowed to decline or to participate freely through the use of a consent form: names of participants were kept anonymous: derogatory statements that could harm the respondents were avoided because dealing with human beings the researcher requires that research ethics are adhered to.

Great care was taken into considerations in order to protect the research participants. The purpose of the research was explained to the participants, allowing them to choose whether to participate or not. They were informed that since participation was voluntary each individual was free even to withdraw at any point during the study. Informed consent was then obtained from all those who agreed to participate in the study. Participants were assured that no harm would come to them as a result of their participation or refusal to participate in the research. They were also assured about the confidentiality of all that they would say in the study. Lastly the researcher assured the participants that the resulting research and publications would not be used in any way that might bring harm to them as a group. The questionnaires did not have any slot for the name to assure anonymity in the sourcing of information. According to Hustonville (2003) research ethics are important in social sciences. On the basis of Hustonville's assertions this study had to adhere to ethical principles. (The WHO guidelines set standards which may not be immediately achievable in many developing countries. So, we should bear in mind that the human right to water is to be progressively realized. WHO considers 50-100 litres per

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

person per day as the amount necessary to meet most hygiene and consumption needs? Reference: World Health Organization:
Guidelinesfordrinkingwaterquality,3rdedition,2006,
www.who.int/water_sanitation_health/dwq/gdwq3rev/en/)

3.7 Scope of the Study

The study was conducted in mchini compound in Chipata city of Eastern province because there is one of the oldest compounds where kiosk water system has become the most improved method of providing clean and safe service delivery and its one of the commercial water utilities which has won award of best peri-urban award consecutively.

3.8 Limitations of the Study

(a) Increased migration of people from rural areas to peri-urban areas increases population in the latter on a daily basis.
(b) Inadequate documentation by Commercial Utilities to show the effectiveness of kiosk water supply system in peri-urban areas.
(c) The small sample size of eighty-one (81) the findings may not be generalized to the total population.

The topic chosen in assessment of effectiveness of the kiosk water supply system in peri-urban areas has not been researched on there was a challenge of literature review.

Implications

This study generated information that contributed some knowledge, skills and values that would help improve the existing body of knowledge and offer some possible solutions to the problems being encountered in the implementation of kiosk water supply system. The findings would further help stakeholders identify their areas of strength and weakness and make possible adjustment to fill the gaps in their roles.

Summary.

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The study was a case study conducted in mchini compound in Chipata city of the Eastern Province which assessed the effectiveness of the kiosk water supply system in peri-urban areas. The study targeted consumers and section leadership in mchini compound in Chipata city. The study used questionnaires and in-depth interviews to collect data. Finally, SPSS version 16 and themes and subthemes were used to analyze data.

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4.0 CHAPTER FOUR

4.1 Presentation of the Finding

4.1.1 Introduction

This chapter presents the findings of the study on effectiveness of the kiosk water supply system in peri-urban areas. This chapter discusses the results and interprets the statistical calculations generated by computer using the SPSS version 16. The findings of the study carried out to answer this research question on an assessment of the effectiveness of water kiosk supply in peri-urban areas. To answer this question first findings from the water providers and regulator are presented followed by users' perspectives regarding the following; water supply and sanitation services.

A total of 81 households were interviewed to assess the effectiveness of kiosk water supply in peri-urban areas. The variables have been grouped in order to give the overall picture. Similarly, findings have been presented in different forms that comprise frequency tables.

Demographic profile	**Percentage/frequency**
Gender • Male • Female	 20(24.7%) 61(75.3%)
Age in years • 20-30 yrs. • 31-40 yrs. • 41-50 yrs. • 51yrs and above	 39(48.1 %) 25(30.9 %) 11(13.6 %) 6(7.4 %)
Educational level • Never • Primary • Secondary • Tertiary	 10(12.3%) 20 (24.7%) 47(58 %) 4(4.9 %)

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Marital status • Single • Married • Divorced • Widowed	 30(37%) 43(53.1%) 2(2.5%) 6(7.4%)
How many people live in the house? • 1-4 • 5-7 • 8-10 • Above 10	 32(39.5%) 32(39.5%) 11(13.6%) 6(7.4%)

The majorities (75.3%) were females and (24.7%) were males. 58% of respondents attained secondary level of education. In general, regardless of the education level, there was more female buying water from the water kiosks than male in all the age groups.

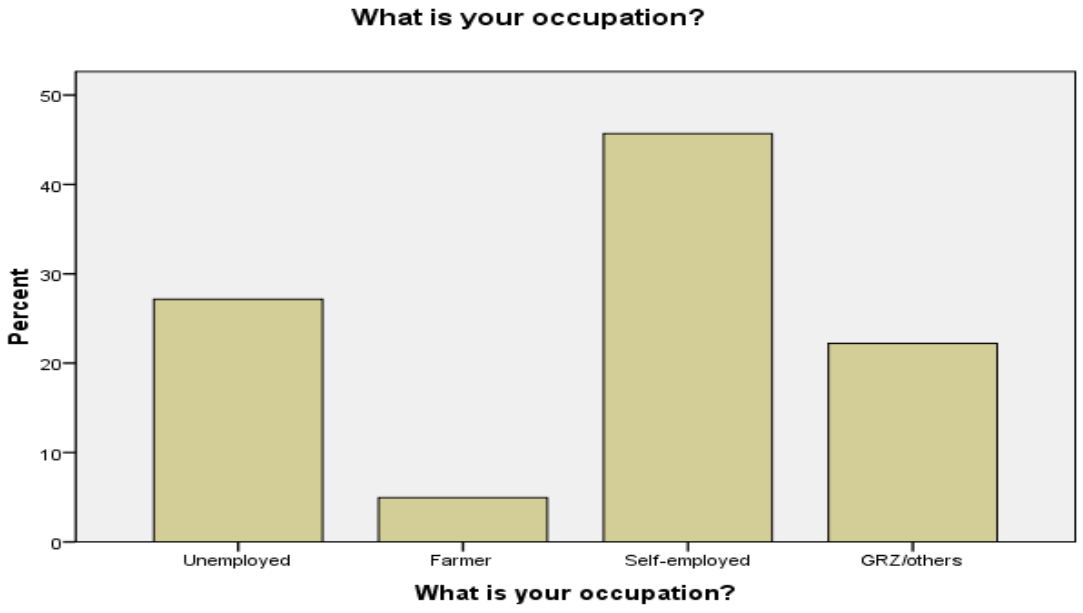

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Figure 4 above shows the occupation of the house hold who used the water kiosks 59 (72.8 %) respondents indicated that they do something for a living.

Table 2: Responses on collecting water during peak demand hours

How long do you usually wait in queue at the water source?

	Frequency	Percent		
0-10minutes	58	71.6	71.6	71.6
10-20minutes	8	9.9	9.9	81.5
20-30minutes	11	13.6	13.6	95.1
Above 30minutes	4	4.9	4.9	100.0
Total	81	100.0	100.0	

Time spent queuing before drawing water from the kiosk

Table 2 shows responses on the time spent at a kiosk drawing water. Respondents that indicated a prolonged time at the water point was attributed to low pressure within the water supply system.

Table 3: Level of effectiveness of water kiosk supply system in peri-urban *(n=81)*

	Frequency	**Percentage**
Are you aware about the kiosk within your area?		
• Aware	81	100
• Not aware	0	0
How far from your household is the water kiosk?		
• Below 50m	32	39.5

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• 50m-100m	14	17.3
• 100m-150m	14	17.3
• 150m-200m	10	12.3
• Above 200m	11	13.6
How many litres of water do you use per day		
• Below 40 litres	16	19.5
• 40 litres-60 litres	21	25.9
• 80 litres-100 litres	25	30.9
• 100 litres and above	19	23.6
How long do you usually wait in queue at the water source?	50	71.6
• 10 minutes and below	8	9.9
• 10 minutes – 20 minutes	11	13.6
• 20 minutes -30 minutes	4	4.9
• Above 30 minutes		
How available is the water supply from water kiosk?	40	49.4
• Water is always available	21	25.9
• Most of the time water is available	20	24.7
• Low pressure		

Table 3 level **of effectiveness of water kiosk supply system in peri-urban areas**. 100% of households confirmed that they are aware about water kiosk within the area. Of the 100% who are aware, 39.5% stay within 50m from the kiosk, 46.9 % stay within the radius of 50 m to 200m, while 13.6% stay more than 200m away from the kiosk. Further, 30.9 % of the households indicated that they used 80 -100 litres of water a day, 25.9% uses 60-80 litres a day,23.6 % use more than 100 litres of water per day and the rest 19.5% uses just below 40 litres of water a day.

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Table 4: Service satisfaction

	Frequency	Percentage (%)
How reliable is the kiosk water supply in your area?		
• Reliable	26	32.1
• Fairly reliable	14	17.3
• Very reliable	39	48.1
• Not reliable	2	2.5
How often do you use the services of water kiosks?		
• Everyday	69	85.2
• Sometimes	12	14.8
How satisfied are you with the services provided by the water kiosks?		
• Not satisfied	7	8.6
• Satisfied	36	44.4
• Fairly satisfied	6	7.4
• Very satisfied	32	39.5
How satisfied are you with the amount paid for water is supplied by the water kiosks?		
• Not satisfied	18	22.2
• Satisfied	43	53.1
• Very satisfied	20	4.7

Table 4 above shows the services satisfaction by the households towards the water kiosk supply. 89.2 % of the households use the kiosk everyday while 14.8% uses it sometimes. On how reliable the kiosk water supply, 48.1 % of respondents indicated that the kiosk water supply is very reliable, 32.1 % indicated that there are reliable. Those who said its fairly reliable are 17.3 % while 2.5% indicated that it was not reliable. 44.4 % of respondents are satisfied with the services provided by the water kiosk, 39.5 % are very much satisfied with the services while 8.6 % and 7.4 % indicated that there are not satisfied and fairly satisfied respectively. 53.1 % of the respondents are satisfied with the amount paid

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

for the water supplied by the water kiosks, 24.7 % indicated that they are very satisfied with the amount while 22.2 % of the respondents indicated that there are not satisfied with the amount.

Association between education level and number of litres of water per day.

(n=81)

How many litres of water use per day					
People live in the house	Below 40 litres	40 litres-60 litres	80 litres-100 litres	100 litres and above	Total
• 1-4 • 5-7 • 8-10 • Above 10	12 (75 %) 3 (18.75 %) 0 (0) 1(6.25 %)	8 (38 %) 12 (57 %) 1 (4.7 %) 0 (0)	9 (36 %) 11 (44 %) 3 (12 %) 2 (8 %)	3 (15.8 %) 6 (31.6 %) 7 (36.8 %) 3 (15.8 %)	32 (39.5 %) 32 (39.5 %) 11 (13.5 %) 6 (7.4 %)
Total	16 (100 %)	21 (100 %)	25 (100 %)	19 (100 %)	81 (100 %)

Notes: Pearson chi2 (9) = 26.9010 P-Value =0.001, Fisher's exact P-Value=0.001

Similarly, an analysis of the association between number of people living in the house and the litres of water used per day revealed that households that uses more than 100 litres per day, fall in the where there are between 8-10 members (36.8%) of the 19 who use more than 100 litres. And within this category, those households who 4 and below members were the least to use more than 100 litres of water per day. The association was also significance at 5% with a p-value=0.001(Table 5).

How satisfied are you with the quality of water provided by the water kiosks				
Education	Very much satisfied	Satisfied	Not satisfied	Total
None Primary Secondary Tertiary	3 (7.8 %) 9 (23.6 %) 26 (68.4 %) 0 (0)	5 (17.8 %) 7 (25 %) 12 (42.8 %) 4 (14.8 %)	2 (13.3 %) 4 (26.7 %) 9 (60 %) 0 (0)	10 (12.3 %) 20 (24.7 %) 47 (58 %) 4 (4.9 %)
Total	38 (100 %)	28(100 %)	15(100 %)	81 (100 %)

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Similarly, an analysis of the association between education and level of satisfied revealed that the respondents were very knowledgeable, fall in the secondary school of education (68.4%) of the 38 who are very satisfied. And within this category, those without any form of education were the least very satisfied. The association was also significance at 5% with a p-value=0.001(Table 5).

How are satisfied are you with the amount paid for water that is supplied by the water kiosk				
Monthly income	Not satisfied	Satisfied	Very satisfied	Total
• Below k500	10(55.6 %)	19(45.2 %)	9(42.9 %)	38(46.9 %)
• K501-K1000	5 (27.8 %)	9(21.4 %)	5(23.8 %)	19(23.5 %)
• K1001-K1500	2 (11.1 %)	8(19.0 %)	3(14.3%)	13(16.0%)
• K1501-K2000	0 (0)	0(0)	2(9.5 %)	2(2.5 %)
• Above 2000	1(5.6 %)	6(14.3 %)	2(9.5 %)	9(11.1 %)
Total	18 (100 %)	42 (100 %)	21 (100 %)	81(100 %)

The majority of the (42.9%) whose monthly income is below K500.00 were very satisfied among these, 19 out 42 representing 45.2% were satisfied. In order to determine whether there was an association between monthly income and satisfaction with the amount paid for water, a chi square test was performed. Fisher's test, however, had to be performed since the expected frequency in some cells was less than 5, and this would make the results of the Pearson chi-square test to be invalid. The results of the Fisher's test indicated that there was a significant relationship between the levels of knowledge and the kiosk water supply system at 5% level of significance
(P-value=0.001).

4.2 Summary

The study was about the assessment of the effectiveness of the kiosk water supply system in peri-urban areas. It is from the findings that shows that the peri-urban areas are aware, satisfied and the kiosk water supply system is considered to have been the effective method of the water service delivery in peri-urban areas.

5.0 CHAPTER FIVE

5.1 Discussion and Interpretation of the Findings

5.1.1 Introduction

This chapter presents the discussion and interpretation of the findings of the study following an assessment of the effectiveness of kiosk water supply system in peri-urban areas, the most current adopted method of providing the clean and safe water and recommendations for the effective water service delivery in peri-urban areas. The effectiveness of kiosk water supply system in peri-urban areas of Zambia.

5.1.2 Discussion of the findings

This chapter discusses the findings of the study and compares with published literature. The findings of the study provide;

The majority of respondents were in the age group of 21-30. Results of the study showed that women participation in water related issues was very high in mchini compound. Out of the 81 respondents, 75 percent were women and 25 percent were men. This augments the Dublin Principle of Integrated Water Resources Management (IWRM) number 3 of 1992 which states that, "Women play a central role in the provision, management and safeguarding of water". Results on economic activities and household monthly income showed that the majority of the households in mchini compound had a monthly income of between ZMW500 and ZMW2000 (Table 1) with their main economic activities being huge self-employment followed by unemployed, GRZ and farming at 45.7, 27.2, 22.2 and 4.9 percent respectively.

5.1.3 Distance to water points

The study findings revealed that 70 percent of the households expressed happiness towards reduced distances to water kiosks, as they are within a 200m walking distance. These findings are also confirmed by Nyambe and Feilberg (2009) who stated that the standard access to domestic water supply is set at 200m from a water point by the Government.

The reduction in distances to water points has directly reduced the time spent walking to and from the water point especially among women who play a major role in water issues at household level. This finding confirms the conclusions by Buckingham (2000) that it is women's responsibility and not a

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

choice to ensure that there is enough clean and safe water for their households' level. Therefore, women participation in productive economic activities and other household chores has improved. However, the findings indicated that 30 percent of the respondents accessed water from a distance of more than 200m. When there is no water at the kiosks, mainly due to power outages and low pressure most of the households have other sources of water which are not reliable in terms of quality and safety.

In a separate interview, where 80% of the section chairpersons responded that the commercial utilities should continue maintaining the minimum distance in the provincial of water service delivery, while 20% were well covered for now.

Because of the long distances walked before the reactivation and construction of water kiosks in mchini compound, women and children spent long hours fetching water, as a result many activities such as preparing children for school, cooking and other household chores were affected. Marital relationships were also reportedly affected, as a woman testified during an interview that she was abused and battered by her husband because of staying out of home for too long because of drawing water. The school going children especially the girl child spent too much time fetching water thereby missing a lot on school activities. Many men did not fully understand the reason behind the time that was spent by women to bring water to the household but now the difference is very clear to them.

On reliable at water points, 48 percent of the respondents indicated that water is very reliable at the kiosk,32 percent of the respondents said that the water is reliable and 17 percent indicated that water is fairly reliable while 2.5 percent indicated that water is not reliable.

5.1.4 Low incidence of waterborne disease cases

The results from the study indicate that 86 percent of the respondents attributed the low incidence of waterborne diseases to the good quality of water from kiosks. Before the establishment of water kiosks, the respondents indicated that waterborne diseases such as diarrhea and cholera were common due to the use of water from unprotected sources. In addition, nearly all the respondents indicated that the living standard in the community had improved, because the prevalence of waterborne high fair low varies

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

The number of respondents said that the waterborne diseases are low as compared to the pre-construction period. These findings are in agreement with the National Water Policy (2010), which states that, the amount and quality of water consumed by a community determines its standard of living. The National Water Policy further indicates that, benefits from supply of sufficient quantities and good quality water and sanitation are important for the sustenance of health.

5.1.5 Affordability of water

Affordability is always a concern when addressing the poor. It is the factor that causes the poor to be less able to get access to needs. According to the findings, respondents that serviced by EWSC pay 10 ngwee per 20 litres container. According to the responses, 86 percent of the respondents had no problem paying for water at the kiosk because it was cheaper as compared to alternative sources such as at people's yard taps where 20 later costs 50 ngwee. This agues with the Dublin Principle IWRM number 4 of 1992 which states that, 'water has an economic value in all its competing uses and should be recognized as an economic good.

5.1.6 Improved water quality and other benefits

Responses made by 70 percent of the respondents indicated that the majority of the people did not treat their drinking water and only 20 percent used chlorine. While 8 percent of the respondents boil their water and only 2 percent treat it with iodine as shown in Figure 4. The main reason, according to their responses, was that the water is already chlorinated by the utility company. These findings were also confirmed by NWASCO (2005) in partnership with Eastern Water and Sewerage Company study in Chipata (Mchini Compound), which stated that customers who fetch their water from the kiosks expressed their satisfaction with the quality of service and the quality of water provided. Kiosk customers also appreciated the taste of the water, which reportedly, was much better than the taste of water drawn from wells.

5.2 Summary

The study was about the assessment of the effectiveness of the kiosk water supply system in peri-urban areas.it is from the findings that the peri-urban areas where about 30% of the population is far from the kiosk water point hence, there has been found that in this effort of providing kiosk water, supply system has reduce the water borne diseases, as it has been found the commodity to be affordable to the population of the peri-urban areas as the tariff been used for pro-poor. It is from these findings that the consumers have confirmed that the quality of water provided by the water utility is of good quality.

6.0 CHAPTER SIX

6.1 Conclusion and Recommendations

6.1.1 Introduction

This chapter concludes the study and presents recommendations for further consideration.

6.1.2 Conclusion:

Providing sustainable, affordable and safe water to the urban poor while embracing a full-service cost recovery calls for greater consideration of the livelihood aspect of the poor in the urban areas who have to survive under a strict and often harsh cash economy.

In this study, the positive impacts of kiosk water supply systems were found to be: Reduced distances to the water points; Affordability of water with charges of 10 and 20 ngwee per 20 later container; Less time spent queuing to draw water; Low incidence of waterborne diseases; and Improved water quality. The positive social-economic impacts in this study outweighed the negative impacts which included water supply at the kiosk not being available on a 24-hour basis and the water being over chlorinated at times. The system provides clean drinking water to the community and has a positive impact on the local society, especially on women.

Maintenance works are carried out as and when they are required. However, there are two systems at play which save as a technical monitoring tool, which sets the pace for carrying out the maintenance works. The CU has set up water committees within each area in the peri-urban areas. This is a community-based agency which monitors and assists in identifying communal facilities that require attention; this is from a backdrop of the high levels of tear and wear on the public facilities. Secondly each peri-urban area has a team of technical personnel assigned to attend to the infrastructure in the area.

The community participates via their representatives in the water committee, on minor repairs like unblocking the soak ways and general cleanliness of the communal facility. The main challenge is mainly issuing of vandalism and in certain instances theft of such things as gate valves and garden taps.

Water kiosk projects in peri-urban areas have shown a positive impact on the residents and have the potential to achieve full sustainability despite some limitations. They are sustainable in as far as the

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

community is involved at all levels, from inception to completion of any project that is seeking to construct water kiosks. Community participation is to some extent the bedrock for kiosk sustainability that is why the CU places premium on the establishment of water committees in the areas.

6.2. Recommendations

Based on the finding the following recommendations emerged from this study;

6.2.1. Recommendations:

1. The commercial utilities to continue constructing more water kiosk systems in peri-urban areas in a distance of 200 meters or less.
2. The communities should be proactive in order to be included in the planning for the water service delivery.
3. The government should continue to support the commercial utilities in order to provide quality service to the peri-urban areas which are under serviced or unserved.
4. The councils to enforce the regulation of the growth of peri-urban areas.

REFERENCES

[1] Assimacopoulos, D., 2002. Recovery of Full Cost and Pricing of Water in the Water Framework Directive, [Water Framework Directive, NTUA, Athens]

[2] Le Blanc, D., 2008. A Framework for Analyzing Tariffs and Subsidies in Water Provision to Urban Households in Developing Countries DESA Working Paper. New York: Department of Economic and Social Affair, United Nations.

[3] M. Kariuki and J. Schwartz, 2005. Small-Scale Private Service Providers of Water Supply and Electricity: A Review of Incidence, Structure, Pricing, and Operating Characteristics, Energy and Water Department, WSP 3727), Washington. DC: World Bank and Bank Netherlands Water Partnership.

[4] P. H. Gleick, G. Wolff, L. E. Chalecki and R. Reyes, 2002. The Risks and Benefits of Globalization and Privatization of Fresh Water. Oakland, California: Pacific Institute for Studies in Development, Environment and Security.

[5] P. Rogers, R. Bhatia and A. Huber, 1998. Water as a Social and Economic Good: How to Put the Principle into Practice, Stockholm: Global Water Partnership/Swedish International Development Corporation Agency.

[6] The Water Supply and Sanitation Act, 1997. Lusaka: GRZ.GTZ, 2009. Case Study: Water Kiosks (Draft Version). Eschborn, Germany: Deutschen Gesellschaft für Technische Zusammenarbeit (GTZ).

Appendix A

Questionnaire

Dear Respondent,

I am Nebert Mzyece a final year master of Project Planning and Management student studying with Information and Communications University. I am conducting a study on effectiveness of kiosk water supply system in peri-urban areas. A case of Mchini compound of Chipata city" which is part of an academic exercise. Your compound has been selected randomly and you have been purposively selected to participate in the study

This questionnaire is mean to collect data on the significant skills for effective teaching of food and nutrition in Zambia. Please kindly respond to the questionnaire truthfully. Your response will be treated with strict confidence while the data gathered shall be used for academic purposes. Where several options are available, indicate your choice with a tick in the space provided.

N. Mzyece

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Appendix B

Consent of Agreement

I have understood the conditions hereby given by the researcher (Nebert Mzyece) who is conducting the study on effectiveness of kiosk water supply system in peri-urban areas. A case of Mchini compound of Chipata city. I understand that my responses will not be associated with me at all costs. I agree to participate in the study.

Sign……. Date…….

Dear Respondent,

I am Nebert Mzyece a final year Master of Project Planning and Management student studying with Information and Communications University. I am conducting a study on assessment of the effectiveness of kiosk water supply system in peri-urban areas in mchini compound of Chipata city in Eastern Province of Zambia. Your community has been selected randomly and you have been purposively selected to participate in the study

This questionnaire is meant to collect data on assessment of the effectiveness of kiosk water supply system in peri-urban areas water consumers and community leaders. Please kindly respond to the questionnaire, truthfully, your response will be treated with strict confidence while the information gathered shall be used for academic purpose. Where several options are available, indicate your choice with a tick in the space provided

N. Mzyece

CONSENT OF AGREEMENT

I have understood the conditions hereby given by the researcher (Nebert Mzyece) who is conducting the study on assessment of the effectiveness of kiosk water supply system in peri-urban areas- in mchini compound of Chipata city in Eastern Province of Zambia. I understand that my responses will not be associated with me at all costs. I agree to participate in the study.

Sign……. Date…….

INTERVIEW SCHEDULE FOR CONSUMERS. Questionnaire

Section A: Demographic

1. Sex

Male-1	Female-2

2. Age

20-30yrs-1	31-40yrs-2	41-50yrs-3	51yrs and above-4

3. Marital status

Single-1	Married-2	Divorvced-3	Widowed-4	Others-5

4. How many people live in the house?

1=4 -1	5=7 -2	8=10 -3	Above10 -4

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

5. How long have you been living here?

Below 1yr-1	1-5yrs-2	5-10yrs-3	10-15yrs-4	15yrs above-5

6. Have you ever attended school?

Yes-1	No-2

7. What is the highest education level you have attended?

Never-1	Primary-2	Secondary-3	Tertiary-4

8. What is your occupation

Unemployed-1	Farmer-2	Self-employed-3	GRZ/others-4

9. What is the monthly income?

Below K500-1	K501-K1000-2	K1001-K1500-3	K1501-2000-4	Above K2000-

10. Where do you get water from?

Kioks-1	Shallow wells-2	Boreholes-3

11. How many litres of water do you use per day

ISSN: 3471-7102, ISBN: 978-9982-70-318-5

Below 40litres-1	
40 litres-60 litres-2	
80 litres-100 litres-3	
100 litres and above-4	

12. How far from your household is the water kiosk where you get the water from?

Below 50m-1	
50m-100m-2	
100m-150m-3	
150m-200m-4	
Above 200m-5	

13. How long do you usually wait in queue at the water source?

……. minutes

Section B.

Customer satisfaction of the kiosk water supply

14. Are you aware about water kiosks within your area?

Yes-1	No-2

15. How available is the water supply from water kiosk?

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16. How reliable is the kiosk water supply in your area?

Reliable	Fairly reliable	Very reliable	Not reliable

17. How often do you use the services of water kiosks?

Everyday-1	Sometimes -2	Never -3

18. How satisfied are you with the services provided by the water kiosks?

Not satisfied	Satisfied	Fairly satisfied	Very satisfied

19. Kindly give your reasons for your ranking:

20. How satisfied are you with the quality of water provided by the water kiosks?

21. How satisfied are you with the amount paid for water that is supplied by the water kiosks?

Not satisfied-1	Satisfied-2	Very satisfied-3

22. In your opinion, how can the kiosk water supply system be improved in your area?

End of Interview Schedule

Thank You for Sparing Your Precious Time to Participate

Appendix C

1B interview schedule for community leadership

1. How long have you been living in this area?
2. Where do the people in this community draw water from?
3. How conversant are you with the kiosk water supply system in your area?
4. What type of understanding are is there between community leadership and the owners of the water kiosks?
5. Are the customers satisfied with the water kiosk supply system and services?
6. Does water from the kiosk water supply system differ from individual connections?
7. Would you be aware how much money do people spend per day on buy water from the kiosk?
8. How available and reliable is the water supply from the water kiosk?
9. Do you have experienced any waterborne diseases in your area due to lack of clean water
10. What opinion do the locals have on the kiosk water supply system?